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An economic value chain analysis of Namibian diamonds

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PURPOSE OF THE STUDY

The Offshore Development Company under the Ministry of Trade and Industry in Namibia initiated this study to assess the suitability of value chain analysis as a tool for identifying local beneficiation possibilities in the Namibian mineral sector. Diamonds are an important contributor to the Namibian GDP and export earnings and were thus chosen as the study subject. The purpose of the study is twofold; to create knowledge on how value chain analysis can be applied to mineral sector research in Namibia, and to carry out a descriptive analysis of Namibian diamond industry value creation.

A literature review of value chain analysis is carried out, as well as a review of global diamond industry studies to set the case of the Namibian diamond industry into perspective.

RESULTS

The Namibian diamond value chain is divided into four stages of processing: (1) rough diamond mining, (2) sorting, valuating and trading of rough diamonds, (3) cutting and polishing of rough diamonds, and (4) jewellery manufacturing and retail. Diamond mining produces gem quality diamonds for the global jewellery end market and is found relatively successful in creating national value added. The main incentive for cutting and polishing companies to locate in Namibia is the access to rough diamonds. Namibia is currently not competitive in productivity terms in this middle part of the chain where companies create substantial revenues but low value addition due to limited local processing and global market realities. Locally active cutting and polishing companies sell only a small share, approximately 0,4 %, of their output as inputs to Namibian jewellery manufacturers. Despite low volumes of inputs, the end of the chain is able to create the highest per carat value addition and revenue increases in the chain. This is in line with global industry studies indicating that largest margins are created in the beginning and end of the chain. Calculations suggest that increasing the volume of Namibian origin diamonds reaching local jewellery manufacturing and retail holds substantial local value addition potential. Policy efforts should focus on quality over cost competence and easing the joint search for this in the middle and end of the chain.

Value chain analysis is found to be a viable tool for mapping the creation and distribution of economic benefits at different stages of a particular mineral sector value chain. Assessing relative importance of chain links in national value creation is also possible. The main challenge of value chain analysis is the acquiring of accurate financial input-output data from all chain participants. The creation and collection of such national data for policy building purposes is important.

Keywords: Value chain, natural resources, development policy, mining industry, Africa, Namibia

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1 Introduction

Diamonds are both historically and in the present day debates of national economics a defining topic in Namibia. These discussions are set in the broader scope of the Namibian mining sector, which has pre and post-independence been the main driver of growth for the relatively young nation. With considerable mineral riches in uranium, copper, zinc and lead among others in addition to diamonds, the country is very much part of the ongoing quest of emerging and developing countries to turn nature's bounty into a foundation of sustainable and inclusive socioeconomic growth within a diversified economy. This thesis is set within the framework of these goals as value chain analysis (VCA) is seen to provide insight into understanding the realities and development possibilities of strategically important sectors of the Namibian economy. The National Planning Commission of Namibia (NPC) has identified value chain analysis as a viable tool for examining future possibilities of the mineral sector and diamonds within the mineral sector as a strategically important industry (NPC, 2004) (NPC, 2008) (NPC, 2012). The NPC's view on the importance of mining within the national economy is validated by a recent study by Humavindu & Stage (2013), which acknowledges mining as a key sector based on input-output and Social Accounting Matrix (SAM) analyses. The importance of mining in general and diamonds specifically for the Namibian economy is further studied in chapter 2.

Based on the above, the purpose of this thesis is to map economic theory of global production, trade and value chain analysis, find key aspects of how value chain analysis can be applied to the context of Namibia, and carry out a limited economic analysis of the value chain of diamonds in Namibia. The research is carried out in cooperation with the Offshore Development Company (ODC) under the Ministry of Trade and Industry of Namibia (MTI).

A definition of a value chain is given by Kaplinsky & Morris (2002): "The value chain describes the full range of activities, which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use". It is already evident in this definition that the act of production itself is only a part of value chain analysis. Roduner (2005) further emphasizes this aspect by stating that the value chain as a concept tries to understand the vertical integration and linkages of production and distribution processes. This description highlights the importance of discussing economic theory and empirics parallel to more pragmatic value chain analysis literature, as it brings required substance depth to the various complex matters VCA intends to tackle. It will

be shown that the fall of transportation costs coupled with scale effects produces regional differentiation (Krugman & Venables, 1995) but also increase the complexity of production, which gives rise to coordination and communication costs that affect integration of production sometimes in the opposite direction, raising the importance of proximity (Baldwin in WTO, 2013). This dispersion affects countries with different levels of costs and technology quite differently, with claimed benefits very often ambiguous (Li & Liu, 2014) (Baldwin & Robert-Nicoud, 2014). These effects must also be measured empirically in multiple new ways, which then result in conclusions parting from conventional wisdom on e.g. trade balances, gain distributions and advantages of developing countries participating in global production (Hummels;Ishii;& Yi, 2001) (Daudin;Rifflart;& Schweisguth, 2011) (Baldwin & Lopez-Gonzalez, 2013) (Kümmritz, 2015). In addition to geographical dispersion complex production processes and their participants are affected in a multitude of ways through technological change. Again, these effects vary depending on the local or global scope of the technological change, what part of the chain is examined and what kind of transmission means the change has (Costinot;Vogel;& Wang, 2013). Also, standard models and their variations show that from a system-wide efficiency perspective individual companies may make inefficient decisions due to coordination failures, the size of the value chain or limited information on other chain participants (Baldwin & Venables, 2013). Combined, these aspects of practical and theoretical analysis offer a comprehensive picture of value chains within the framework of global production, trade and development. It is these linkages and the actions and relations of actors in the chain this thesis goes on to study within the diamond industry of Namibia.

In essence, VCA is both a descriptive and an analytical tool (Kaplinsky & Morris, IDRC, 2002). A descriptive or heuristic tool helps in understanding *what* the world is like, and from this perspective VCA describes which actors are present in the chain, what activities they carry out, what kind of flows of goods, services and money they create, and what are the revenues received and costs incurred. Aggregating this actor specific data paints a picture of the importance of the different steps of production with regard to value creation, employment and national and international linkages. Secondly, VCA seeks to understand the stages where the economic activities are acted out and thus answers the question of *why* the world is organized as it is found to exist. These business environment issues are key analytical constructs in understanding how value is created and distributed in modern global value chains. There are two main categories for analysing the economic environment. First, *barriers to entry, trade and rent* focus on entities limiting the possibilities of actors to enter, exit and exist within value

chains. These are closely linked to capabilities of companies and countries active within the chain and also arise from competitive forces as suggested by the capability window of Sutton (2007b) where a threshold of quality is created under which companies cannot sell even by lowering prices. On a broader level it is then related to the suggestions of Neary et al. (2015) who state that on the long run the cost versus quality trade-off does not exist. The second category discusses *governance structures* examining the relative power of actors to influence the nature of the entire chain and the inter-firm division of tasks, capital, capabilities and value (Gereffi & Korzeniewicz, 1994). Again, from a more general perspective governance is related to aspects of contractual agreements and the economics of the firm and the market (e.g. (Baker;Gibbons;& Murphy, 1994) (Williamson, 2005). Based on both descriptive and analytical tools, VCA suggests ways of developing the value chain, namely through different forms of *benchmarking* and *upgrading*. Chapter 3 broadens and deepens these stylized aspects of VCA by carrying out a literature review.

The theoretical foundation mapped in chapter 3 paves the way for an empirical study of the Namibian value chain of diamonds in chapter 4. In this case study the diamond value chain is divided into four steps: (1) production of rough diamonds, (2) sorting, valuating and trading of rough diamonds, (3) cutting and polishing of rough diamonds, and finally (4) jewellery manufacturing and retail. The case study is limited to Namibia and mostly remains in the sphere of descriptive analysis, namely mapping active companies, trade flows, revenues and costs as well as employment effects. Analytical tools – barriers to entry, trade and rent as well as governance structures – are nevertheless touched upon, as the analysis involves descriptions of the legal and market environment, relative powers of chain actors and measures of these actors in affecting the distribution of activities, capabilities and rents within the chain.

The Namibian case is set into perspective with comparison to the recent global diamond industry analysis (Bain & Company, Inc., 2011) (Bain & Company, Inc., 2012) (Bain & Company, Inc., 2013) (Bain & Company, Inc., 2014) (McKinsey & Company, 2014). These industry analyses contrast and complement the Namibian case where a slightly modified value chain depiction is used as the Namibian diamond industry bears certain peculiar characteristics. The global value chain is often divided into at least six steps, whereas the Namibian chain is better described by a four step structure following a division of meaningful company and activity boundaries. The data collected in Namibia in 2014 in cooperation with the ODC includes financial and economic data from the single oligopolistic actor, NamDeb Holdings, who governs the two first steps of the Namibian chain; rough diamond production, and sorting,

evaluating and trading of rough diamonds. Data on cutting and polishing of rough diamonds was received from four companies. A case example of a jewellery manufacturing and retail company paints a crude but vital picture of the realities of an end of the chain actor in Namibia. The fact that at least some responses were uncovered for all steps of the value chain provides important foundations for future research and allows for at least a partial view of the challenges present throughout the chain. This is an important consideration as the thesis is intended to function as a prefeasibility study into VCA in the context of Namibian mineral sector industrial development, and is thus more concerned with formulating the right questions and tools for industry benchmarking and upgrading than providing exact answers and policy interventions. Initial findings and opinions of chain actors on upgrading are reported under the case example.

Chapter 5 concludes and discusses possibilities for future research. The bibliography of sources is presented in chapter 6.

2 Mining and diamonds in the Namibian economy

This chapters frames the later value chain analysis by providing information on the Namibian economy in general and on the importance of the mining sector and diamonds in particular. The economics of diamonds in Namibia, with background on the global diamond industry, how Namibia ties into it, and the relevant Namibian legal and policy structures, are further described and developed in chapter 4.

2.1 Namibia is a middle income country with an open economy

Namibia is located in southern Africa. According to the World Bank (2013) it had 2,303 million inhabitants in 2013 and the GDP in current USD was 12,58 billion, which stands for a per capita figure of 5 462 USD. This positions the country among the upper middle income countries in WB classification. The rise to the middle income group has been recent and fuelled by the fast GDP growth throughout the 2000s. The pre-financial crisis annual GDP growth figures for 2002-2008 averaged 5,7 %, and also rebounded quickly after a contraction of 1,1 % in 2009 to 6,3 % in 2010. Since then growth has been steady, with yearly figures between 4 – 5 % and future projections indicating similar numbers. (OECD/AfDB/UNDP, 2014). An important characteristic of the Namibian economy, and a consideration to be kept in mind parallel to high growth figures, is the fact that Namibia has one of the most unequal income distributions on the African continent, with a Gini coefficient of 0,63 (Humavindu & Stage, 2013). The Humavindu & Stage figure however seems to be from as far back as 2003 with a drop witnessed since to 0,61 by 2009, which according to the World Development Indicators is the latest figure (World Bank, 2015). The inequality issue has been targeted in national plans, and according to the Vision 2030 (NPC, 2004) the final goal is at an ambitious 0,3. During the NDP3 term the goal of 0,58 was reached, but the gap between the poorest and the richest income groups only narrowed marginally (NPC, 2012). The country also continues to battle with high unemployment, which stood at 36,7 % in 2004, 51,2 % in 2008 and 27,4 % in 2012 (Namibia Statistics Agency, 2013). The national unemployment estimates, however, deviate quite significantly from the modelled ILO estimates, which in 2012 and 2013 stood at 16,7 % and 16,9 % respectively. In addition to unemployment and the previously noted high income differences, absolute poverty is also a serious concern for Namibia. For 2011 the World Bank (2015) figures state that 15,9 % of the population lived on under the USD 3,10 a day and 9,7 % on less than USD 1,90.

From another angle on the least privileged sections of the population, the child poverty rate reached 34,4 % in 2009/10 (Namibia Statistics Agency, 2013). In this regard the Namibian economy is very dualistic in nature, with a modern market sector based on capital intensive industrial production on one hand, and a traditional subsistence farming sector on the other (Humavindu & Stage, 2013).

When looking at foreign trade, it is evident that Namibia has a high degree of openness with a trade to GDP ratio of 84,7 % in 2012 and in general a rate that has hovered in the vicinity of 90 % (OECD/AfDB/UNDP, 2014). Namibian trade policy is to a great extent governed by the South African Customs Union (SACU) Common External Tariff. Historically the main trade destination for exports has been South Africa, but in 2013 the peak position was handed to Botswana, with South Africa second and the European Union third. This development and sudden change is, in fact, quite relevant in the scope of this thesis as the main reason was the decision of the global diamond giant De Beers to relocate its main diamond trading centre from South Africa to Gaborone in Botswana, which turned the flow of rough diamonds from Namibia to the new destination (OECD/AfDB/UNDP, 2014).

Trade destinations aside, an important characteristic of Namibian foreign trade has for years been a positive current account balance, which is offset by a deficit on the capital and financial account side. Namibia has thus for a long time been an exporter of capital with excess savings, setting it in quite a different situation in comparison to most other developing countries. Capital scarcity is in this regard not a major concern for Namibia; if good investment opportunities arise, domestic savings are available for such projects (Humavindu & Stage, 2013). It has to be stated though, that the trade balance is in fact negative and only pushed to positive by SACU based current transfers, namely duties and tariffs levied on imports from outside the SACU area distributed among the member countries. These transfers have been dropping in relative importance, which according to the national accounts has even turned the overall current account balance to deficit and the capital and financial account to surplus since 2009 (Bank of Namibia, 2014). The same trend, though pushing the overall current account balance to deficit only in 2013, is also visible in the OECD data (OECD/AfDB/UNDP, 2014).

2.2 Namibia's economy is built on mining and minerals drive export income

Mining has historically been a fundamental building block of the Namibian economy. Oldest written accounts of mineral riches in Namibia date back to 1761, and in 1790 gold and copper were found in the area of modern day Rehoboth. The first copper mine was established in 1856 near Windhoek, but it took until 1906 for Namibia to work its way to the world map of mining when the copper mine of Otavi Mienen und Eisenbahn Gesellschaft (OMEG) was established in the Otavi region. The finding of diamonds near Lüderitz on the Southern coast in 1908 was also a momentous turning point, which set in motion the long history of diamond mining in the country. It is from this history the nation inherited a well-established mining industry as it gained its independence in 1990. Vast deposits of diamonds and uranium along with copper, zinc and lead were mined by international mining giants De Beers, Anglo American, Rio Tinto among smaller companies. At this stage the industry contributed around a fifth of total national production and employed more than 14 000 people. (Sherbourne, 2013).

Since the first steps of the nation, the importance of mining to the Namibian economy has been gradually diminishing, but remains a strong backbone of the industrializing country. Calculated at the current prices of 2013, the average GDP contribution of mining and quarrying from 1990 to 2012 has been 10,4 %, and has also in the past few years been rather steady around the 10 % mark (Bank of Namibia, 2013) (National Statistics Agency, 2013). When it comes to employment, the absolute numbers of employment by the mining industry have not, in fact, changed significantly from the early years of independence. What is a significant structural characteristic, though, is that the industry contributing a tenth of national production only employed 1,8 % of the work force at the time of the last available labour survey in 2012, in absolute terms 11 240 people (Namibia Statistics Agency, 2013).

Within the production of minerals, diamonds are undeniably in the league of their own, alone contributing on average 7 % to total GDP in current prices of 2013 during the time of independence from 1990 to 2012. Save a dip below 4 % in 2009, the contribution has also remained relatively stable in recent years, rebounding to an above average 8,36 % in 2012 (Bank of Namibia, 2013). The importance of these precious stones to the nation's economy becomes even more evident when foreign trade is examined. Within the time window of 2004 – 2013 minerals and ores accounted for, on average, 57 % of total exports, out of which diamond exports alone were 49 %, thus standing for 29 % of total exports. Even though slightly lower, the average export contribution for diamonds alone in more recent 2010 – 2013 was still 22 %, giving a relatively stable rule of thumb that roughly a quarter of Namibian export

earnings are pulled in by diamonds. (Bank of Namibia, 2014). What becomes evident for diamonds later in the analysis, and very much applicable to ores and minerals, is that most raw material commodities are exported out of the country in unprocessed or semi-processed form (Humavindu & Stage, 2013).

Due to the current importance of the mining sector, but also to still untapped possibilities available from natural riches, the mineral sector has been targeted as a strategic sector in the Namibian policy sphere. Humavindu & Stage (2013) argue that unlike in the past where the Namibian government has aimed at developing industries across the board, sector identification and selection is increasingly important. It is evident from the National Development Plan 4 and the latest Namibian Industrial Policy that a sectoral approach is indeed chosen to guide the nation towards an industrialized future as envisioned in the Namibian Vision 2030 (NPC, 2012) (Namibian Ministry of Trade and Industry, 2012). The relevance of this to the thesis at hand is that mineral beneficiation, fundamentally local value addition of minerals within the manufacturing industry, is stated as a strategic target within NDP4. Furthermore, a value chain analysis of rough as well as cut and polished diamonds is stated as a concrete tool to further the goal of local value addition. Identified practical goals, discussed further under the diamond value chain findings, include increasing the supply of rough diamonds from the present 10 % to 20 % and enabling Namibia to become a larger producer of jewellery (p. 101, NPC, 2012). A detailed account and further discussion on the history of local value addition and the relevant legal and policy structures are found in chapter 4.

In this instance it is beneficial to state that the choice of mineral processing as a strategic target for industrial policy development is contested by the key sector analysis of linkages within the Namibian economy carried out by Humavindu and Stage (2013). At the present moment mining is identified as a key sector for labour income, but this is rather a result of the absolute size of the sector than a reflection of the sector's forward and backward linkages. When linkages are considered, transport and communications and certain sectors of manufacturing are rather identified for positive policy support returns. Humavindu & Stage do, however, make some cautionary notes due to the nature of the Namibian economy. As the economy is small in absolute terms and many sectors only consist of a few companies, entries and exits of single companies may largely affect the linkages and the relative importance of those sectors. The small size also means that if rapid expansion happens, especially within the present larger sectors, such as mining, domestic markets might struggle to meet the input demands of the suddenly growing industries due to capacity constraints.

3 Theory of value chain analysis

3.1 Origins, definitions and theory of value chain analysis

The early origins of VCA can be seen in Leontief's input - output models of the 1950s and regional economic research of the 1960s, which focused on industrial linkages and spatial relations of regions and economies. The concept of value chains was also used in the 60s and 70s in charting and analysing the paths of development for mineral exporting economies (Girvan, 1987). Another relevant strand of economic research is Wallerstein's (1974) World Systems Theory, which has contributed to e.g. the global commodity chains thinking of Gereffi et al. (1994). In the 1980s the previous work on value chains was followed by that of Michael Porter, who used the concept in describing how individual enterprises would be able to obtain competitive advantage by upgrading specific parts of its value-creating activities (Rudenko, 2008). Porter also developed the idea further to explain how the same break-down could be used to upgrade national capabilities in relation to global competitiveness (Kaplinsky, 2000). A more recent body of work and approach to value chains is the above mentioned global commodity chains school of thought, which begun in the work of Gereffi et al. (1994) borrowing much of its thoughts from world system analysis. It is these later developments of the past 20-30 years, building on a long lineage of research, Roduner (2005) describes as a systematic attempt within the English-, German- and French-speaking research communities to describe and analyse the vertical integration and disintegration of production and distribution processes in the global context. It is in support and contrast additional definitions of value chains are in order.

In its simples form a value chain is defined in the work of Schmitz (2005) as "the sequence of activities required to make a product or provide a service". This definition is, however, only a starting point and requires further development to become relevant for analytical and policy purposes. In the modern production and distribution process context it is firstly useful to add the term *global* to describe the fact that value-adding activities of individual products are often carried out in different parts of the world. A second consideration, and an important assumption to justify also the relevance of this thesis, is that some activities and stages in the chains add more value than others. Thirdly, continuing on the previous assumption, some actors in the chain have more power than others and are thus able to govern and capture more value than others. Another commonly accepted and initially more thorough definition of value chains comes from the work of Kaplinsky and Morris (2002): "The value chain describes the full

range of activities, which are required to bring a product or service from conception, through different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use". Also in this definition is seen that the act of production is only one aspect of value addition. Roduner (2005) emphasizes this further by defining the value chain as "a sequence of organizations that are involved in consecutive production activities". In these definitions the idea of tracking the path of a product from raw materials through production and consumption to disposal is very much present with an important addition of analysing the relationships of organizations involved in the production.

In addition to the above definitions of value chains that look at production from organizational perspectives it is important to see how economic theory and empirics look at value chains. As the scope of this thesis is ultimately in studying how countries, particularly developing countries, participate and are affected by value chains, literature is summarized from this perspective.

As stated by Kümmritz (2015) theoretic literature relevant in the context of this thesis mainly discusses a setting where a global value chain (GVC) is set up between a lower technology low-wage country, often called "South" in models, and a technologically more sophisticated high-wage country, "North". These differences in labour costs and technology levels create incentives for dividing tasks between the two countries or production locations. North benefits from South's lower labour costs, but also from increased specialization as it is able to concentrate on those tasks it has core competence in. Together these create productivity improvements for North. Similarly, South also gains from specialization, but in addition from technological development, which materializes through learning-by-doing or spillover effects. Theories are, however, to some extent in disagreement on gains of GVC participation. Some notes on these follow.

A theoretical model by Li & Liu (2014) describes how a global value chain evolves over time. In their model both North and South move up the global value chain, but the modes of obtaining this shift differ. Furthermore, the gains in the case of North actually depend on initial conditions. To summarize Li & Liu, North offshores some tasks to South where factor prices are lower. These tasks are within or marginally beyond the technological reach of South, which in fact sets in motion a learning-by-doing technological improvement process that makes the offshoring of more tasks possible. The process continues until production converges to a steady

state. In this way South has obtained a move higher in the value chain by carrying out more and increasingly sophisticated tasks, whereas the gains realized by North follow from specializing in fewer but highly sophisticated tasks. The ambiguity of the overall effect for North follows from the fact that before the steady state is reached there is a period during which Northern welfare is actually decreasing. As an increasing number of tasks shift to South there is a downward pressure on Northern wages due to constant factor endowments. This negative terms of trade effect may push the aggregate benefit of higher GVC participation also to negative.

Baldwin & Robert-Nicoud (2014) introduce a model where in contrast to Li & Liu (2014) the benefits to South are ambiguous. Similarly to the above model North is technologically superior, but shifting tasks to South is advantageous due to exogenous variation in trade costs. What occurs is that the North is able to use its more sophisticated technology with lower wages of South. Northern terms of trade improve in addition to a rise in Northern output, which follows from the fact that North's effective labour endowment increases when tasks that were before carried out in North are now performed by South. The ambiguous gain for South follows from this as the previous should lead to a proportional decrease in Southern output. This result is, however, not set in stone as Baldwin & Robert-Nicoud also introduce a variant of their model where technological spillovers give rise to overall output in both countries as technologies converge. Kümmritz (2015) also poses a further important comment, especially for the developing country context, whereby research on absorptive capacity shows that spillover effects require a fostering environment, which might not be the case for low and middle income nations.

Taking into consideration the above summarized theoretical context, Kümmritz (2015) proposes that irrespective of the exact mechanism GVCs have the possibility of generating gains for participating countries, and that the final answer needs to be approached through empirics. Kümmritz seeks to answer the question using two sources of data, the World Input-Output Database and the OECD Inter-Country Input-Output tables, that extensively cover nations at different levels of development. His paper ultimately studies the effect of GVC participation on the domestic economy of countries. Firstly, he finds that the higher the GVC participation the higher the industry-level domestic value added. Second, his analysis indicates that the positive effects of participation in GVCs is independent of the position of countries within the GVC, meaning that both selling and source countries benefit from forward and backward linkages. On a further note, however, he finds that high income countries benefit

more from sales linkages while middle-income country benefit is higher from backward linkages. A third key finding highly relevant for this paper is that low-income countries seem to have no gain effect from GVC participation. Kümmritz, however, does treat this result with care as the data only shows that the countries in the sample have on average not benefitted, and it cannot be stated that none of the countries would have gained from GVC participation.

In addition to above presented basic theoretic background and empirical findings following from them, some notes on more general GVC literature is in order. The above discussed Kümmritz (2015) paper is particularly relevant for this thesis as it deals in benefit gains of individual countries, but the more general empirical findings on GVCs focusing on measures of participation and the development of GVCs over time are important to set the stage of global trade changes captured by value chain research.

One of the primary GCV participation measures used was developed by Hummels, Ishii & Yi (2001) who studied the OECD IO tables of 35 industries in 10 countries from 1970 to 1990. They coined the so called vertical specialization (VS) measure, which calculated the foreign value added content in exports of sample countries. Hummels et al. found that during the data time span VS had grown an average of 30 % and was also responsible for most of the total export growth of the sample countries. The Hummels et al. VS measure was further formalized by Daudin, Rifflart & Schweisguth (2011), who calculated the VS1 measure, which reveals the share of domestic value added in foreign exports. Daudin et al. figures also confirm that countries are increasingly taking part in GVCs. More recently, and similar to the Hummels et al. approach, Baldwin & Lopez-Gonzalez (2013) studied the World Input Output Data from 1995 to 2009 to find three measures uncovering GVC patterns. The import content of exports is in essence the same as VS, whereas import content of production and factor content trade reveal new constructs in global trade. The sample data confirms the importance of GVCs as production is more and more international.

Measuring trade balances also changes as global trade is increasingly best understood through value chains where goods may cross national borders in various phases of completion. Johnson & Noguera (2012) show that compared to trade balance calculations in gross terms, value added balances put bilateral trade in very different light with often much lower imbalances. As an example Johnson & Noguera state the US-China relationship, where the trade imbalance in VA is up to 40 % smaller than in gross terms. This fact of trade being more and more in value added instead of gross terms has other important implications. Timmer, Erumban, Los, Stehrer &

Vries (2014) show that world trade organized in GVCs shifts the factor composition of production away from unskilled labour and favours skilled labour and capital. Also, studied from the value added perspective, countries' revealed competitive advantage (RCA) differs substantially from standard RCA characteristics.

This section has set a backdrop to value chain analysis as understood through definitions, relevant theoretical models and empirical findings confirming that value chains are relevant in describing and analysing modern trade. The above outlined research does, to some extent, surpass the scope and depth of this thesis. The main aim is to study the national diamond value chain in Namibia and as such this study will not analyse e.g. the measures of GVC participation of Namibia. Relevant aspects are however discussed, particularly as some remarks are made on initial policy suggestions.

The above definitions, models and empirical findings can be used to identify key aspects and determinants of value chains that give rise to analytical constructs within value chains. These determinants are now collected from different strands and schools of value chain analysis to give a better view into the topic of VCA and to arrive at a more focused map on how this thesis analyses the Namibian diamond value chain.

3.2 Value chains are examined through descriptive and analytical tools

As pointed out in the introductory chapter to the thesis, value chain analysis offers both descriptive and analytical tools, where descriptive aspects try to explain *what* the world studied is like, whereas analytical considerations delve deeper into the questions of *why* the world is structured as perceived. From these present state descriptions it is still possible to separate tools of *how to bring about change* in existing and future value chains. (Kaplinsky & Morris, 2002).

In this chapter heuristic or descriptive tools of *input-output structure*, *chain mapping* and *geographic concentration* are introduced.

The change of value chain analysis from a heuristic tool to an analytical construct is done through studying *governance structures, barriers to entry, trade and rent* and *systemic efficiency*.

In reference to ways of changing value chains, the tools of *benchmarking* and *upgrading* are discussed.

The chapter closes with discussion on the concept of value, key methodological considerations and the global importance of value chains for policy planning.

3.2.1 Descriptive tools of value chain analysis

Mapping and describing the way a value chain is structured is in itself an important task as it provides a framework of what data to gather for further analysis. The tools used and the information extracted are thus a fundamental building block of more sophisticated analysis. Knowledge of why the world exists as witnessed – studied through analytical tools – has to be preceded by an accurate vision of what the world is like – studied through descriptive tools.

3.2.1.1 Input-output structure, mapping the chain and financial and economic analysis

The basic starting point for understanding a value chain begins with tracking the flow of raw materials, intermediate goods and finished products and how these are linked to knowledge in in the process of value creation (Rudenko, 2008). In addition to defining and tracking the flows of components that comprise the final goods, this determinant also involves the mapping of the chain, meaning the division of production into stages and activities and assigning these to individual companies or agents and actors as they are often called. In many cases the various activities and stages can be grouped into principal functions that simplify the chain and can be represented in e.g. a commodity flow chart. At this stage the value chain is thus a simple flow chart describing the flow of components and activities as they are transformed into final goods by a group of actors holding varying capabilities within principal functions. The mapping should also include some reference to the nature of ties the agents have with one another. In addition to the flow of goods in the chain, financial analysis is here also regarded as part of input-output analysis and thus descriptive tools. What volumes are moved at what prices, entailing what costs as well as destinations of goods and monetary flows are here considered as part of this stage of value chain analysis (McCormick & Shmitz, 2001) (Kaplinsky & Morris, 2002).

In the case of the Namibian diamond industry structure identification and mapping produced a relatively straight forward four principal function or stage structure with rough diamonds being the raw material turned into diamond jewellery. This structure, including the companies involved, their activities, financial flows and ties are described and analysed in chapter 4.

3.2.1.2 Geographic concentration

Geographic concentration refers to the global and regional dispersion of activities and to characteristics that determine which actors carry out these activities (Rudenko, 2008). Value chain analysis is closely related to a lineage of economic discussion and theory, which looks at the way production choices are made with respect to concentration or dispersion of benefits following from scale economies, transportation and trade costs and factor endowments. As Krugman & Venables (1995) state, conventional wisdom has long argued that while particular groups within economies can suffer from global integration of production, it in the aggregate benefits all nations. Critics of this view have on the contrary posited that integration creates winners and losers within nations giving rise to increasing inequality. On the global scale, then, the world economy will be divided into a rich core and a poor periphery where the wealth of the former comes at the expense of the latter. A much later opposite continuation of this unequal distribution of benefits argument is that, in fact, globalization is primarily advantageous to the periphery and the core bears the cost of this.

To address these opposing cases Krugman &Venables build a theoretical model where regional differentiation is brought about by the interaction of scale economies and changes in transport costs. Their analysis shows that indeed both conventional wisdom and the opposing arguments receive some backing from theory, with the dynamic borne out of phases of shifts in global production and trade. Firstly, the system is brought to a state of division into a core and a periphery only after a certain critical level of integration is achieved. This critical level is in the Krugman & Venables model achieved as transport costs fall from a very high level where regions are virtually self-sufficient in two types of goods, agricultural and manufactured, to levels where trade between them is economical. In addition, relative size differences for any arbitrary reason in e.g. the manufacturing sector produce scale benefits which lead to this type of production gravitating to that region. If transportation costs fall under some critical level, the world will spontaneously organize itself into an industrialized core and a deindustrialized periphery. Even if a slight sidestep to later empirics and theory from a purely theoretical world, this part of the Krugman & Venables model is closely related to what Baldwin discusses under the second unbundling (e.g. WTO, 2013) and the subsequent globalization paradox. Validating the discussed theoretical model, Baldwin states that cheap transportation favours large scale production, which is complex in nature and the coordination of this complexity is made easier by extreme proximity. This actually means that the fall of transport costs brings about a rise in another cost type, namely coordination costs, which makes concentration of production

important in more ways than before. Returning to Krugman & Venables, this division leads to unequal development between regions as scale advantages in the industrialized region drive up labour demand and real wages while they are pushed down in the deindustrialized region. In this regard, when differentiation takes hold the income of the core rises at the expense of the periphery.

The dynamic does not, however, end there. If transportation costs still keep falling the gravitational centre of manufacturing starts losing its competitive edge as the periphery offers a lower wage rate. At some point the reverse dynamic takes hold as lower labour costs more than offset the location and transportation costs. Again a temporal leap to Baldwin is relevant. Baldwin notes that up until the mid-1980s the wage differences between the developed and developing nations had grown vast, which made the geographical dispersion of production profitable. The second key ingredient alleviating the coordination of complexity problem was ICT. Together wage differentials, still falling transportation costs and ICT coordination technologies began to melt the glue of proximity, which led to globalization's second unbundling as coined by Baldwin. In the Krugman & Venables model, a convergence of wages between the core and the periphery also follows. In this way the advantage of the core has eroded and the income growth of the periphery may happen at the expense of the core.

Technological change as described by Baldwin and the subsequent possible welfare loss of the core in the final phase of the Krugman & Venables model receives partial backing from the workhorse model of supply chains by Costinot, Vogel & Wang (2013). The authors build a simple theory of trade with sequential production, multiple countries, one factor of production and final good within a production process which is subject to mistakes to capture technology differences between countries. The model shows that, firstly, countries with lower levels of mistakes specialize in later stages of production where failure is more costly. The effects of technological change, separated into global and local, are then created and studied in four ways. First, global technological changes are modelled by "complexity", captured through an increase in the length of the production process, and by "standardization", captured through a uniform decrease of failure rates throughout the chain. The findings from these adjustments show that increased complexity and standardization result in all countries moving up the value chain, but also in opposite effects on global inequality. An increase in complexity raises inequality across all nations while an increase in standardization decreases inequality. Standardization, however, benefits poor countries depicted in the model by higher failure rates proportionately more. Actually, Costinot, Vogel & Wang find that standardization may lead to immiserizing growth,

or a welfare loss, in the technologically advanced countries. Local technological changes, on the other hand, produces ambiguous results on welfare effects. Again, the authors consider two forms of local change; first, labour-augmenting technical progress, and second, "routinization" referring to a decrease in country's failure rate. What is found is that these have very different effects at the bottom and at the top of the chain. At the bottom countries may move up or down the chain but the direction of the move determines the change in the inequality of nations. At the top, local technological development always moves the nation up in the chain, but the inequality of nations may either fall or rise. What the authors find surprising is that at the bottom rich countries benefit disproportionately more from being pushed up the chain, but at the top this is not so.

Returning again to Krugman & Venables, the authors offer several points of caution as their above introduced theoretical model is a highly simplified depiction of complex international trends and changes. The first is highly relevant from the perspective of value chain analysis; as even conventional free trade advocating models admit, barriers to trade, natural or artificial, may change the positive aggregate benefit effects of integration. Definitions, creation and impacts of barriers to trade and entry are discussed later in this chapter. Second, the model assumes an exogenously defined division of regions into "South" and "North" (introduced in chapter 3.1 in (Kümmritz, 2015) (Li & Liu, 2014) (Baldwin & Lopez-Gonzalez, 2013)) which then brings about the differentiation into core and periphery regions. As the authors state, the changing roles of e.g. southern parts of USA and Europe, Japan and East Asia show that there is continuous redefining of the core and periphery and what currently seems a growth in the geographical area of the core or even the emergence of several separate cores. Third and fourth, the model does not include capital and in the form introduced by Krugman & Venables does not use actual figures from empirical studies.

The above models by Krugman & Venables and Baldwin can also be amended with insights provided by Baldwin & Venables (2013), who discuss the division of value chains into two extremes, *spiders* and *snakes*, according to characteristics of the production process. In a snake a sequential process of production adds value through operations that are carried out in a predetermined order. Spiders in contrast are systems with many limbs of separate smaller processes where parts of the final product are assembled and have to come together only for final assembly. As Baldwin & Venables point out, pure snakes or spiders are rarely met, and most production processes or value chains exhibit characteristics of both. The distinction of

analysis of these two extremes is, however, useful as it produces differences in insights into global production.

The snake and the spider share some characteristics that should be discussed first. In both cases geographic location is determined through the interplay of international differences in production costs and co-location costs following from unbundling. As previously indicated, reductions in international costs of trade, communication or coordination facilitate relocation of production, but Baldwin points out that this is not necessarily continuous or monotonic. Parts of production may move against their comparative costs to capture unbundling benefits, or "overshoot", which means that reshoring can occur later on as unbundling costs fall. For Baldwin & Venables this overshooting is due to coordination failure, but the above introduced Costinot, Vogel & Wang model argues the opposite; overshooting is not necessarily a coordination failure, but reflects the fact that in a perfectly competitive model with sequential production and in the presence of trading frictions, firms must offshore a sufficiently large set of stages to find the fragmentation across borders profitable. According to Baldwin & Venables both spiders and snakes may, however, also exhibit coordination failures when individual companies carry out inefficiently little offshoring even after unbundling costs have fallen. This happens when companies cannot be sure that if they were to offshore activities the critical links they are tied to would follow. According to the authors, this suggests incentives for vertical integration or other forms of coordinating actions that could minimize costs.

Where spiders and snakes differ is the amount of trade they potentially create. As parts in spiders only cross borders twice, trade is bounded by twice the value of the final output and does not necessarily rise as frictions fall. The snake is different, as falling frictions may divide the snake into ever smaller production stages that arise from engineering details, separations costs and comparative cost differences. The snake also has a further characteristic, upon which continuous relocation following from falling trade frictions causes polarization of activities into labour- and capital intensive production regions. As Baldwin & Venables state, the effect of this on factor prices is beyond the scope of their paper, but points towards factor price convergence. This polarization does not, according to them, hold for the spider.

In the context of this thesis geographical concentration and the above theoretical models with their later applications become more relevant when the entire global diamond value chain is examined. The global industry level approach receives, however, limited attention in this thesis as the main aim is to analyse the diamond value chain within the national borders of Namibia.

The above raised issues will to some extent still be discussed as geographic concentration from the Krugman & Venables point of view is particularly relevant for the middle market of the diamond industry, and the entire global diamond value chain exhibits characteristics of the snake as discussed by Baldwin & Venables (2013). In addition, the related creation and existence of barriers to entry and trade introduced in this chapter are particularly topical to the diamond industry at large and also to Namibia in particular. They will thus be discussed from a theoretical perspective later in this chapter and pertaining to the findings on the Namibian diamond industry in chapter 4.

3.2.2 Analytical tools of value chain analysis

The previous subchapter explained tools within value chain analysis that are descriptive in nature, shedding light on the data based existence of the world as it is witnessed. Even though a fundamental building block of understanding what kind of value, how it is created and to whom dispersed within the chain, an explanation is also needed for *why* things happen as they are perceived to. Analytical tools of value chains try to answer these questions. Kaplinsky (2000) and Kaplinsky & Morris (2002) describe the following three characteristics of value chains that have to be taken into account and the analytical tools intend to tackle.

Firstly, value chains create and distributes rents, which are dynamic in nature. The concept of rent describes, in short, the process of returns generated to owners of scarce resources. This process is dynamic, which means that scarcity can be created, changes hands from owner to owner, and the barriers containing scarcity are eroded by forces of competition. These issues are further discussed under the tool of *barriers to entry, trade and rent*.

Second, effective value chains entail some form of governance, which means that agents within chains are not equal with respect to how much power they hold in deciding who produces what, at what price and when. These abilities of agents to influence the actions of other agents are dealt with under *governance structures*, which give aid to classifying different types of value chains and in understanding how power differences are created.

The third consideration deals with the broader scale of global value chains competing with each other. *Systemic efficiency* draws our interest to the fact that successful value chains are characterized by efficiency throughout the chain, thus systemic, instead of point-specific efficiency of individual agents, steps or processes. This aspect of value chains involves again elements of governance, but also draws insights from the reality of interconnectedness in global production witnessed in recent decades.

3.2.2.1 Barriers to entry, trade and rent

The concept of rent, in the context of value chains, is based on the fundamental economic reality of scarcity. The original idea of economic rents was put forth by the classical economists, e.g. Ricardo, who saw that economic rents are based on the unequal ownership and access to scarce resources. In addition to this view, Schumpeter argued that scarcity can be constructed through intentional actions of entrepreneurs. Entrepreneurial surplus is collected by those agents in the economy who are able to create new combinations of goods withholding larger returns to buyers, i.e. these entrepreneurs take part in the process of innovation. Innovation is driven forward by the search of so called super profits or entrepreneurial surplus that the innovator is able to reap after the innovation as competition has not yet caught up with the new combination. It is important to note that these profits are not static, meaning that competitors will copy the original innovation and in time prices are pushed down, the abnormal returns normalized and producer surplus transformed into consumer surplus. This dynamic nature of rents is the driver of capitalism and creates cycles of continuous change, where new innovations always replace the old ones. (Kaplinsky, 2000).

Based on these realities of the economy, *barriers to entry, trade and rent* arise. These are then created in two ways. Firstly, the process of innovation creates dynamic barriers to rent as entrepreneurs are able to beat their competition. Secondly, barriers to entry refer to the ability of agents to protect themselves from competition. This can happen through acquiring scarce resources, e.g. land, minerals, technical capabilities or knowledge, creating better processes, e.g. logistics and economies of scale, or constructing other barriers exemplified by branding, certification schemes, designation of origin, etc. (Roduner, 2005).

These barriers limiting competition and thus affecting the boundaries of value chains have been changing rapidly in past decades. Many countries have been developing their industrial capabilities and new entrants such as China and India have risen to the front of global competition. These developments have to a great extent been responsible for falling barriers to entry, trade and rent and changes in the nature of these barriers. They are less and less found in production and increasingly in activities such as design, branding and marketing. (Kaplinsky & Morris, 2002).

The above views from somewhat practically oriented value chain analysis literature benefit from contrasting arguments of more theoretical value chain and industrial organization research in the field of economics. Firstly, as suggested by Sutton (2007a), there are theoretical caveats

in the Schumpeterian competition model as discussed above in Kaplinsky (2000). To summarize, when it comes to industrial organization industries can be seen as divided into two discrete categories, to those where advertising and R&D are not important, and those where they are of paramount importance. This model, referred to as the "endogenous sunk costs model", in essence states that even if entry to markets or value chains is in principle free, some industries exhibit characteristics where sizeable initial sunk costs in e.g. R&D or marketing limit the number of firms. As discussed later in chapters on the global diamond industry and the case study of Namibia this has significant bearing on the diamond value chain where various steps of the chain entail large sunk costs in the form of agreements, capital investments or marketing efforts. These sunk costs consequently act as barriers to entry and have to be taken into account when e.g. designing national policy interventions aiming at higher GVC participation.

Sunk costs are not the only barrier arising from industry characteristics and actions of individual companies. The dynamic innovation process as discussed above by Roduner (2005) can also be developed to a more detailed level. Sutton (2007b) examines a theoretical model where a firm's survival is determined by two factors, quality and productivity, where the latter can be in general terms be understood as cost competitiveness. What Sutton finds is a so-called capability window defined at the higher boundary by the highest level of quality or productivity obtained by any firm, and limited at the lower end by a threshold level under which firms cannot sell anything even by lowering their prices. This process is shown in a model of three phases closely related to the one described by Krugman & Venables (1995) and Baldwin (WTO, 2013) in a previous chapter on geographic concentration. The first phase is that of trade liberalization, which induces a selection effect on firms or countries, where those falling under the threshold of capability suffer a "shakeout" effect and cannot remain in the market (This shakeout effect is further studied in Sutton (2007a)). In essence, the capability threshold creates a barrier to entry for firms or countries under which they cannot access the value chain of global production. A key point from Sutton is that wage level differences can even fully offset different levels of productivity, but cannot do the same for quality. An implication of this is, as also stated by Krugman & Venables (1995), that the first phase of global integration can be welfare reducing for countries that do not have adequate capabilities and can thus not participate in global production. The second phase is characterized by the fact that wage and capability differentials between regions create high incentives for low-capability countries to invest in capability, but also for high-capability countries to shift this capability to countries

with lower wages. As Sutton points out, this second phase is argued to carry the benefits of globalization to the so-called mid-capability-level countries, even if the determinants of speed and effectiveness of this process are not very well understood. The final third phase, called the escalation phase by Sutton, withholds an adjustment of firms into the new global environment as they now have access to more markets than before and have to adjust to the new capability requirements of the global market. Sutton also argues, as introduced above in the model of endogenous sunk costs (Sutton, 2007a), that it is at this point that the barriers created by sunk costs are also raised as they are integral in determining the optimal levels of productivity and quality. The third phase may then entail further shakeouts particularly in highly concentrated markets, defining the capability windows for global markets or GVCs.

Combining the findings of Sutton (2007a and 2007b) and Neary et al. (2015), conclusions highly relevant for this paper are arrived at. Firstly, access to global value chains is closely related to an entry level of capability, which has to be obtained to even exist in the chain. Second, this in reality means that the choice between low wages (high productivity) and quality does not exist. There are limits to how far production cost competitiveness can aid in capturing more value in GVCs, but no limits to what can be achieved through obtaining higher quality. Third, theoretical and empirical findings on cost- versus quality-based competence by Neary et al. (2015) suggest that export industries producing differentiated products exhibit first and foremost quality-based competence, whereas those in non-differentiated-goods industries exhibit cost-competence. In both industry categories companies thrive by focusing on those goods where they have core competence, which would be expected also from the arguments of Sutton based on the moving quality window of GVCs. These findings from Neary et al. give rise to an argument that "one-size-fits-all" type of policy interventions would not be suitable for promoting export industries or higher participation in GVCs.

The above introduced barriers to entry, trade and rent are very relevant in the analysis of the global and the Namibian national diamond value chains. There are those barriers that are easily defined, such as legal frameworks, government policies and international agreements on diamond trade. The other subset are those that are brought to life by industry specific characteristics in investments, access to endowments, capabilities and quality considerations arising from market dynamics or through conscious efforts of companies in trying to build barriers to rent. In all of the above cases they are tightly linked to relative capability and power differences individual actors hold within the chain, which are discussed next under governance structures of value chains.

3.2.2.2 Governance structures

In his study of value chain analysis as a tool, Roduner (2005) defines governance structures as "the ability of one firm in the chain to influence or determine the activities of other firms in the chain." According to him, this aspect of a value chain shows in a broader sense which organizations define who produces what, how much and when. Rudenko (2008) continues along the same lines by stating that governance structures are "understood as authority and power relationships that determine how financial, material, and human resources are distributed within a chain". The idea of governance in the context of value chains was originally suggested by Gereffi in his work on global commodity chains (e.g. Gereffi & Korzeniewicz, 1994). His ideas are exemplified also in the definition by Kaplinsky (2000), as he states that value chains should be studied through the existence of "key actors in the chain who take responsibility for the inter-firm division of labour, and for the capacities of particular participants to upgrade their activities." This thinking entails the idea that, firstly, linkages are repetitive, and second, that an aspect of intentional organization is present in value chains instead of a simply random structure. Even though governance discusses the organization of value chains more from this perspective of intentional actions by firms, overall analysis benefits from including views of international organization introduced in the previous chapter on barriers to entry, trade and rent. As Sutton (2007b) concluded in his work on the moving capability window of global production, the producers of the highest quality within a value chain essentially determine a range of producers that are capable of obtaining a required quality level and are thus able to access and exist in the chain.

Based on the above definitions and attributes constructs are obtained that will help in simplifying the complex reality of value chains and focus on important characteristics for later analytical and policy purposes. The first construct relates to sources of governance, in the work of Kaplinsky (2000, 2002) referred to as the *three forms of governance*. In addition, the global commodity chain school of thought originating from the work of Gereffi (e.g. Gereffi, Humphrey & Sturgeon, 2005), suggests that value chains can first be divided into *producer and buyer driven chains* and second classified according to *five types of governance*. These classifications and subsequent tools of analysis are discussed further below.

The value chain classification producing construct of Kaplinsky (2000, 2002) actually lends its groups of three forms of governance from political and civic theory, i.e. the three functions of government and its separation of powers. These are the *legislative*, the power to make laws, the *executive*, to implement the laws, and the *judicial*, upholding conformance to laws.

Combined with these forms, Kaplinsky states that the governing power requires the capacity to sanction behaviour in positive or negative ways, and that in the long run sustained governance legitimizes the reign of those in power.

In the case of value chains, *legislative governance* can be seen as the rules of participation in the value chain. These various sets of rules can include international and other industry specific standards and are in broader terms the parameters that govern company participation and existence in the chains they belong to. In addition to setting the parameters, it is necessary to audit performance and check compliance of chain participants within the parameters, which can be seen as *judicial governance*. The implementing and mediating role of *executive governance* falls between the two previous ones, with assistance given to value chain participants in meeting the parameters in an active managing way. Executive governance can be direct or indirect. It is also worth noting that it is both parties internal and external to the value chain that exercise these forms of governance, with national environmental standards an example of legislative governance, NGO monitoring of labour standards an example of judicial governance and government industrial policy support an example of executive governance by parties external to value chains.

In addition to the three forms of governance by Kaplinsky, the analytical nature of value chain analysis has benefitted from the contributions of Gereffi and the global commodity chain classifications of value chains. The first distinction is the rather straight forward divide of *producer vs. buyer driven chains* (Gereffi & Korzeniewicz, 1994). In producer driven chains the main governing body is a producer, often holding vital technologies or having access to critical resources. Producer driven chains are often characterized by the importance of physical capital. Buyer driven chains are in contrast characteristically found in labour intensive industries, which often bears much importance to the developing country context. Gereffi has also noted that producer driven chains are more prone to foreign direct investment (FDI) than buyer driven chains. (Gereffi;Humphrey;& Sturgeon, 2005).

The second distinction that bears relevance to the value chains in general but also this thesis, is the division of governance into five distinct types. The typology in an ascending order of complexity and chain participant power over others is as follows (Gereffi;Humphrey;& Sturgeon, 2005):

1. **Markets***:* Linkages are loose and costs of finding new partners are low for all chain participants
2. **Modular value chains***:* Suppliers produce goods according to customer specifications, but these specifications do not tie the producers or buyers strictly to individual companies. Both parties hold to their key competencies, transaction specific investments are low and both parties may have several partners.
3. **Relational value chains***:* These chains are characterized by complex interactions that create mutual dependencies and asset specificity. Trust and other informal ties regulate relations that are often built over time. (Even though beyond the scope of this thesis, further discussion on how these informal ties function can be found in e.g. Baker, Gibbons & Murphy (1994)).
4. **Captive value chains***:* Small suppliers are dependent on large buyers and face large costs of switching into other buyers. Buyers exert a large amount of monitoring and control over small suppliers.
5. **Hierarchy***:* This type of chain is similar to vertical integration, where the dominant organization exerts managerial control over the chain and is in charge of monitoring, compliance and competence building of chain actors. The flow of information and decisions is from the dominant organization to the subordinates.

Gereffi et al. (2005) combine the above with a theory of conditions under which the different types of governance are to be expected. There are three factors that contribute to the type of governance found in a value chain:

A. **Complexity of transactions***:* This relates to the complexity of information and knowledge required to make a transaction between chain partners. It is well exemplified by product or process specifications and how complex they are.
B. **Codifiability of information***:* Whether partners are able to codify their information, knowledge and processes, and transmit it efficiently without partner specific investments.
C. **Capabilities of suppliers***:* How capable existing and potential suppliers are in relation to the specifications of the transaction.

The above conditions of Gereffi et al. (2005) are closely related to the work of Williamson (2005) whose studies on theories of organization shed light on important aspects of contractual agreements and the economics of the firm and the market. As Williamson points out, continuity

of relationships is a source of value in contractual agreements and in fact simple market exchange as per the first point in the above classification of Gereffi, Humphrey & Sturgeon (2005) is only a special case in economic relationships. In this regard Williamson suggets that the above rising complexity of transactions as in Gereffi et al. (2005) gives rise to a need for adaptation as agreements are always incomplete and need to adapt to disturbances that could not have been foreseen during the agreement's initial setup. Following from governance of continuity and the need of adaptation, economic theory cannot assume transaction costs as zero, but has to take the effects of all three into consideration. How this is done is beyond the scope of this thesis but Williamson deserves a note here on the underlying theoretic backgound of VCA.

These simplifications of examining governance structures of value chains assist in understanding and classifying the Namibian diamond value chain in chapter 4.

3.2.2.3 Systemic efficiency

The final analytical tool that requires a note in value chain research is *systemic efficiency*, which takes a step back and regards the entire value chain as a system that competes with other value chains for scarce resources, and affects the survival and success of individual parts of the value chain. In essence this means that point-specific efficiency, the ability of single companies to organize their production and processes in an optimal way, is no longer enough in the systems of global production. As companies search for competitive advantage, they are faced with the challenge that in order to survive and thrive, they must also take some level of interest in the actions of other links of the chain. The systemic efficiency element thus further develops the characteristic of value chains explained under governance structures. Ways of governing distribution of capabilities, tasks and capital are no longer just structures organically emerging in all value chains, but strategic tools companies use to control their competitive environment. This is increasingly so for large lead firms, producers and buyers alike, that are able to and responsible for actively affecting the futures of value chains they belong to. (Kaplinsky, 2000).

Beyond the above where the performance of the entire chain is looked at from the perspective of single companies searching for competitive advantage, relevant issues of systemic efficiency also arise from much of the economic models introduced previously in this chapter. Costinot, Vogel & Wang (2013) found that systemic efficiency resulting from technological differences guides the distribution of value chain tasks on the global scale. In essence countries with higher technological capabilities, in the model captured by lower failure rates in production, tend to

carry out tasks higher up the chain where the costs of failure are greater. The model also bears significance to systemic efficiency from another perspective, namely companies searching for technological development as a tool to upgrade value chains or parts of it. As Costinot, Vogel & Wang show, technological changes, whether global or local, have different kinds of effects on the ways countries move up and down the value chain, whether there is more or less concentration and how inequality among nations participating in a chain change.

Another note on the interplay of company actions and systemic efficiency is also in order here. Both Costinot, Vogel & Wang and Baldwin & Venables (2013) state that decisions arising from single company actions are often not efficient. Both studies draw attention to overshooting, reshoring and coordination failures, where company decisions may exhibit too much or too little offshoring at different times of the existence of the value chain. Particularly coordination failures where the value chains are too small to induce efficient unbundling, or single actors cannot count on the fact that other parts integral for their offshoring decisions move in sync, are exemplary problems of systemic efficiency. These theoretical considerations then caution against companies being able to act as governors for the entire chain as single company interest may result in inefficient solutions from the perspective of the entire system. A further consideration can be added from the works of Sutton (2007) and Neary et al. (2015). Sutton first showed that global competition produces a moving capability window, which results in a lower bound of quality under which no company can sell products. This also entailed that the trade-off between low costs and quality does not really exist; there are limits to what cost competitiveness can do if it is not combined with quality that exceeds the lower bound of global competition. Neary et al. also study whether productivity or quality is key in export performance. One of the issues they note is that due to flexible manufacturing, or unbundling, companies focus on production that is close to their core competence. This may lead to more complexity breaking the value chain into more stages, especially in the case of snake-type chains (Baldwin & Venables, 2013), and thus increases the potential for coordination problems and inefficiencies arising from single company decisions.

Some further characteristics of the above models and their effects were outlined in a previous chapter on geographic concentration but as the details are beyond the scope of this thesis, notes on the underlying theory will suffice here. In some of the value chain analysis literature systemic efficiency is treated within governance structures but as witnessed here, the inclusion of economic theory of production and trade adds further depth to understanding the global division of tasks and value, inequality issues as well as effects of technological change on the

chain in its entirety. The above specific issues are also raised due to their relevance for the global and Namibian diamond value chains which exhibit a few powerful supply side lead companies focusing on core competence acting in a snake-type value chain facing calls of further vertical integration. The outlined quality window thinking is also highly relevant for the case study as the middle and the end of the chain exhibit multifaceted quality requirements that might prove very hard to obtain. These aspect are further discussed in chapter 4.

3.2.3 Value chain development tools

The above mentioned descriptive and analytical tools are already a source of detailed knowledge that helps towards practical policy interventions and value chain development measures. Especially the governance structures linked to power differentials within chains give much insight on which links or even individual firms efforts should be focused on, what skills, capital and capabilities may be missing, and what market access problems chain links face. In addition to these value chain theory contains two additional tools, *benchmarking* and *upgrading*, which can be used to affect value creation and distribution within value chains. Again, it should be noted that the underlying theoretical and empirical work discussed previously on the moving quality window (Sutton, 2007b), the productivity versus quality paradox (Neary;Eckel;Iacovone;& Javorcik, 2015) and the possible inefficiencies following from individual company decisions (Costinot;Vogel;& Wang, 2013) (Baldwin & Venables, 2013) should be kept in mind when considering the below outlined practical tools.

3.2.3.1 Benchmarking

In essence, benchmarking means the analysis of productive efficiency of actors within the chain or the entire chain in comparison to other chains. Individual companies and the entire chain face following drivers:

- Cost competitiveness
- Quality
- Lead times
- Capacity to make minor and frequent change
- Capacity to fundamentally change products and processes

Benchmarking thus means firstly understanding and measuring the present state of how things happen in a chain link or the entire chain, and second comparing the results against references points. These reference points against which performance is measured can be the following:

- Own historic performance
- Performance of companies or chains with similar characteristics
- Performance of companies in the same sector, but producing different products
- Performance of companies in other sectors, but with similar processes

Benchmarking has mostly been applied to activities that involve the transformation of inputs, but as has been stated before, many activities that define the effectivity and performance of the value chain are no longer in these activities. This is why analysis of design, marketing and management activities are of growing importance. A similar approach also applies to benchmarking practices and performance, where practices used, such as a quality circles and continuous improvement schemes, may affect effectivity even more than performance of e.g. logistics services. Thus the question of what to benchmark requires consideration in trying to change value creation and distribution issues. (Kaplinsky & Morris, 2002).

3.2.3.2 Upgrading

In practical terms value chain analysis assists in locating links in the chain that are weaker than others and can subsequently be improved or upgraded. It thus deals with the competitive position of a chain link within the chain and across chains. In real terms the performance of a link is determined by its effectiveness of performing its core task or the bargaining power in the chain, captured in the notion of governance structures explained previously (Rudenko, 2008). Upgrading can occur on four levels within a value chain (Kaplinsky & Morris, 2002):

1. **Process upgrading**: Making processes within chain links more efficient than those of rivals. This notion of upgrading also involves the improvement of processes between chain links, for example the coordination of orders and delivery times.
2. **Product upgrading**: Introducing new products or improving the quality of old products faster than rivals.
3. **Functional upgrading**: Changing the mix activities within a chain link, e.g. outsourcing accounting or taking charge of logistics to customer, or moving to different links in the chain through vertical integration.
4. **Chain upgrading**: Moving to a new value chain, where the link or chain core competence can be leveraged in a new way.

Value chain analysis can help in formulating upgrading strategies in these different spheres by describing and analysing sources of competitiveness that arise from factors like local competitors, infrastructure, customers and coordination between companies, given the environmental structures of barriers to entry, trade and rent and governance (Rudenko, 2008). In reference to what parties external to the chain, e.g. government agencies, can do to aid and set in motion the processes of upgrading, Schmitz (2005) states that Business Development Services (BDS) are often used especially in the developing country context. These measures include consulting, training, business planning and funding. There is debate whether these services actually contribute positively to upgrading processes, but it seems that when combined with aid in inter-link coordination and business relationship building, they do have positive effects. Schmitz (2005) does, however, provide critique regarding the limitations of value chain analysis in upgrading. In essence, upgrading has to happen and be initiated by companies within the chain, which sets reservations on whether this will actually happen. Especially when developing country production and value chains are in question and external parties try to push for the development of a chain, barriers, e.g. size of companies, exist. Buyers may not be willing to buy from a multitude of smaller producers even when price and availability issues are not a problem. The core of this argument is that in modern value chains transaction costs play a large role and often arise from larger complexity. If a company cannot trace the origin of its products and govern the chain it is linked to, there are concrete costs in reputation and coordination that make these changes less appealing. An additional concern arises when competitive positions of lead firms are contested by upgrading activities. Lead firms play a very important role in governing the entire chain and determining the effects of upgrading activities. If these activities include functional upgrading, which restructures the mix of activities within the chain, lead firms may block upgrading activities. The role of lead firms in determining changes in value creation and distribution through upgrading activities throughout the chain are also highly relevant in the case of the Namibian diamond industry discussed later in chapter 4.

3.3 The concept of value

To understand what is meant by value chain analysis, some notes have to be made on the concept of value and value addition. In broad terms value addition refers to the creation of value in the economic sense, which is depicted in the idea of wealth. In this study, and value chain analysis in general, value or wealth is thus measured very similar to gross domestic product (GDP), but only scaled down to a particular chain, sector or individual company. From

this it follows that value addition and the aims of value chain analysis deal with economic growth, meaning development of the long term productive capacity of a chain, sector or nation. In a macroeconomic sense value is the contributions made by factors of production, land, labour and capital, which raise the economic value of a product. This rise in economic value is seen in the unit price of a good or in reduction of the cost of intermediate inputs, and corresponds with the incomes received by the owners of the productive factors. Value addition in value chain analysis is not only interested in the absolute value and wealth changes of goods and services, but also in the distribution of this value represented by the incomes received by the agents of an economy; households, firms, financial institutions, non-financial enterprises and the government. Some value is also directed back into invested capital in the form of depreciation. (Rudenko, 2008).

Based on the above a calculation a method for value addition can be defined. On the national level value added measures the sum of remuneration to labour, profit, interest charges and taxes. The distributional and chain aspects come into play when value added is examined and calculated for each stage of production. From this perspective an economic agent's value addition is can be calculated as the difference between the full value of output and the value of purchased inputs. (McCormick & Shmitz, 2001) (Rudenko, 2008).

In essence value addition can be calculated by the following formula:

VA = personnel remuneration + profit + interest charges + taxes + depreciation

The main aim of this thesis is to examine the creation and distribution of financial value in the Namibian diamond industry. To a great extent this work is descriptive in nature, tracking the chain links, active agents, labour effects and the economic value created by individual companies, separate chain links and the chain as a whole. However, the study will benefit from a contrasting view of value and its creation, which takes into account the rather peculiar character of diamonds as a good. These characteristics and details of the diamond industry and diamonds as goods are discussed later in chapter 4, but the contrasting approach presented by Bracking et al. (2014) will be discussed here from a theoretical perspective. The reason this approach is included in this study is that, in addition to the diamond industry analyses performed by Bain & Co. that act as a backdrop for the Namibian study, the case study on the South African diamond industry by Bracking & Sharife (2014) provides important insights to the broader context of this particular industry in Sub Saharan Africa.

The approach of Bracking et al. (2014) begins with the concept of *calculative rationality* as a basis of the economic sphere of thought. Here rationality refers to the view that we are self-interested accumulators of a certain type of wealth seen through money as the measure of all value. Calculative then refers to the process of abstracting, measuring and rationalizing bodies of nature. Value, in the economic sense, is here referred to as the degree to which objects are desired, particularly as measured by how much agents are willing to give up to get them. Calculative rationality produces so called *calculative technologies and devices* as well as *value framings* that enable objects to arise as "valued entities" in social spaces and markets. This process of defining and determining value shapes society and economy and can be associated with power effects. Even if Bracking et al. do not directly associate this to the theory of value chain analysis, they do state that the process they describe generates patterns in organization and distribution of wealth, which then relates closely to the previously explained ideas of barriers to entry, trade and rent and governance structures. In this respect their approach deepens the study of the analytical structures of value chains. According to the approach, the concept of value can be studied through four aspects of value systems that reveal important characteristics of the valued entity and how value is distributed in the networks of production.

Firstly, calculative rationality produces the notions of *calculative technology* and *calculative devices*. Calculative technology refers to the means and context where the valued entity exists, i.e. what is being done. In the case of the Namibian diamond value chain the relevant calculative technology is the process of determining the sales and export price of rough diamonds. Calculative devices then refer to the concrete techniques of carrying out the evaluation and pricing process, which in the case study of Namibia can be seen as the "Price Book" of the dominant rough diamond producer, evaluator and trader NamDeb Holdings, who sets the price of a rough diamond according to some 2000 price points. The details and setting of this price setting is discussed further in chapter 4.

Second, the institutions and agents that give rise to calculative technologies by applying calculative devices have to be taken into account. Here, Bracking et al. talk of *institutional assemblage*, where the value system participants function within the calculative technology and safeguard the way it is understood and the calculative devices used. Assemblage refers to the fact that this process is active and strategic, with agents having different levels of power to affect it. Here the link to barriers to entry, trade and rent seems most valid. As an example, in the case of the diamond industry, Bracking & Sharife (2014) suggest that the institutional assemblage for the pricing process of rough diamonds favours corporate influence over public

regulation, which also speaks of the relative power and governance of the powerful lead firms in the diamond value chain. In the case of Namibia this view can also be contested.

Third, presenting the fourth element of analysis, Bracking et al. introduce the concept of *discursive framing*, which refers to the particular way the institutional assemblage understands the process of creating value. These ways include narratives, discussions, value framings and ideological positions that affect the valuation process. In the case of diamonds, Bracking & Sharife (2014) propose that the preferred industry narrative refers to diamonds as entities that have no intrinsic value but a value that is created through cultural framing. This hypothetically has implications to how the industry stores and moves value it creates, including a possibility of making a profit in low tax jurisdictions instead of the countries of primary economic activity.

3.4 Globalization and value chain analysis in policy planning

Throughout this chapter various aspects of what the concept of global value chains (GVCs) capture of the complex reality of modern production and trade are studied. In this chapter a step further back is taken to look at some aspect of how changes approached in several ways in previous chapters could affect policy planning.

GVCs and the global fragmentation of production are to a great extent results of changes in the business and regulatory environment, as well as transformations of corporate thinking and business organization. Firstly, *trade costs* have fallen significantly in recent years. For goods these entail transport, freight and port costs, insurances, tariffs and duties as well as non-tariff measures. In the case of services, the equivalent of transport costs are communication costs, but these can also be seen to affect complex manufacturing through coordination costs as stated by e.g. Baldwin (WTO, 2013). Second, successive rounds of trade liberalization have meant fast reductions in barriers to trade and investment. Multi- and bilateral agreements have decreased tariffs and, sometimes even more importantly, taken down non-tariff measures. Simplification and harmonization of international investment structures have allowed firms to use FDI to spread production also to emerging regions, which has helped in these areas integrating into GVCs. Falling trade costs have indeed driven globalization for decades, but it has been the rapid developments of ICT that has added the needed tools for the change into a world best understood through GVCs. International dispersion of activities requires coordination and GVCs will only develop if trade, transaction and coordination costs together are lower than expected returns. In addition to the coordination aspect, ICT has made many previously unforeseen services tradable across borders. As the competitive and production

environment has changed in these ways, companies have adjusted their strategies and activities across the geographic and company maps to reach new levels of value addition. (OECD, 2013).

These changes can be understood through the previously introduced second unbundling coined by Baldwin (WTO, 2013) discussed now in more detail. Whereas the first unbundling refers to the spatial separation of production and consumption, the second unbundling of globalization dispersed production stages previously performed in close proximity across vast geographical areas. This second unbundling had effects that came to mark the new era of globalization. Firstly, the income divergence between the north and south started to reverse, with the G7 share of world income peaking in 1988 at two thirds and the fast drop to approximately half of all income in 2010. This trend is also seen to continue in coming decades. The second effect is the industrialization of the south and the de-industrialization of the North. De-industrialization is seen to happen quite uniformly across all developed nations, whereas the industrialization of the South owes to the excellent performance of about a dozen nations tightly knit into the global supply chains with China alone accounting for most of the reversal. An important further note is put forth by Hoekman (2013), who adds that moving into production of manufactured goods still means capturing more value added, but focusing on manufacturing capabilities is too narrow of a view. This is also the view of Sutton (2007b), who states that eventually raising productivity or cost competiveness has its limits whereas quality development benefits are unlimited. Continuing with Hoekman, high-income countries are service economies, capturing value in non-tangibles upstream, e.g. R&D and design, and downstream, e.g. retail and branding. 2/3 of GDP in developed countries comes from services, but they account for only ¼ of trade, as services are, at least to some extent, harder to move across borders. Back to Baldwin, his third effect argues that whereas the 20th century was about crossing borders, the 21st century is about the more complex networks of cross border movements of four key elements: goods (parts and components), investment (production facilities, training, technology and long-term business relations), services (complex coordination systems), and intellectual property (know-how, managerial and marketing skills). Fourth, developing countries no longer need to build extensive industrial bases in order to join GVCs. Now the more common route is to join already existing supply chains. Finally, developing nations are pursuing new forms of trade liberalization by dropping old policies, e.g. import substitution, FDI and local content restrictions, to attract offshored manufacturing and investment by liberalizing tariffs and working towards pro-business and pro-investor policies. (WTO, 2013).

Baldwin's second unbundling is then argued to demand a new kind of thinking within the policy sphere, which is still currently too much concentrated in globalization seen through the lens of the first unbundling, where production is seen to happen within chains contained by national borders and globalization is felt at the level of industries. Based on the trends and changes discussed before, four guidelines can now be seen to direct the economic environment and thus also relevant policy measures (OECD, 2013):

1. **Stages and tasks instead of industries**: GVC structures change what economies are seen to do. Exports no longer represent only domestic activities, but often contain much foreign content in the form of intermediaries. International labour division does not happen on the level of industries but on the level of stages, activities and tasks. Companies disperse activities in order to maximally benefit from competitive advantages and factors across countries.
2. **Individuals instead of firms, industries and skill groups**: GVCs and trade in tasks often affect individuals and firms in different ways, even within the same industry. Skills and capabilities are no longer necessarily the determining factor of success in the labour markets, as determinants linked to governance structures, e.g. character, codification and tradability of tasks, have become more important.
3. **Unpredictability**: Factors affecting offshoring activities are becoming more complex and hard to analyse. Tipping points for shifting activities are more sudden and unpredictable, which makes it hard to design policies that would permanently make certain nations more attractive for GVC members.
4. **Suddenness**: ICT development has fundamentally lowered costs related to coordination and transactions. Jobs and activities previously seen as untouchable by offshoring activities are becoming more mobile and changes may happen in fast leaps.

A direct need for change and a manifestation of trade and the economy seen through the second unbundling is evident in the statistics and measuring procedures guiding policy. Goods in different stages of production pass frequently in both directions of national borders. As an example Johnson & Noguera (2012) argue that compared to trade balance calculations in gross terms, value added balances put bilateral trade in very different light with often much lower imbalances. They state that the US-China trade imbalance in VA is up to 40 % smaller than in gross terms. In such a world measuring trade in gross terms creates a bias in trade accounting, which easily leads to wrong assumptions on competitiveness, economic development and measures in trade policy. Firstly, gross export statistics do not measure how much actual

domestic value added is in exports, i.e. how much foreign content is in exports. This was in the beginning of the previous chapter introduced as the vertical specialization (VS) measure, one of the primary GCV participation measures introduced by Hummels, Ishii & Yi (2001). The Hummels et al. VS measure was further formalized by Daudin, Rifflart & Schweisguth (2011), who calculated the VS1 measure, which reveals the share of domestic value added in foreign exports. Still more recently Baldwin & Lopez-Gonzalez (2013) studied the World Input Output Data from 1995 to 2009 to find three measures uncovering GVC patterns. The import content of exports is in essence the same as VS, whereas import content of production and factor content trade reveal new constructs in global trade. These measures bring further realism and accuracy to the world economy where countries have comparative advantages in certain stages and tasks within value chains where effective imports may be a crucial element. These parts of the economy may very well then be hurt by protectionist measures that are meant to help them. Another characteristic of trade understood through GVCs is that domestic value added is also found in imports in the form of intermediaries that are shipped abroad and then re-enter the domestic market at a later stage of production to act either as a further intermediary or a final good. In such cases trade measures put in place without understanding the chain and network structures may affect domestic companies upstream. Third, the distorting view given by gross figures relates to upstream production also from another perspective. Many upstream companies may significantly contribute to exports as inputs even if the industry or task has little direct international exposure. Understanding the links and feed structures within industries can thus give rise to policies that improve export competitiveness through the idea of systemic efficiency of the entire value chain. Finally, measuring impacts on some very important aspects of global production, e.g. job creation and CO^2 emissions, is only meaningful in the environment of value chains and networks. Decomposing production into tasks and contributions of individual economies, industries and companies reveals the correct distributions of benefits across these actors, but also where most of the job contents, emissions, etc. are created, which can then be targeted for effective policy measures. (WTO, 2013).

Based on these arguments, it is a real problem that data is mostly available only at the economy and industry level, which do not allow for distinguishing between imported intermediary and domestic value addition in exports. These issues are witnessed in the OECD (2013) and WTO (2013) TiVA (trade in value added) studies where early findings state that exports require imports and a high share of intermediate imports are used to serve export markets. VCA and TiVA measuring is able to access these feed structures not only in the descriptive domain of

intermediary, monetary and service flows, but also from the analytical perspective of chain governors actively shaping the chain and creating barriers to entry, trade and rent.

The nature of trade and production as divided into tasks where products pass national boundaries in several stages of completion, also demands a different rationale when thinking about national borders. Thick national borders complicate international trade and affect the sourcing of inputs, which may be key in accessing value chains (OECD, 2013). This argument is also stated from a slightly different perspective by Hoekman (2013), who looks at non-tariff measures (NTMs) in affecting participation in global value chains. According to him government policies affecting trade and operation costs include much more than the traditionally perceived import tariffs, export restrictions and local content requirements. NTMs, such as border management measures, quality of logistics and transport services, communication infrastructures, product regulations, licensing requirements and data reporting standards often have significant effects on barriers to competition. Looking at specific value chain barriers and lowering them may be much more effective in increasing real incomes than decreasing tariffs, because value chain barriers eliminate resource waste, whereas tariffs mostly only deal with reallocating resources. An important note on the developing country foundations of growth is that SMEs often suffer disproportionately from value chain barriers as fixed costs linked to them are often high and unrelated to volumes shipped. In general Hoekman concludes that instead of focusing on policy standards, tariffs and sectoral policies, the focus should be turned towards specific value chains and barriers that hinder their efficient functioning.

3.5 From theory to a limited value chain analysis of Namibian diamonds

This chapter has given the broader framework of theory for a limited value chain analysis of the diamond industry in Namibia. In essence the different aspects of the chain which will be examined were given, along with arguments related to the global changes in production and trade that make VCA a viable approach for analysing economic activity. Many aspects that are subcategories of global developments will naturally come up also in the more concrete Namibian industry analysis. Measuring trade and activity contributions in value added, different modes of governance structures carried out by lead firms, concrete examples of barriers to entry, trade and rent, as well as policy guidelines and characteristics of Sub-Saharan Africa will be studied and broadened. The methodology of carrying out analysis through financial data, interviews and a questionnaire will also be presented in the next chapter.

4 A limited economic value chain analysis of Namibian diamonds

The previous chapters have painted a fundamental picture of Namibia, its mining sector and the role of diamonds in the nation's economy. Theory of international trade and value chain analysis were also discussed where applicable to providing a background for the case study of Namibian diamonds. This is what the rest of the paper will focus on.

Before moving to the particulars of the Namibian market and context, the global diamond value chain has to, however, be discussed. This is mainly for the reason of giving a benchmark for demarcating the diamond value chain and to highlight similarities and differences arising in the thoroughly analysed case of Namibia.

After setting the global stage, the paper will move on to describing the Namibian diamond market. The key players and the involvement of the government will be explained, especially as the value chain faces expectations for more local value addition from stakeholders at large, which also explains the role of the Offshore Development Company under the Ministry of Industry and Trade of Namibia as the initiator of the study. In this part the legislative and policy environment will also be discussed.

Before moving to the actual case value chain analysis, the methodology of how the research was carried out will be outlined. First, the choices made in demarcating the national chain are explained as they slightly differ from the global chain demarcation used in industry studies on the global scale. As will be shown, this is due to meaningful company boundaries, but also follows from the scope of this study, which is limited. After the demarcation, the aspect of financial analysis is discussed. As a limited analysis, key aims of this study were to get an idea of financial revenue based valued addition throughout the value chain and the volumes of Namibian diamonds which travel all the way to end of the chain. The financial questionnaires answered by the companies are explained here, as well as setbacks on gaining access to data on certain steps. The companies were also asked to answer questions on the development of the national value chain and these questions are explained after the financial analysis. Finally, the discussions had with various chain participants are outlined to sum up the methodology section.

The value chain analysis of Namibian diamonds will follow the four step demarcation found most appropriate, and assess these steps and the entire chain through the descriptive and analytical tools outlined in the theory of value chain analysis in chapter 3. The characteristics, strengths and challenges of each step and the entire chain will be discussed especially in

relation to the call for more local value addition. As will be shown in the analysis of key players and descriptive tools the role of a prominent multinational firm also has to be discussed as it is a defining characteristic of the Namibian chain but also the global diamond industry. Some ideas on value chain development by using the tools of benchmarking and upgrading will also be suggested. Concluding remarks and related policy suggestions sum up the chapter.

4.1 The global diamond value chain

For the purpose if this study, the origins of the global value chain of diamonds can historically be traced to the 1870s and the discovery of massive diamond deposits near the Vaal and Orange River regions of South Africa. These findings created a diamond rush, which among many other businessmen sparked interest in a British-born politician Cecil Rhodes, who started systematically buying small diamond claims in South Africa. Rhodes was the founder of De Beers, a commercial mining company, which, by the time Rhodes died in 1902, accounted for 90 percent of world rough diamond production. The other key figure in the story of diamonds is Ernest Oppenheimer, a German-born businessman and financier. As the founder of the Anglo American Corporation he continued buying De Beers shares until 1927, when he became the most significant shareholder and later the chairman of the company. Under his leadership De Beers became a global diamond empire, which defined and dominated the mining, trading, marketing and manufacturing sectors of diamond business for most of the 20th century. The involvement of the Oppenheimer family only ended in 2011 when they announced the sales of their shares to the Anglo American Corporation.

These beginnings of the diamond industry are not only interesting from the perspective of historic trivia. De Beers as an individual company is in essence solely responsible for the creation of today's global demand of diamonds, which owes to a long and highly successful marketing campaign started in the first half of the nineteen hundreds. During several decades diamonds first became associated with romance and lasting, timeless love in the United States, but slowly also globally. As an example the share of brides receiving a diamond engagement ring had risen in USA from 10 percent in 1939 and in Japan from 6 percent in the 1960s to over 80 percent in both countries by the 1990s. These at first look seemingly gradual and small actions of a single company can be argued to have extensive implications throughout the value creation, evaluation and pricing processes carried out by agents in the value chain. According to Bracking & Sharife (2014), they create structures in the chain, which may favour corporate stakeholders over public interest, and give private industry entities much power in defining the

way they store and move the value they create through economic activities. The creation of the value of a diamond by companies thus leads to a discursive framing where diamonds as such have no intrinsic value but whose worth is defined by cultural framing (see chapter 3.3 The concept of value). (Bain & Company, Inc., 2011).

Even though naturally not an exhaustive description of the global value chain of diamonds from mining to end products, the above story does highlight the fundamental structures of what is discussed in this chapter. The diamond pipeline is in the beginning dominated by De Beers and a handful of other global mining giants creating a supplier driven governance structure that to a great extent also shapes and limits the behaviour of agents in the following steps of production. The role of De Beers is not only important from the global perspective, but also bears significance to the Namibian case study at hand. De Beers, through a 50-50 joint venture with the Namibian government, is in essence the sole producer of rough diamonds in Namibia.

The following pages define several aspects of the global diamond value chain. The demarcation or mapping of the value chain is carried out first, explaining the different stages of production and the agents within those steps all the way to the end markets. The explanation of mapping will also include structures of how diamonds are passed from one stage of processing to the next. Global dispersion of production will be described next, followed by the main focus of this study; the financial aspects of value creation, such as revenue dispersion and profit margins. To end, a significant tool of governance and an industry barrier to entry, trade and rent, the Kimberley Process dealing with problems of conflict diamonds, will be explained.

4.1.1 The global diamond value chain has eight stages

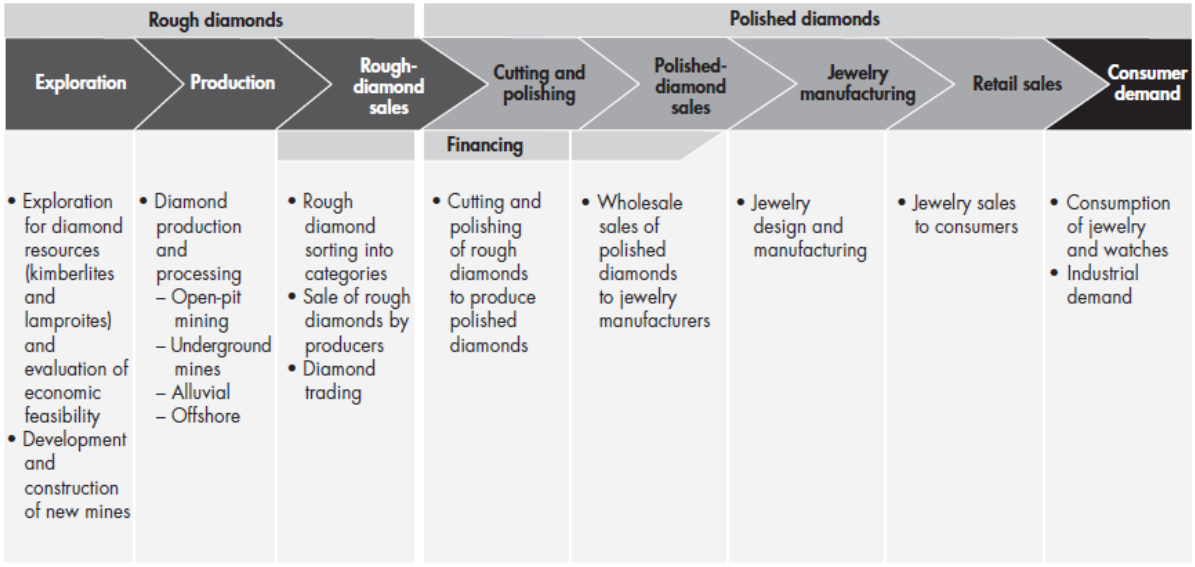


Figure 1: The eight stages of the diamond value chain (Bain & Company, Inc., 2011,p. 19)

According to the Bain & Company (2011) demarcation, the global diamond value chain can be divided into 8 stages:

1. **Exploration** entails the producers seeking commercially viable diamond resources in the form of lamproite and kimberlite pipes, which contain diamond ore. Only about 1 % of found resource locations can be developed economically. The field development cycle from exploration to beginning of mining is 6 to 10 years.
2. **Production** is done through open-pit, underground, alluvial or marine mining, with the last two highly applicable to the case of Namibia. After the diamond ore is extracted from the ground it goes through several phases of processing to arrive with rough diamonds.
3. **Sales of rough diamonds** happens after rough stones have been sorted and evaluated by the producing companies.
4. **Cutting and polishing** transforms rough stones into finished gemstones.
5. **Sales of polished diamonds** take place as the finished gemstones are sold to jewellery manufacturers.
6. **Jewellery manufacturing** sets gemstones into diamond jewellery to be sold to the final customers.
7. **Retail sales** takes place through various channels across the globe.
8. **Consumer demand** and its fluctuations drive the final markets and affect the different stages of the value chain in varying ways.

Before further examining the division of labour and the composition of the value chain from the aspect of agents, it is important to explain a few assumptions built into the above demarcation of the above chain. The key issue to understand here concerns the last step of the value chain, the consumer demand. As depicted in Figure 1, the final markets of diamonds actually consists of two different segments, broadly the diamond jewellery market and the industrial uses for diamonds. Diamonds are used in industrial tools due to their characteristics of hardness, thermal conductivity and optical dispersion. Today, slightly more than 50 % of the volume of diamonds end up in gemstone jewellery, but these account for more than 95 % of the total global market value of mined diamonds. This brings rise to another interesting market characteristic of diamonds; diamonds can also be industrially manufactured, but this second source of supply does not compete for the same market with "natural" diamonds. The manufactured or "synthetic" diamonds end up being used for industrial purposes and do not enter the markets of diamond jewellery (see figure 2) (Bain & Company, Inc., 2014). In fact, the diamond jewellery market agents have been remarkably successful in market differentiation for natural and manufactured diamonds, bearing in mind that in physical properties and chemical makeup the end products themselves are in essence identical. Due to these reasons the analysis of the end market of industrial applications of diamonds is left out of this study, and the single end market is identified as the consumption of diamond jewellery.

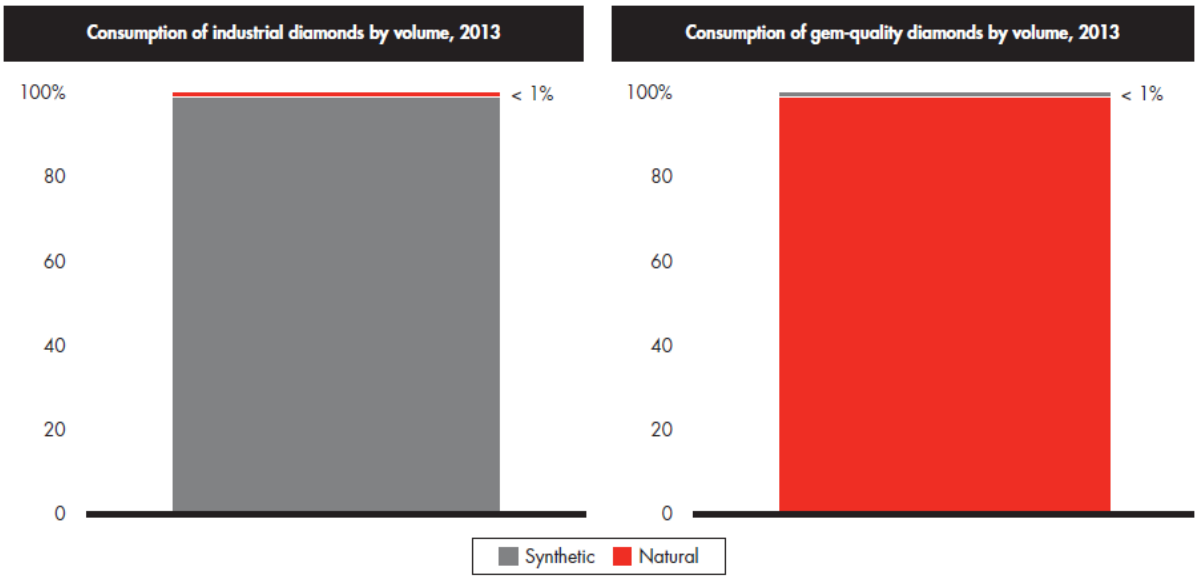
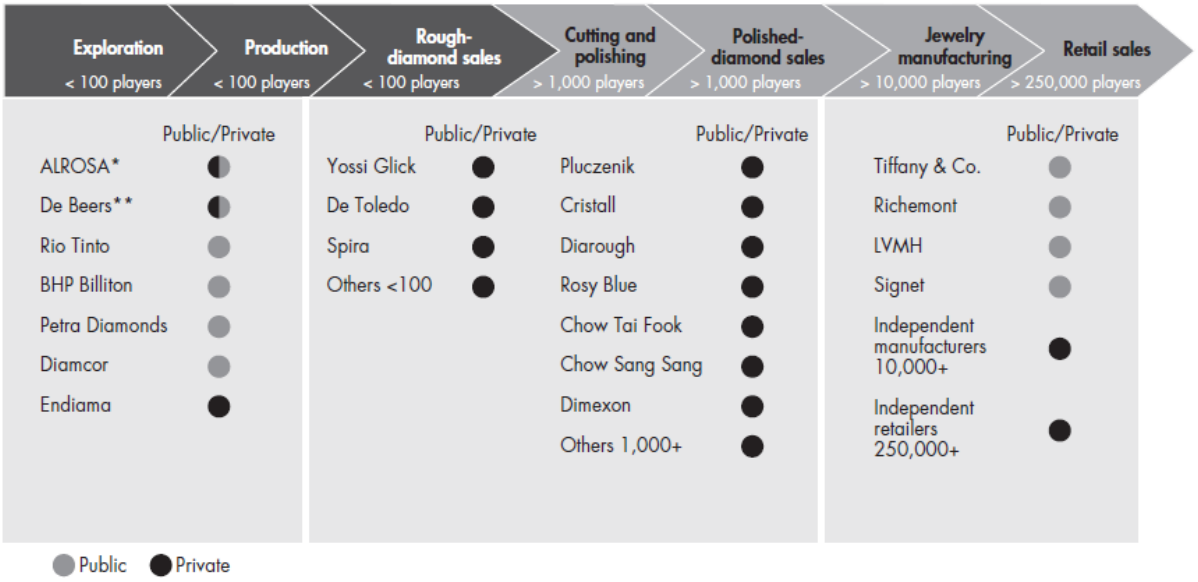


Figure 2: The final market of synthetic diamonds is in industrial applications (Bain & Company, Inc., 2014, p. 34)

4.1.2 High concentration upstream, fragmentation downstream

The next stage of mapping the global value chain of diamonds focuses on the agents active throughout the chain and the ties these actors have with each other. When looking at solely the number of actors present in the value chain, a pattern is found of upstream concentration and gradual fragmentation as the diamonds travel through the chain to the final customers. Starting with less than a 100 actors in exploration and mining, the agent count reaches 250 000 in retail sales of jewellery (figure 3) (Bain & Company, Inc., 2011).



*ALROSA is registered in Russia as an Open Joint Stock Company; **De Beers is part of Anglo American, which is a publicly listed company
Source: Bain analysis

Figure 3: The diamond value chain is concentrated upstream and fragmented downstream (Bain & Company, Inc., 2011,p. 21)

The number of agents does not, however, adequately capture the dominant position of a handful of firms throughout the chain. When looked at in terms of volumes and values, a more detailed picture is painted; the top 5 players in exploration and rough diamond production account for 70 % of total volumes and approximately 85 % of total value. In addition, and even though the middle and downstream markets are fragmented in numbers, approximately 110 long term contract holders of the top 5 rough diamond producers hold 70 % of supply value feeding into the various stages of the chain. These 110 companies are mostly integrated throughout multiple functions in the value chain. (Figure 4) (Bain & Company, Inc., 2014).

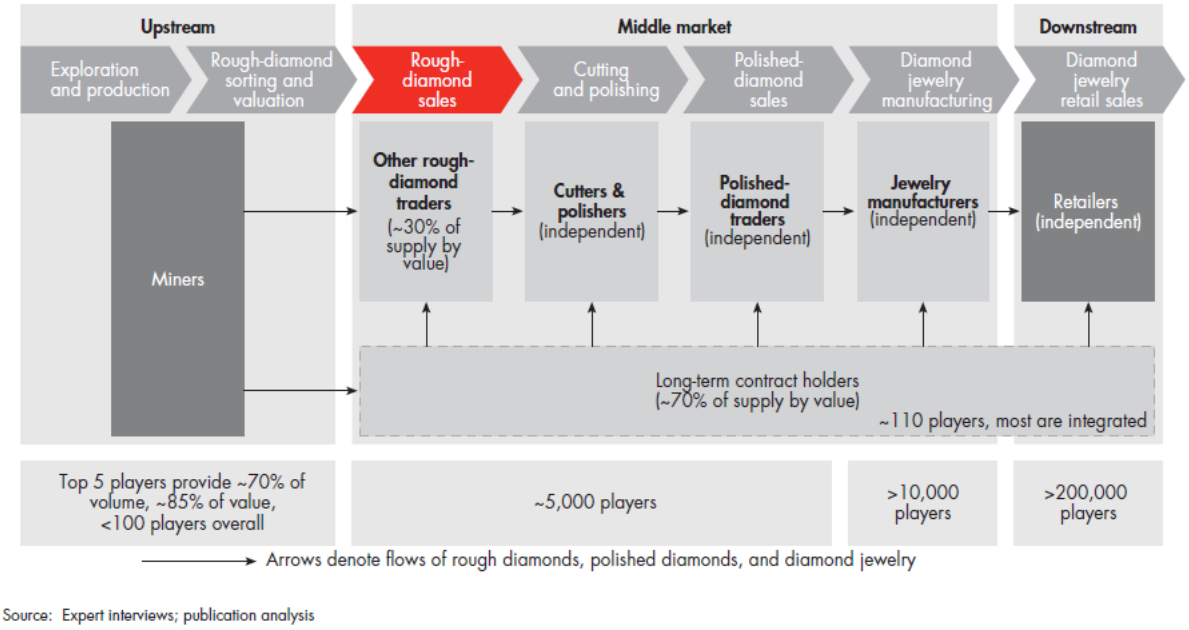


Figure 4: Considering volumes and value shows greater concentration, also downstream (Bain & Company, Inc., 2014, p. 29)

To understand the relative concentration of the diamond market but also the different roles of the agents the next step is to concentrate on the supply and trade structures of how diamonds pass from one stage to the next. The nature of these ties will be examined for the following three transactions; the sales of rough and polished diamonds, and sales to final consumers of diamond jewellery.

4.1.3 Rough diamond sales are carried out through three main channels

Access to rough diamonds is one of the key junctures of the diamond value chain and, as will become evident also in the case study of Namibia, a major factor that defines the governance structure of the chain. For most of the diamond market history, and previously explained De Beers empire, the main sales channel of rough diamonds was the De Beers Central Selling Organization (CSO), which had long term contracts with a very select group of customers. When the CSO was terminated during the 1990s, new sales channels started to emerge, but long term contracts still remain the main channel of sales for most rough diamond producers. According to Bain & Company, Inc. (2013), long term contracts account for 65 % of sales value, followed by auctions at 30 % and short term contracts and spot-sales accounting for the final 5 %.

Long term contracts within the diamond industry are organized through a so called *sightholder system*, where a select group of buyers are allowed to purchase rough diamonds. The system was originally set up by De Beers with the sightholders referring to a group of

clients who met at a location called a *sight* to inspect the stones on sale. Now the sights actually refer to the sales themselves, which occur every four to six weeks, depending on the producer. The sales process is, in fact, quite peculiar and seems to mirror the strong governance position of rough diamond producers. Producers sell rough diamonds in boxes or parcels, which have pre-set quantities, qualities and prices. Producers try to assemble the parcels in a way that matches the needs of their clients. The clients are only allowed to accept or reject the parcel; the prices or contents of the boxes themselves are non-negotiable. Being a sightholder is highly advantageous, with less than 100 sightholders working with prominent producers. These sightholders purchase in excess of 70 % of all rough diamonds produced globally. (Bain & Company, Inc., 2011). Figure 5 demonstrates the importance of the long term contracts in the sales of rough diamonds; major players sell 50 – 90 % of rough diamonds through them (Bain & Company, Inc., 2013).

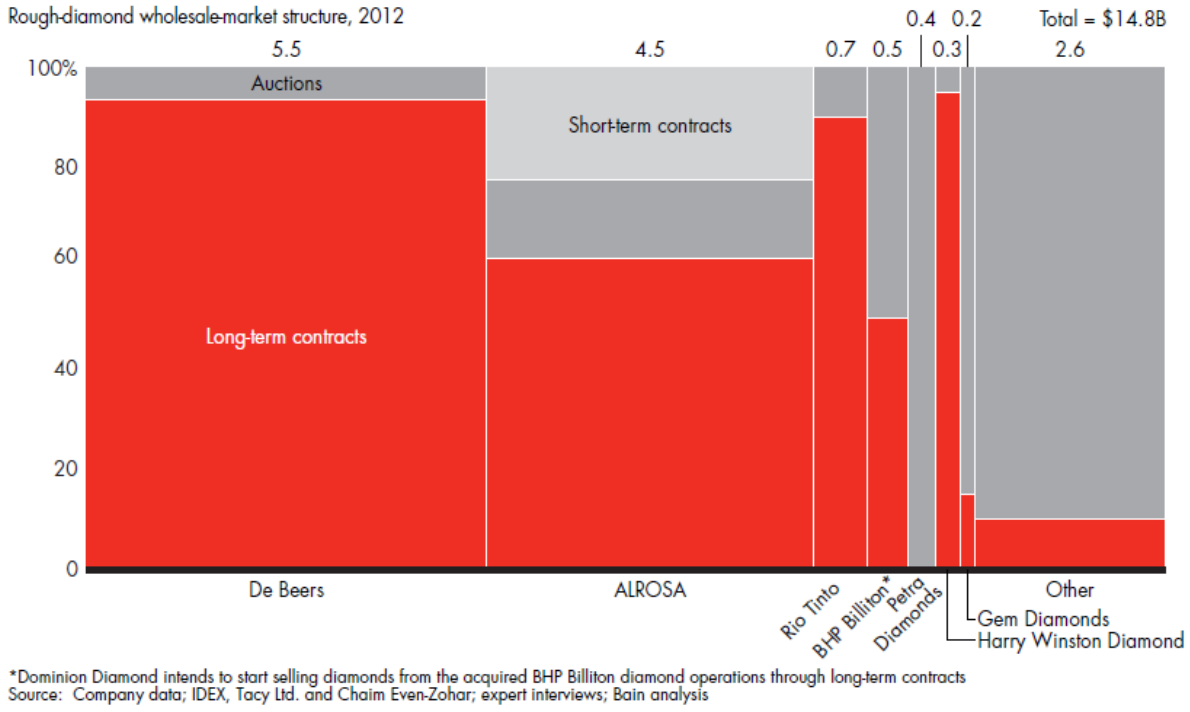


Figure 5: Major players sell 50-90 % of rough diamonds through long term contracts (Bain & Company, Inc., 2013, p. 31)

The second channel of rough diamond sales, **auctions**, used to be a choice of sales only for large stones to the beginning of 2000s, but have since gained an important role in market transactions as demand for trade outside long-term contracts has grown. With 30 % of sales occurring through auctions, they are often carried out in a similar way as sights, with an

assortment of stones set into boxes or parcels. As the buyers are not committed to the sellers by contracts, they can better take advantage of the present market realities.

Spot-sales account for the final 5 % of transactions, where producers sell rough diamonds to buyers in the form of once-off contracts.

Each of the three ways of sales carry their own advantages. Long-term contracts guarantee supply and stability. Auctions allow producers to maximize profits if the market conditions are right, they provide market intelligence on real time prices and volume demands, enable the sale of single exceptional stones, and as auctions are relatively inexpensive to administer, allow to cut sales costs. From the buyers side there are also advantages to auctions with not being forced to undergo strict demands of due diligence carried out on long term customers, as well as being able to collect precise varieties of diamond portfolios the buyers' clients might have. Spot-sales have similar advantages of covering those stones unfitting for long term buyers or of exceptional quality. (Bain & Company, Inc., 2011) (Bain & Company, Inc., 2013).

4.1.4 Global diamond trading revolves around six diamond hubs

As most of the sales of rough diamonds are dominated by the large diamond miners who pass the output of mines to the next stages through long term contracts at sights, the sight centres naturally play a large role in the global diamond trade. For the large upstream players the sight centres are mostly at the same location as the sorting centres where the rough diamonds are gathered from several mining locations, evaluated and aggregated into parcels or boxes before being presented to sightholders. Apart from a few exceptions, these centres are situated in the same locations as many other key functions of the diamond value chain, which together have created six so called diamond hubs (see figure 6). In addition to sorting centres, second tier dealers, sales offices of cutting and polishing companies and diamond related insurance and financial companies have together created diamond value chain nodes in these locations. Three of these, New York, Antwerp and Tel Aviv, have held their importance throughout the history of global diamond trading, with the next three, Dubai, Mumbai and Hong Kong, mirroring the emergence of new players and global macroeconomic development trends. The emergence of new hubs has been fuelled by favourable taxing regimes, transfer pricing legislation and proximity to large cutting and polishing centres in India, as well as other final markets in Asia. In addition to sorting and sight centres channelling rough diamonds down the chain at the global hubs, the second tier of trading, sales of cut and polished diamonds, also happens mostly at the hubs. Approximately 60-70 % of trade in cut and polished falls under direct contracts

from regional offices located at the hubs, mainly Antwerp, New York and Tel Aviv. The other 30-40 % of trade takes place in large exhibitions of cutters and polishers mainly in established locations led by Hong Kong, Las Vegas and Basel. (Bain & Company, Inc., 2011) (Bain & Company, Inc., 2013).

Figure 6: Global diamond trade revolves around six hubs (Bain & Company, Inc., 2013, p. 40)

Outside what happens at the hubs, two companies and their actions deserve a special note in this regard. De Beers, the global rough diamond production leader in value terms, draws significant attention to Southern Africa, with three sight and sorting centres in South Africa, Botswana and Namibia. A significant development of late has been the relocation of the De Beers main sight centre from London to Gaborone, Botswana. This can be seen to answer the significant global call of origin country beneficiation, which will continue to be a major development point and challenge affecting especially the global mining giants but also the rest of the value chain. Local value addition will be discussed in depth in the case study of Namibia. The other note is on the functions of ALROSA, the Russian rough diamond producer competing for the position of global number one producer, currently being the leader in volume terms. ALROSA holds sights in Moscow, also outside the main six diamond hubs. (Bain & Company, Inc., 2013).

4.1.5 USA, China and India are main final markets for diamond jewellery

As touched upon in the beginning of the chapter, the two main final demand sources for diamonds are jewellery and industrial applications, which in total carat volume terms both pull about 50 % of total production. In value terms the story is, however, very different, with jewellery demand accounting for approximately 95 % of total value created in the beginning of the value chain of diamonds. In addition, even as about 50 % of mined diamonds end up in industrial applications, the industrial applications final market is dominated by manufactured or synthetic diamonds, which account for 99 % of inputs. The two end markets, jewellery and industrial applications, are thus very separate when it comes to inputs; synthetic diamonds do not enter the jewellery markets as inputs, and are thus left out of this analysis. Another reason for this distinction in the study is that Namibia as the case example at point, produces in global comparison very high gem quality diamonds, for which the end market of jewellery is by far the applicable one in value terms. What follows is a short look into the final demand of diamonds in the global jewellery market.

Even if natural diamonds are mined in similar ways to commodities like gold, copper and tin, they cannot be regarded as a commodity but a luxury good. End users purchase diamonds for their aesthetic, symbolic and status value, which in essence are culturally framed (Bracking & Sharife, 2014). From a broader perspective diamonds belong to the same luxury product pool as other jewellery, watches, high-end apparel and accessories as well as fragrances and cosmetics. These goods are associated with high end brands, labels, exclusive retail settings and normally sell at premium prices, which also withhold a sense of exclusivity for the end user. Within this pool, fine jewellery, which contains precious metals and a wide variety of precious stones, is estimated at 160 billion USD in annual retail sales (Bain & Company, Inc., 2011). In the global markets USA is by far the largest consumer of luxury goods, accounting for roughly a quarter of global consumption. Even with the fast growth of the luxury good markets in Asia, North America and Europe together still claim 70 % of the global luxury market in value terms (Bain & Company, Inc., 2013). The particular financial characteristics of the diamond value chain will be discussed later in this chapter.

As seen in figure 7, the consumption of diamond jewellery is to a great extent located in the three economic powerhouses of USA, China and India, accounting for roughly 60 % of the entire global market. These areas also drive the diamond industry's growth, and are expected to do so also in the future (Bain & Company, Inc., 2014). Even if still in absolute terms smaller than the US market, China and India are by far the fastest growing markets, with China boasting

a compound annual growth rate (CAGR) of 27 % and India 11 % in the time span of 2006 – 2012 (Bain & Company, Inc., 2013).

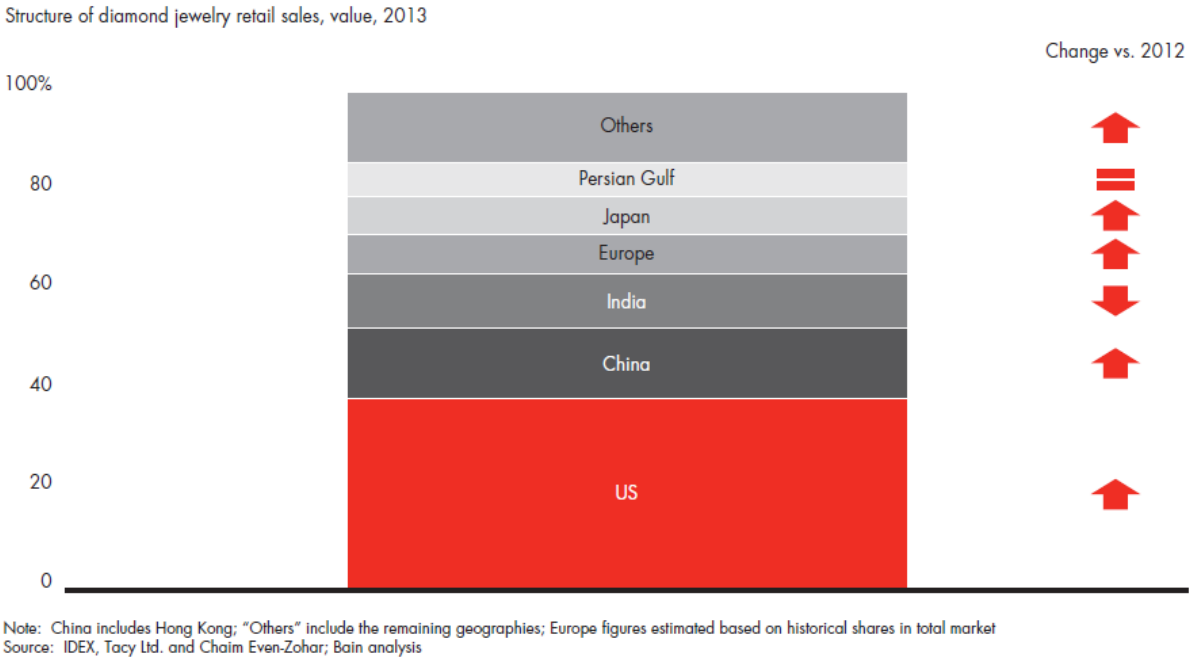


Figure 7: USA, China and India account for approximately 60 % of global diamond jewellery consumption (Bain & Company, Inc., 2014, p. 5).

4.1.6 Global diamond mining is concentrated geographically and company-wise

As the beginning of the diamond value can be seen to have a high governance impact on the entire industry, it is worthwhile to take a closer look into the production of rough diamonds. Bain & Company, Inc. (2011) estimates that 70% of the world's diamonds are located in Africa and Russia, the figure holding relatively well both in volume and value terms (see figure 8). Australia and Canada are other main production regions, but also rather new entrants to the value chain. In general, but especially as it is relevant for Namibia as a diamond producer, it is important to note that there is significant variation in the value of diamonds mined at different locations. Namibia's output, for example, consists of very high gem quality diamonds, which pushes up its global output contribution in value compared to volume terms. The same can be said for Canada. Another important note is that the quality of deposits varies a lot also in volume terms. In reality, global diamond production is sourced from very few mines; the world's largest 11 mines in Africa, Russia and Canada accounted for 62 % of all production in 2011.

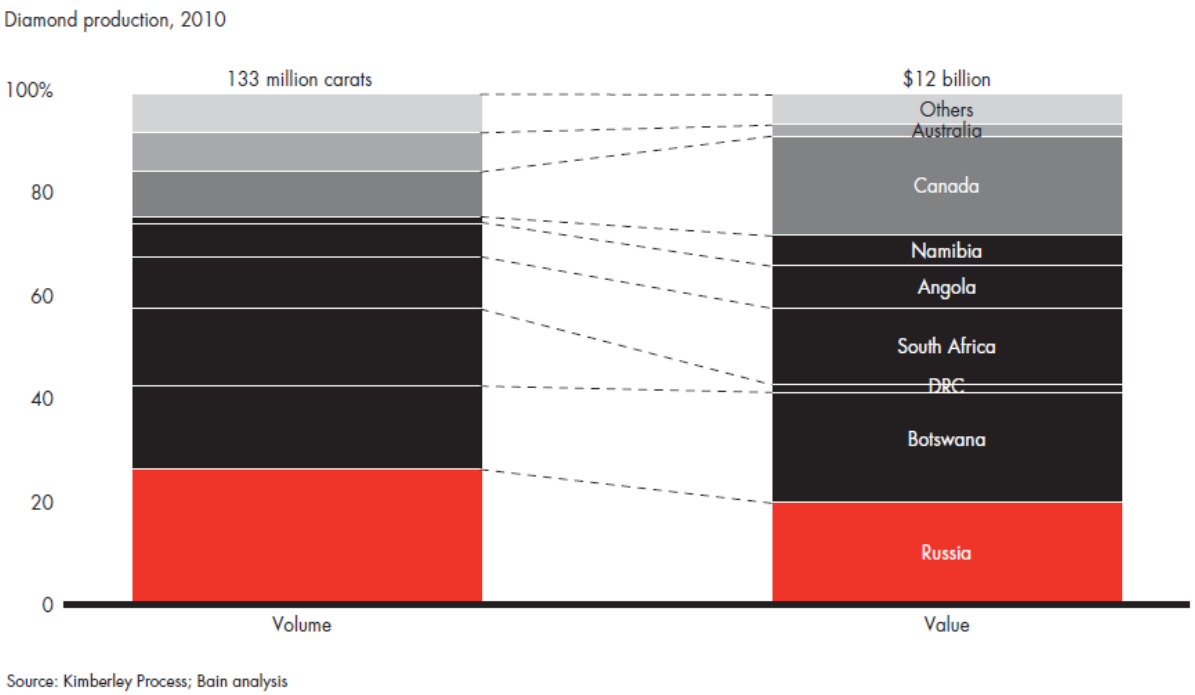
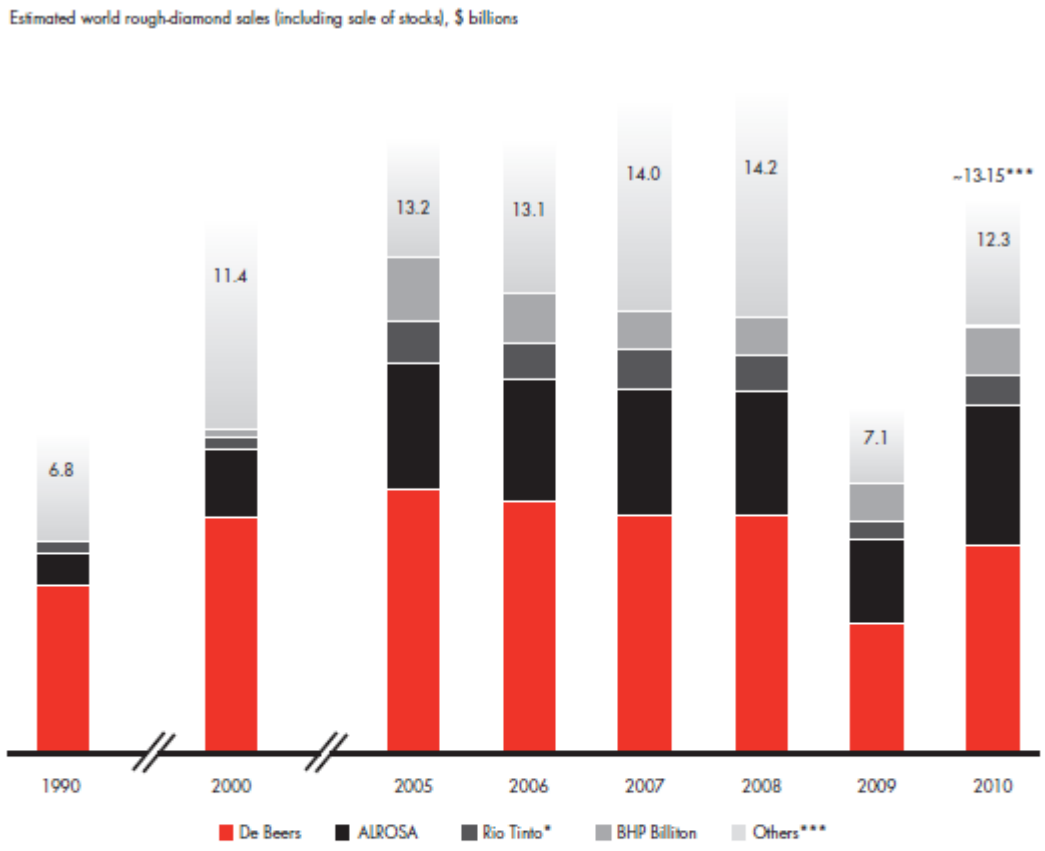


Figure 8: Africa and Russia account for 70 % of global rough diamond output (Bain & Company, Inc., 2011, p. 30)

The concentration of rough diamond production does not end in geographical dispersion, but is also very much visible in terms of market participants. The combined production of two largest agents, De Beers and ALROSA, accounts for 70 % of total worldwide output. In geographical terms De Beers' mines are situated in Southern Africa and Canada, whereas ALROSA is the single Russian agent on the market. In fact, both global giants compete for the title of the number one actor in rough diamond mining, with De Beers leading in value of production and ALROSA in volume. Figure 9 outlines the global value of sales for rough diamonds throughout the second half 2000s, ending in 2010, which show the prominent role of De Beers on the market and the effect of the financial crisis that started in 2008. The total global sales of rough diamonds were valued at 12,3 billion USD in 2010, though some estimates put the figure in the range between 13-15 billion USD. The higher figures try to estimate production of smaller players and artisanal mining, whose figures are hard to reliably quantify. (Bain & Company, Inc., 2011).



Global rough-diamond sales (including sale of stocks), $ billions

Producer	1990	2000	2005	2006	2007	2008	2009	2010
De Beers	4.1	5.9	6.5	6.2	5.9	5.9	3.2	5.1
ALROSA	0.8	1.7	3.1	3.1	3.1	3.1	2.1	3.3
Rio Tinto*	0.3	0.2	1.1	0.8	1.0	0.8	0.5	0.7
BHP Billiton**		0.3	1.5	1.3	0.9	1.0	0.9	1.3

Figure 9: De Beers is the global leader in value of produced rough diamonds (Bain & Company, Inc., 2011, p.31)

A depiction of the entire global diamond value chain containing a comprehensive picture of the aspects of geographical and market participant concentration with respect to value creation in 2011 is provided by Sherbourne (2013) as shown in figure 10. A few notes are in order considering what has been discussed in previous paragraphs. Mine sales to industry show the prominent role of DTC, the sales organization of De Beers, which in total terms account for 6,47 billion USD, or 36 %, of total sales of 18 billion USD at this stage of value addition. Another important note concerns the middle market of cutting and polishing, where the prominent position of India is witnessed, accounting for approximately 60 % of all production. The role of India and drivers of global concentration in cutting and polishing will be discussed

to a greater extent under the case study of Namibia, and here it suffices to say that the success of India lends greatly to cost differentials across regions, with India being very competitive with respect to cutting and polishing costs, especially labour costs (Bain & Company, Inc., 2011). This part of the chain, however is also facing increasing pressures, especially in Africa, of local beneficiation demands, which to some extent surpass the cost drivers of market participants. This seems to be evident when even as India and China have been the absolute growth drivers in cutting and polishing in 2006-2013, with respective CAGR in national industries of 3 % and 6 %, Africa has achieved a CAGR of 12 % within the same period with much higher per carat processing costs (Bain & Company, Inc., 2013).

After now having discussed the demarcation of the diamond value chain in actors, actor relationships and production flow channels, geographically and in total value terms, the focus of the study turns to the financial aspects of value creation. These selected financial aspects will function as the global benchmarks of understanding the Namibian case study, tracking similarities and differences to the global industry in this specific region.

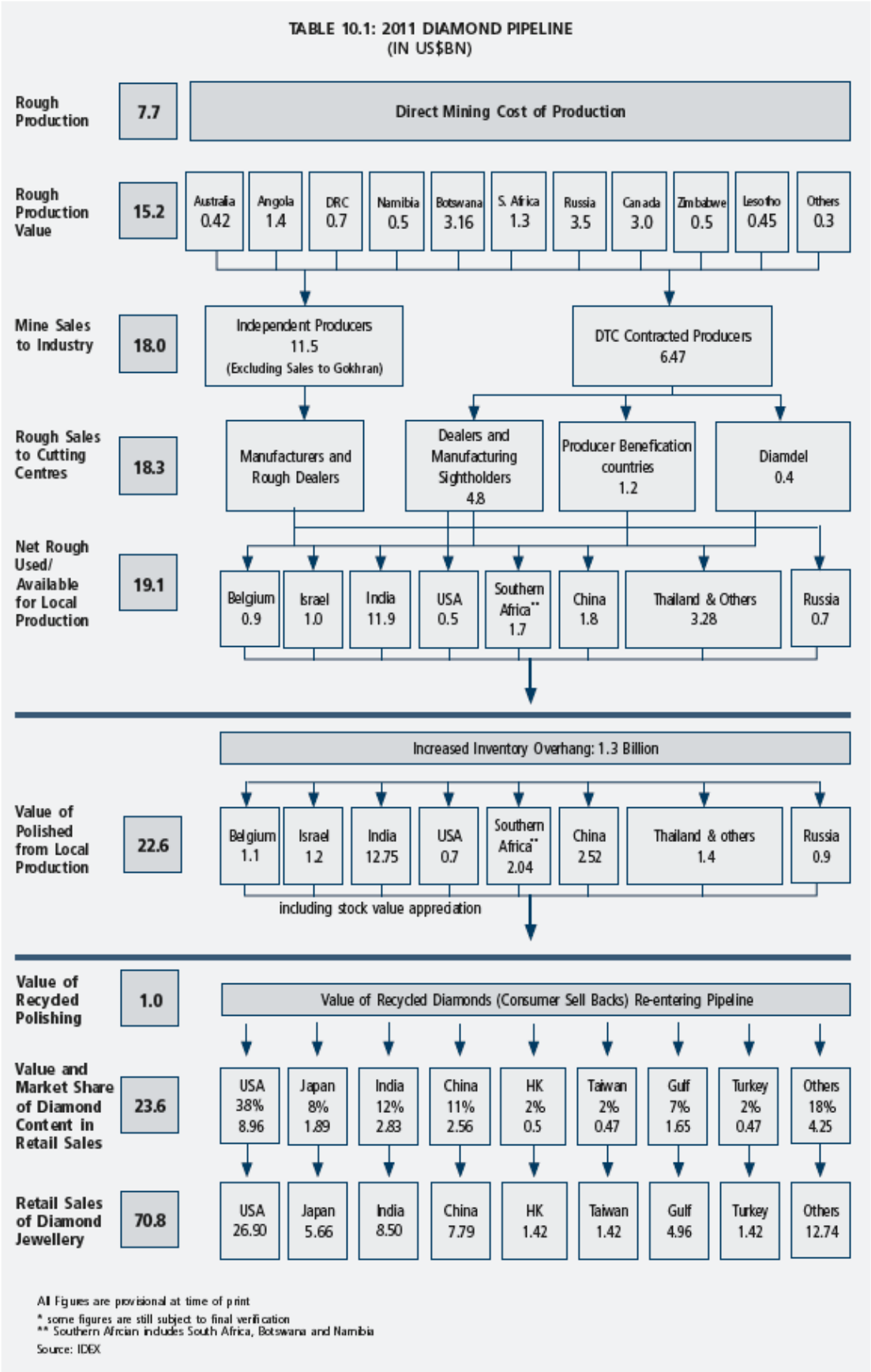


Figure 10: The complete global diamond value chain in 2011 (Sherbourne, 2013, p. 222)

4.1.7 Financial analysis of the global diamond value chain

The fundamentals of financial analysis in the scope of this study can be summarized under revenue based value addition and the profitability of actors within different steps of the value chain. Especially profit margins paint a picture of governance structures and market competition at each stage of production. It is these aspects in addition to product flows and employment effects the Namibian case study will concentrate on, and as such it is important to provide a global benchmark of the industry performance.

In absolute terms the revenue received throughout the value chain increased in 2012 from 14,8 billion USD (18,3 billion USD in 2011) in rough diamond sales to 72,1 billion USD (70,8 billion USD in 2011) in diamond jewellery as seen in figure 11 (Bain & Company, Inc., 2013).

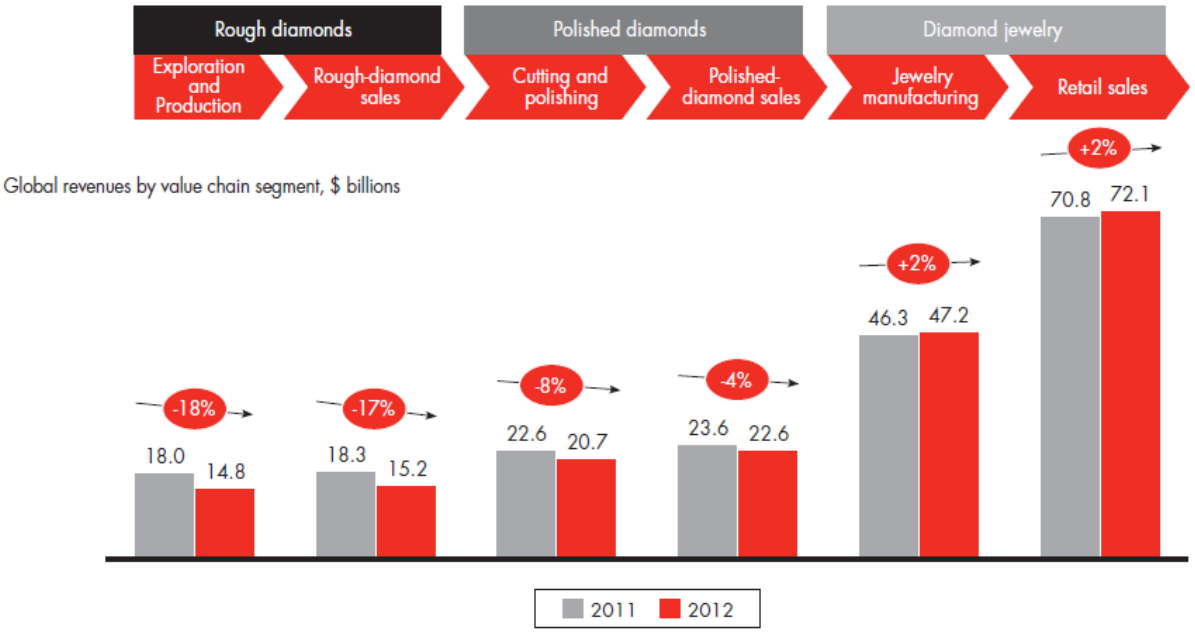


Figure 11: Revenues increase fivefold from rough diamond sales to jewellery retail (Bain & Company, Inc., 2013, p. 3)

Keeping this in mind, it can be noted that the highest value addition in absolute terms is achieved in jewellery manufacturing and retail, as shown in figure 12.

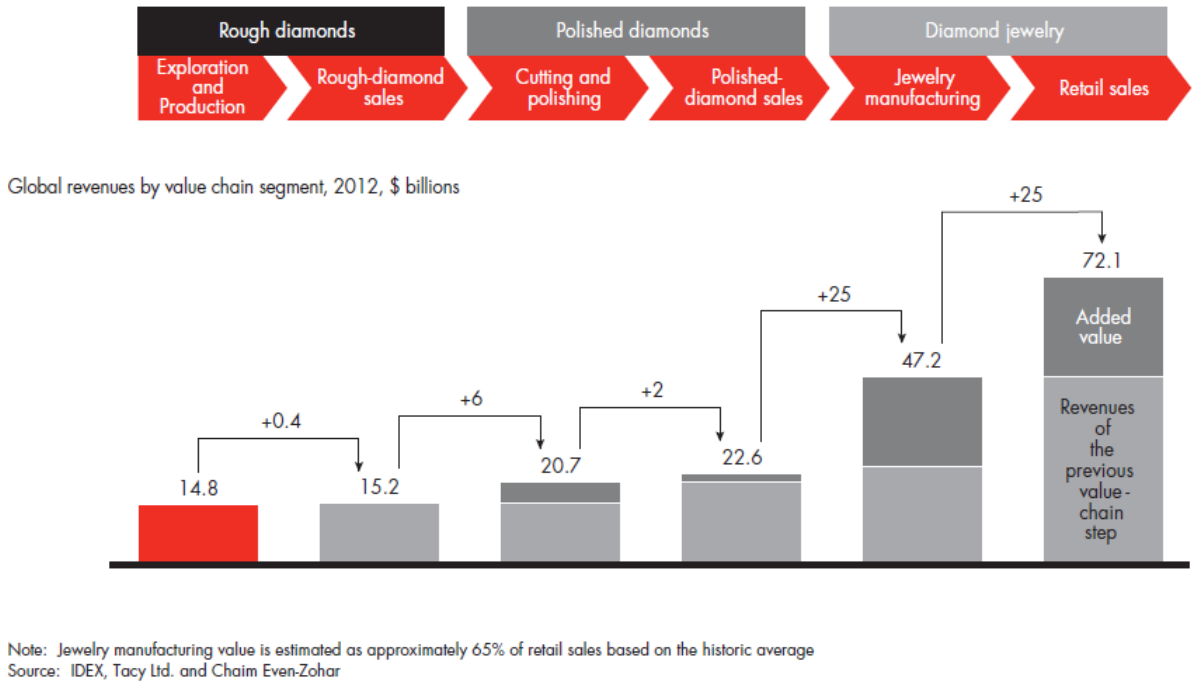


Figure 12: Highest value addition is achieved at the end of the chain (Bain & Company, Inc., 2013, p. 5)

Looking at only value addition throughout the chain gives, however, a deceiving picture of the financial reality of the diamond industry. When profit margins are considered, a very different picture of the industry is painted (see figure 13) as the highest profit margins in 2012 are made in the beginning of the chain by rough diamond producers, and by large diamond jewellery retailers at the far end of the chain (Bain & Company, Inc., 2013). The middle part of the chain as well as smaller actors in jewellery retail are faced with fierce competition, resulting in profit margins between 0 – 6 %. In this regard it seems that the governance position of large rough diamond producers as the lead firms of the chain as well as global top luxury brands through successful diversification are able to create extra profits within the chain. Especially the end of the chain actor margins vary significantly, with top brands gaining 20-35 % margins compared to e.g. e-tailers who achieve 2-5 % returns (Bain & Company, Inc., 2014).

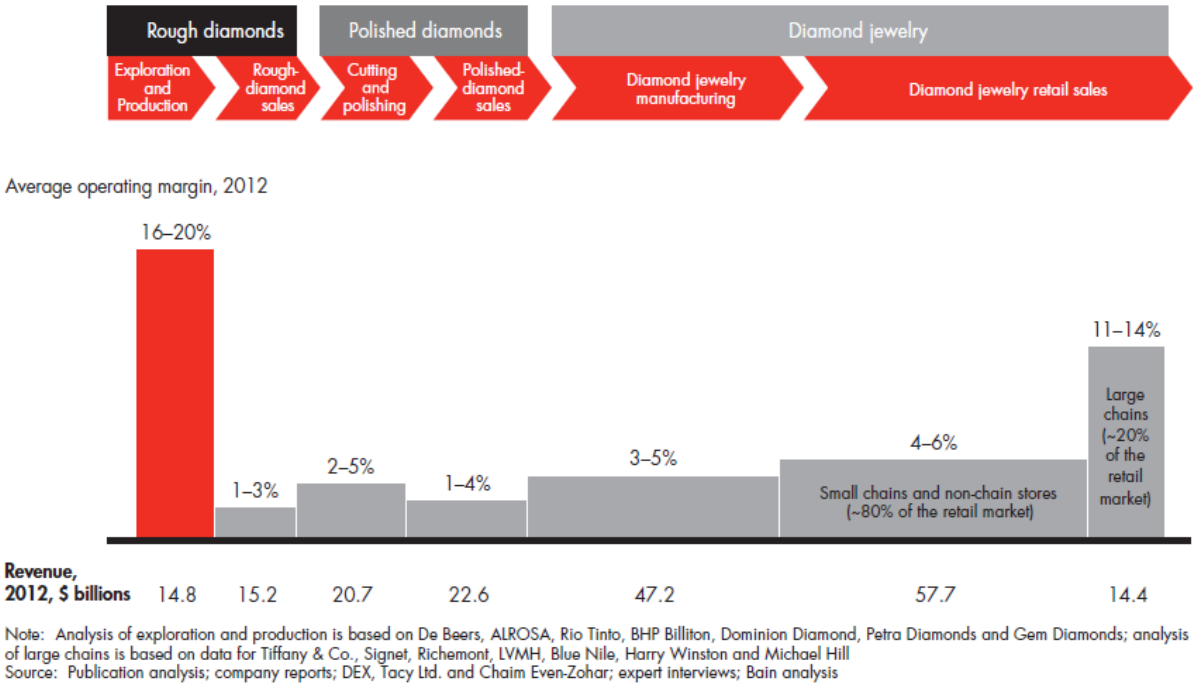


Figure 13: Highest margins are achieved in mining and jewellery retail (Bain & Company, Inc., 2013, p. 6)

4.2 The Kimberley Process tackles the problem of conflict diamonds

The Kimberley Process preparations date back to 1998, when a British NGO Global Witness published a report on how an Angolan civil war rebel movement UNITA had been financing itself by diamond trading throughout at least the 1980s. Similar reports were also published after that concerning the Sierra Leone civil war. When the UN also produced a so-called Fowler report addressing the issue, the diamond industry came face to face with the problem of conflict or blood diamonds. As established before, the industry is much dependent on the image of diamonds as symbols of enduring and eternal love, and thus faced a serious challenge with losing this image. In 2000 diamond producing countries, industry representatives and civil society members met on the invitation of the South African government in the town of Kimberley, which is the historical centre of the diamond industry. These meetings were the start of the Kimberley Process, whose birth was also much aided by a UN resolution in the same year supporting the initiative. Two years later, in 2002, the Interlaken Declaration officially established the Kimberley Process Certification Scheme, which provided certification to traded diamonds, ensuring end consumers that the diamonds in question had come from legitimate mining operations and did not finance rebel activities. (Bockstael & Vlassenroot, 2009). In addition to certification, participating countries had to provide audible

statistics on mining, exports and imports of all diamonds. Today, the 49 participants of the process represent 75 countries and it is estimated that they cover 99,8 % of all diamond supply. Expert opinions state that due to the KPCS the share of conflict diamonds on the global market fell from approximately 4 % in the end of 1990s to less than 1 % by the end of the 2000s. (Bain & Company, Inc., 2011).

Even if the estimates may provide a relatively accurate figure of blood diamond trade reduction and the brutal wars in Africa that ran into the beginning of the 2000s have ended, conflict diamonds still do not seem to be a thing of the past. In Cote d'Ivoire, for example, smuggling of diamonds from rebel held areas to non-KPCS member states and then to global markets still carries on (Bockstael & Vlassenroot, 2009). The KPCS has also faced criticism throughout its existence, and as the case example of this study, Namibia has also been the focal point of some of this criticism. In 2009 concerns started mounting on the case of Zimbabwe, where the NGO Human Rights Watch claimed that Zimbabwean government soldiers had killed 150 diamond miners and their families and used the incomes of smuggled diamonds to illegitimate ends. The NGO called for the suspension of Zimbabwe from the Kimberley Process. During an investigation the KPCS Secretariat found evidence that Zimbabwe was, in fact, not complying with the minimum requirements of the process. At this time Namibia was hosting the KPCS meeting of 2009 and was thus in the middle of the debate. The criticism was also directed at Namibia as the country was a strong supporter of President Mugabe of Zimbabwe, and because the meetings of 2009 only ended up in a seemingly weak compromise of continued monitoring of the situation in Zimbabwe. Even if there is no evidence that Namibia was harmed by the issue of blood diamonds, the criticism and debates have shown how vulnerable diamond producing countries can be to shifts in consumer sentiments and negative publicity. (Sherbourne, 2013).

The Kimberley Process is also important in this study as the recorded mining, export and import figures give a good and seemingly reliable benchmark for analysing production and trade flows of nations and thus also Namibia. These figures are discussed more under the case study in coming chapters.

4.3 The Namibian diamond market and the call for local value addition

The beginning of this chapter has given an outlook into the applicable parts of the global diamond value chain to set a background for the Namibian case study. Even though a much richer understanding of the global realities can be gleaned from existing industry studies, the chosen focus is on especially those parts of studies that give sufficient global benchmarks for a limited view of financial and production flow fundamentals affecting also Namibia. It is important to note that the analysis presented in this paper is to a great extent descriptive, concentrating on the flow of diamonds throughout the chain only within the Namibian borders. Before focusing on the value chain as a whole and analysing the flow issues of value creation, some explanation should be given about the rather special dynamics of the beginning of the national chain, namely the relationship of the Namibian government and De Beers as in effect the sole source of rough diamonds in the country. The relationship of these two institutions and their in some respect clashing interests are particularly visible in the demand for local value addition, for which a background is also set here.

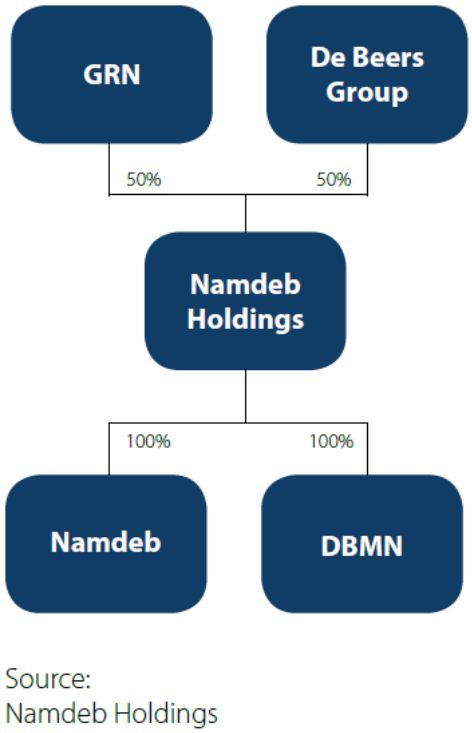


Figure 14: De Beers and the Namibian government both have a 50 % stake in NamDeb Holdings (Chamber of Mines of Namibia (2013), p. 30)

As seen in figure 14, Namdeb Holdings is a 50:50 partnership between the global diamond giant De Beers Centenary AG (De Beers Group) and the government of Namibia (GRN). The

importance of Namdeb Holdings cannot be stressed too much in the case of Namibia, as it produces a vast majority of all rough diamonds in the country. Namdeb Holdings in its own right is divided into Namdeb, which takes care of the land mining of diamonds, and De Beers Marine Namibia (DBMN), which mines diamonds in the marine areas of the country. From these two rough diamond sources the stones are sold to another corporate entity under a 50:50 DeBeers/government partnership, Namibia Diamond Trading Company (NDTC), which took final form and began operation in 2008. From the above it is possible to distinguish what became the two first relevant steps of the demarcation of the Namibian diamond value chain. In the scope of this study *rough diamond mining* consists solely of the Namdeb Holdings production, and NDTC as the sole agent for the second chain link of *rough diamond sorting, valuating and trading*. As established in the previous chapter on global diamond value chain characteristics, the trading of rough diamonds from NDTC follows the industry specific long term contract system of sightholders used globally by De Beers. When discussing Namibia as one part of the global diamond production of De Beers, it is important to note already here that not all Namibian rough diamonds are sold in Namibia. In fact most of the production is traded to another part of De Beers, the Diamond Trading Company (DTC), the central trading organization currently located in Gaborone, Botswana, which aggregates global production of De Beers and trades them onwards to global sightholders. The division of sales to Namibian sightholders and DTC will be further discussed under the actual value chain analysis chapter. At this point it suffices to say the Namibian government maintains the view that maximizing the proportion of diamonds sold to cutters and polishers in Namibia would be best for the nation, whereas from the De Beers perspective Namibian high quality diamonds are integral in creating their industry renowned aggregated parcels, which means that some production needs to leave the country. It is also important to note that the government and De Beers sales agreement is confidential when it comes to the share of profits and other particulars, and this agreement is renegotiated every five years. The creation of NDTC was, in fact, a result of a series of these negotiations that took place in 2005-2007. (Sherbourne, 2013) (Chamber of Mines of Namibia, 2013).

The above description of the beginning of the Namibian diamond value chain already highlights some of the issues within the sphere of demands for local value addition or beneficiation. The wish that more of the final market value (diamond jewellery retail sales totalled 72,1 billion USD in 2012 (Bain & Company, Inc., 2013) has permeated the debates of the natural resource industry in Namibia throughout the country's independence. This is

particularly so for the diamond industry, where the wish of the government has been that a majority, if not even all of the Namibian rough diamond output, should also be further processed within the country. Since the establishment of Namdeb in 1994 as a joint and equal partnership between the government and De Beers, the global diamond giant insists on the other side of the argument, believing that holding on to the single channel marketing system adds great value to rough diamonds and should thus be kept intact. Throughout the cooperation of the two stakeholders there have been multiple takes on appeasing both sides.

The initial steps towards testing local value addition took place in 1998 in the establishing of NamGem, which was the first cutting and polishing company in Namibia. It was owned in its totality by Namdeb. Traditionally the example of NamGem has been seen to support the De Beers argument of allowing sightholders and cutting and polishing companies locate globally where the business environment is seen as most competitive. Competitive in this regard means mostly lower labour costs, which has seen most of cutting and polishing activities gravitate towards China, India and other Asian countries. According to Sherbourne (2013) NamGem has, since its creation, failed to turn in any profit through its activities. This view is, however, contested by analysis presented in this paper on the cutting and polishing segment of the value chain, providing financial data that, in fact, NamGem made a profit each year from 2008 to 2012, recording a loss only in 2013.

Another concrete building block of Namibian beneficiation is written into Namibia's Diamond Act, which was passed by parliament in 1999. Especially section 58 of the legislation shows considerable power of the government with respect to rough diamond production. If invoked, section 58 gives the Minister of Mines and Energy the power to force any producer to sell any amount of their production to local cutting and polishing. The price received by the producer is set according to the prevailing market prices for rough diamonds, which suggests that pricewise the producers should not lose financially in the forced sales. (Ministry of Justice of Namibia, 1999). Since the passing of the act, a key question has been what circumstances would be deemed viable for the minister to invoke section 58. As De Beers has considerable stake related to putting the section into effect, it has throughout negotiations with the government sought reassurances that the section would not be invoked. To some extent the government also seems to have been happy to give in to these demands. On the De Beers side, the give-in has been an assurance of a regular supply of rough diamonds to local cutting and polishing companies, which at the turn of the millennia occurred through the DTC. (Sherbourne, 2013).

Since the beginning of the 2000s, however, the global diamond industry has seen a considerable change in attitude towards local beneficiation in origin countries. Industry studies as well as company outlooks seem to acknowledge that the pressures from producing countries in extracting more value are not going anywhere and this has to be considered a fundamental challenge for beginning of the chain actors (McKinsey & Company, 2014) (De Beers Group of Companies, 2014). The balancing factor, however, is that the global economic fundamentals have not changed at all. As Sherbourne (2013) points out, the labour costs have not fallen, the exchange rates have not weakened and productivity has not risen. Still, Industry occurrences point to fundamental shifts towards more local value addition presence especially in Africa. With respect to De Beers, the top management has evolved during the 2000s toward a more lenient disposition towards local value addition. The second issue is that no new rough diamond supply sources are anticipated to be found, which strengthens the negotiation power of African producer countries. The third issue has been the aforementioned pressure of especially Southern African countries towards local beneficiation. This has created some significant milestones, very relevant to also the analysis at hand. The first of these is the establishment of the Namibia Diamond Trading Company (NDTC) as a joint venture between De Beers and the Namibian government in 2007. The company first of all formalised the long term contract buyers within Namibia, as NDTC nominated 11 sightholders for the three year term of 2008-2011. These nominations favoured existing De Beers' sightholders and caused some dismay in other cutting and polishing licence holders who had shown considerable commitment to Namibia in previous years. The establishment of NDTC also formalised the above mentioned regular supply of rough diamonds into Namibian cutting and polishing. According to the agreement 16 % of cuttable diamonds were to be made available to local cutting and polishing. This percentage of local supply is something for which some variety of opinions exist. Sherbourne (2013) refers to the initial agreement of 16 %, though he does not state whether it is in carat volume of value terms. Multiple national sources refer to 10 % in value terms (NPC, 2012, p. 101), which was also repeated in many of the interviews for this study. As will become evident later, it seems that the reality of local sales is in fact quite different, with total sales from NDTC to local cutting and polishing companies somewhere between 20-30 % in value terms. These discrepancies, it seems, are to some extent problematic as the agreements and statistics between the government and De Beers are not open to public scrutiny and thus often create false assumptions even within government agents.

In addition to the establishment of NDTC in Namibia, an even more profound shift with respect to increasing producing country presence within the value chain was the shift of De Beers Global Sightholder Sales from London to Botswana in 2013. The change followed negotiations between De Beers and the Botswana Government, which is also a De Beers stakeholder with a 15 % share of the company. As of 2014 most of all global production of De Beers is sold in Botswana, which is expected to position Gaborone as a rising global centre for the diamond industry. (De Beers Group of Companies, 2014). Only a few years ago such presence in Botswana was considered "national folly" by the that time MD of De Beers, which points in the direction that large mining players are turning towards a new attitude in answering the demands of producing countries (Sherbourne, 2013).

Taking the above changes into account does, however, present certain limitations when it comes to demands of beneficiation in individual countries, for example in Namibia. As pointed out by Value Addition Committee of Namibia (2014) the existence of the world's largest rough diamond sorting, valuating and trading center in Botswana may undermine the development of such a center in Namibia. In face of these industry realities the question is whether a more regional stance should be taken towards value addition in Southern Africa and whether the focus should possibly be not in cutting and polishing but further down the chain, in jewellery manufacturing and retailing. This view can be further backed up by experiences of existing cutting and polishing companies in Namibia. According to Sherbourne (2013) no cutting and polishing companies have chosen to locate in Namibia without the promise of local supply, which suggest that Namibia is not a competitive place for cutting and polishing activities, especially for stones below a certain size. A further complication is added by the production statistics of Namdeb. As production is moving more and more to offshore mining, the average carat size is declining. As diamond size declines labor and other cutting costs become a determining factor of competitivity and this is where Namibia cannot match the fundamentals of cutting and polishing centers in Asia.

The above issues will be further expanded in the chapter on the Namibian diamond value chain, providing production, flow and financial data as well as industry opinions on the raised questions. An issue that arises from the analysis is that the debate has maybe too much focused on the middle part of the chain, leaving the end of the chain overlooked. There seems to be much that Namibia could achieve by easing the situation of local companies in jewellery manufacturing and retail by looking into issues of market creation, reduced bureaucracy and more effective trading policies. Before though, related aspects of the legislative and policy

environment will be discussed as these tie in with the barriers of entry, trade and rent as an important determinant of value chain dynamics.

4.3.1 The legislative and policy environment

The legislative and policy environment governing the mining industry is an integral part of value chain analysis as it sets boundaries for companies active in the value chain. In value chain analysis these fall under *barriers to entry, trade and rent* (see chapter 3.2.2.1), which can be both formal, as is the case here, and informal, not set by legal structures but rather industry participants, with relevant examples of the sightholder system of De Beers or the Kimberley Certification Process designed by the global diamond industry stakeholders to tackle conflict diamonds. In the case of Namibian diamonds the relevant legislation and policy environment can be summarized into three topics; the three pieces of legislation introduced during independence by the Ministry of Mines and Energy, the role of Export Processing Zone policies, and the function of the Government Diamond Valuator, which acts to control the fairness of prices in rough diamond production.

The Ministry of Mines and energy was set up after the independence of Namibia to act as a steward of the nations' natural riches for the benefit of all citizens. During its existence, MME has introduces three important pieces of legislation, the minerals act, the minerals development fund act and the diamond act. Out of these, the first governs the actions of the mining industry in general, setting rules on licensing and inspecting operations, limiting ownership of government officials, and appointing bodies from various stakeholder groups to advice the ministry. The Minerals Development Fund (MDF) was set up with money received from the EU Sysmin funding facility, which was set to assist African-Caribbean-Pacific countries heavily dependent on mineral exports. The countries involved were allocated money that could then be lent onwards to private sector projects in the mining industry. The operations of the MDF have, however, not been very transparent up to the point where the Government's annual Accountability Report no longer provides information on the MDF. (Sherbourne, 2013). These aforementioned acts thus set barriers of activity for the diamond industry as well, but will not be analysed more deeply here. The third piece of legislation, the diamond act, does deserve a slightly more thorough look.

The Diamond Act was passed by parliament in 1999 and replaced a large body of legislation that dated back all the way to 1939. One of the key results was the setting up of the Diamond Board headed by the Diamond Commissioner, who is to advice the MME on diamond industry

related issue as well as carry out regulatory tasks of production, ownership and trade of rough and polished diamonds. As mentioned before when discussing local value addition, the Act also included the specific sections 58 and 59, which grants the Minister of Mines and Energy the power to force rough diamond producers to sell any amount of their production to local cutters and polishers (section 58), and the power to test the market and its prices by direct sale of up to 10 % of producer output by value (section 59). These sections have not been invoked. In addition to other legislative details the export of unpolished diamonds carries a duty of 10 % payable to the Diamond Board. When it comes to financial duties paid by diamond companies it is important to also note the Income Tax Amendment Act of 1992, which distinguished diamond mining companies as a target of separate tax treatment. Diamond mining companies pay an effective 55 % corporate profit tax plus the above mentioned direct 10 % export royalty on rough diamonds. It is, however, unclear whether these are the precise terms by which taxation is carried out in the Namdeb partnership of De Beer and the Namibian government as the details of the cooperation agreement are classified. (Sherbourne, 2013) (Ministry of Justice of Namibia, 1999).

In addition to the Acts passed by MME, which mostly govern the actions of diamond mining companies, the downstream chain link of cutting and polishing acts tightly within the framework of the so called Export Processing Zone (EPZ). The EPZ status has been used by the Namibian Government to encourage cutting and polishing companies to settle in the country in addition to the fact that they may gain access to the rough diamonds produced by Namdeb (Joint Value Addition Committee of Namibia, 2014). In essence, companies holding the EPZ status are exempt from corporate income tax, duties and value-added tax on imported machinery, equipment and raw materials, are allowed to hold foreign currency accounts in commercial banks and can repatriate their capital and profits. Such companies are only to pay the income tax on employee income and a 10 % tax on declared dividends for non-resident shareholders. (Ministry of Trade and Industry of Namibia, 2012). During the NDTC sightholder period 2012-2015 all 11 sightholders were EPZ, and thus their purchases from NDTC carried the 10 % export duty payable to the Diamond Board as sales to an EPZ company is legally seen as export. As pointed out by Sherbourne (2013), Namibia does benefit from this export duty directly, but only indirectly from the activities carried out by EPZ companies. They can naturally be seen to provide Namibia with employment, skills transfer and indirect tax revenues. What is often neglected, though, is the effect the EPZ status has on downstream activities, particularly jewellery manufacturing. What will later become evident is that the EPZ

status substantially hinders the purchase of Namibian origin cut and polished diamond for the end of the chain actors, as it is very cumbersome for them to buy stones from the 11 NDTC EPZ sightholders.

The third legislative topic important for this study is the function of the Government Diamond Valuator (GDV). For the government the GDV is a critical industry actor as it provides an independent valuation of diamonds mined and sorted in the country. The concern of course is whether the diamonds fetch the best prices and that the value based royalty calculations are based on current and realistic valuations. As the operation is highly specialized, demanding extensive understanding of rough diamonds, the GDV has generally bought the service from foreign companies. In 2009, however, a new GDV was appointed. The Gazania Investment Eighty-eight is owned by four Namibians. (Sherbourne, 2013). Even as the GDV carries out an important task in ensuring that the interests of Namibia are properly enforced, industry critics have raised concerns that there may still exist large information asymmetry between private corporate and producing country interest. Bracking & Sharife (2014) point out that the price setting of De Beers is based on an internal pricing mechanism not transparent to external regulators. Rough diamonds are priced based on several criteria recorded in the so called Price Book, which essentially creates the market value of rough stones. The combinations of criteria create essentially thousands of categories for valuating stones. If the mechanism of how this is carried out is not available to government regulators it can be questioned whether diamond producing companies have an upper hand in affecting the monetary value and thus their financial liabilities with respect to national governments. Based on the analysis of the Namibian diamond value chain it seems two mediating factors exist. Firstly, the equal ownership of the Namibian Government and De Beers does potentially allow for more transparency. The second issue is that according to industry interviews the GDV uses former De Beers' employees as experts, which would also provide the GDV with essential industry insight.

4.4 Methodology of research

Figure 15 below works as a structure in explaining how the value chain analysis of Namibian diamonds was carried out.

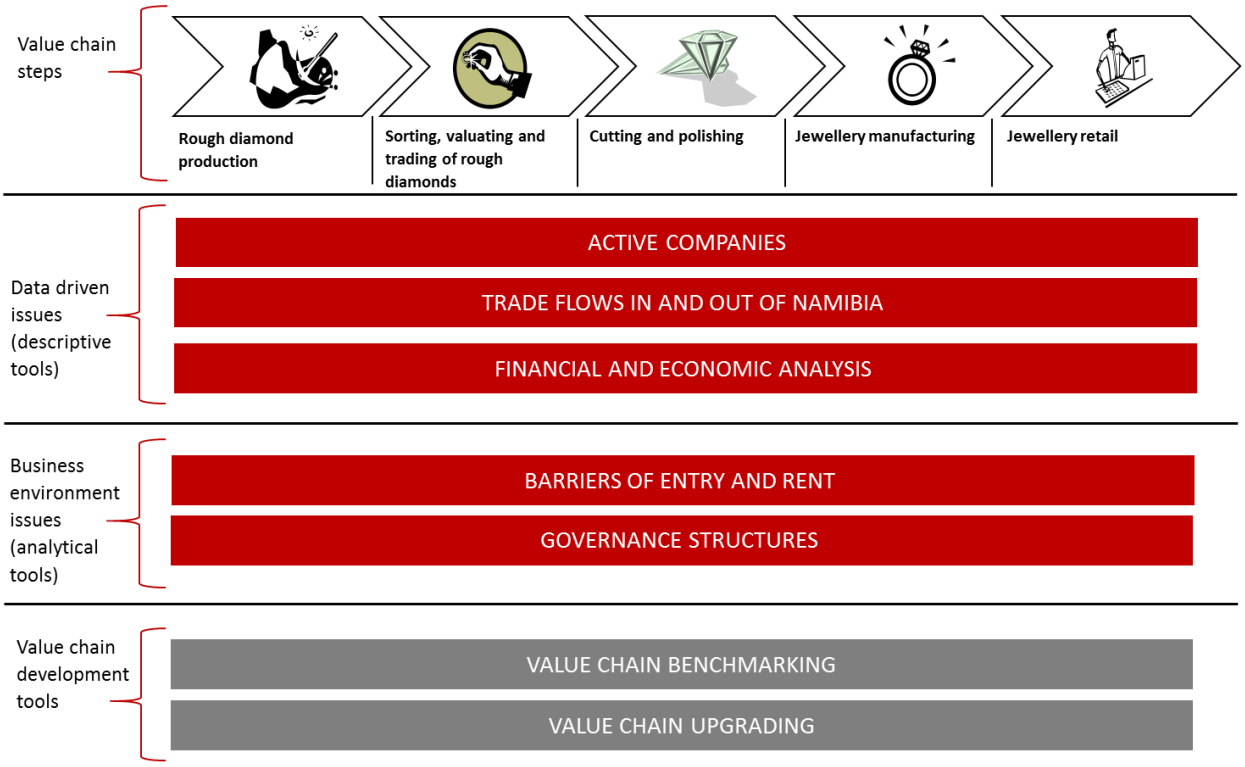


Figure 15: Demarcation of the Namibian diamond value chain and the issues analysed

The first part of the analysis was to arrive at a demarcation of the Namibian value chain, as the aim agreed upon with the Offshore Development Company (ODC) under the Ministry of Trade and Industry was to map and understand the specific characteristics of the industry functioning within the Namibian borders. It is against this background the demarcation in figure 15 differs from the eight stage depiction used by Bain & Company, Inc. (2011) and was somewhat shortened into what can be understood as a four step chain ending in final customer demand of diamond jewellery. It is important to note that the steps follow existing company boundaries applicable to the Namibian diamond industry. The first step of rough diamond production is accounted for by Namdeb Holdings, with the second consisting of the Namibia Diamond Trading Company (NDTC), which has the same shareholder structure as Namdeb Holdings but is still its own corporate entity. The third chain link of cutting and polishing is populated by approximately 20 companies active in that section of the industry. However, the main focus and target group for which data was gathered were the 12 NDTC sightholders active in Namibia

during the sightholder period 2012-2015. Even though the above figure shows jewellery manufacturing and retail as separate stages, in this study they form a single value chain step, as it consists of small and medium sized companies carrying out both manufacturing and retailing.

As seen in figure 15, the first sets of information gathered for the analysis were the so called data driven issues. The understanding on active companies were predominantly carried out in cooperation with the ODC. The first two steps were straight forward as for this analysis it sufficed to concentrate on the activties of Namdeb Holdings and the NDTC. Information and contacts to cutting and polishing companies were also acquired through the ODC as it is the task of ODC to keep track on EPZ companies, which all active cutting and polishing companies conveniently are. In the end questionnaires were sent to 16 EPZ companies, out of which 12 were NDTC sightholders. Responses were received only for sightholder companies. For acquiring information on the jewellery manufacturing and retail sector the Jewellers Association of Namibia (JASSONA) was consulted. JASSONA has 16 active members, and their estimate of active companies in Namibia is at the moment 30-40. Out of the 16 JASSONA member companies interview and data gathering efforts were focused on three. It was agreed with the ODC as the initiator of the study that a case example of the jewellery sector would suffice. In the end all three companies were interviewed but financial data was received only for one company. Even if not representing the entire sector in Namibia, this case example provides the analysis with critical financial information and works to guide future analysis.

For trade flows in and out of the country several sources were used. Parts of Namdeb Holdings activities are recorded in public statistics, which gave an important benchmark for more detailed approaches. The Kimberley Process global statistics act as an important second source of overall import and export figures. The Chamber of Mines of Namibia also provided the study with valuable and more detailed information on value addition, government revenues and employment effects among others.

The most challenging part of the analysis was the acquiring of financial and economic data directly from private companies. Due to confidentiality of the agreement between the Namibian Government and De Beers, direct data from Namdeb Holdings and NDTC proved difficult to acquire even after continuous consultations with both companies. This did not, however, nullify the entire study as some data was available publicly. In the case of cutting and polishing

companies and the jewellery sector the data form shown in figure 16 was sent out to responding companies.

Questionnaire part 1: Financial data sheet

Value Chain Analysis of Diamonds in Namibia - Financial data questionnaire 2014

			Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Value of output	I) Total incoming diamond volume (carats)											
		i) Imports										
		ii) Sourced in Namibia										
	II) Processed output volume	i) Sales destination: Namibia (carats)										
		ii) Sales destination: Other (carats)										
		i + ii) Total output volume (carats)										
		iii) Sales destination: intercompany sales (carats)										
	III) Revenue received	i) Sales destination: Namibia										
		ii) Sales destination: Other										
		i + ii) Total revenue										
		iii) Sales destination: intercompany sales										
	IV) Average price received (per carat)											

			Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Value of inputs	1. Total costs											
	2. Direct costs	a) Total cost of intermediate inputs										
		Imports										
		Sourced in Namibia										
		b) Total cost of materials and services										
		Cost of diamonds										
		Imports										
		Sourced in Namibia										
		Cost of other materials and services										
		Imports										
		Sourced in Namibia										
		c) Total labor costs/wages										
		Employment										
		d) Depreciation of machinery										
		e) Total direct costs										
	3. Indirect costs	a) Total indirect costs										
		b) Total labor cost/wages										
		Employment										

		Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Other	4. Net profit										
	5. Total taxes and duties paid										
	6. Investment / Capital budget										
	7. Payments to financial institutions or holding companies										
		a) Interests / cost of finance									
		b) Dividends paid									

Figure 16: Financial data collection form presented to value chain agents

The above financial data collection sheet was assembled keeping in mind the end goal of calculating the step specific value addition. There are several complementary ways of carrying out this calculation. At its simplest, value addition is calculated as the difference of full value of output and the value of pucrhased inputs (McCormick & Shmitz, 2001). Another way to do this is to follow the formula of:

VA = personnel remuneration + profit + interest charges + taxes + depreciation

When value addition is looked at from this perspective value added is not only a depiction of wealth, but it also shows how the value is distributed among the main participants of the national economy; households, financial institutions, government and private companies (Rudenko, 2008). Both of these views were taken into account when compiling the above data form with added focus on sources and nature of inputs, sales destinations and intra-company

trade. The financial data form thus tried to capture firstly the total output side volumes and revenues received. On the other side the structure of inputs was analyzed. It was important to understand whether inputs were imported or from local sources, but also whether the value chain step was dominated by direct costs of production or indirect costs. This distinction was made in attempt to understand whether the infant industry argument would be valid in the case of Namibia. If fixed or indirect costs were large, barriers of capital might exist in some value chain segments and the concrete policy recommendations would have to be designed accordingly.

The above issues of chain demarcation, trade flows and financial analysis belong to the vital but still limited sphere of descriptive tools. Understanding the Namibian diamond value chain through these was the main aim of this study. In addition, however, attempts were made to analyse the chain from the perspective of analytical tools of *barriers to entry, trade and rent* and *governance structures*, and to arrive at some principles on value chain development tools of chain *benchmarking* and *upgrading*. The background for understanding these naturally follow from global industry studies and the legal and policy environment but it was also important to get first hand information from the private companies themselves. There were two ways of accomplishing this. The first were the meetings conducted with the companies, where the author interviewed relevant personnel at the companies. These interviews were only recorded in the notes of the researcher as the company representatives did not allow other forms of recording to happen. The ODC as the initiator of the study was satisfied to get this type of informal information from the respondents and did not push for complete validity of responses. To complement this the value chain participants were, along with the above financial data form, sent an open question form containing three questions on the business environment in Namibia, the challenges of the industry, and the opinon on value chain analysis as a tool of understanding the industry. The question sheet and the actual questions are shown in figure 17.

Value Chain Analysis study on the diamond sector in Namibia

Questionnaire part 2: The business environment – Industry realities and challenges

1. **What do You as an active diamond industry company see as the most important reasons / competitive advantages for doing business in Namibia?**

2. **What are the main business challenges You as an active diamond industry company are facing in Namibia?**

3. **What do You think about the method of Value Chain Analysis in understanding and developing Your industry?**

Figure 17: Open question form presented to value chain agents

The above methodology was used on data gathering trips to Namibia in March, July and November of 2014. The study will now move on to describe and analyse the findings of these field trips through studying the essentially four step demarcation of the Namibian diamond value chain presented above. The particular methods of arriving at figures, depictions and conclusions will be amended in the applicable instances.

4.5 Descriptive analysis of the Namibian diamond value chain

This chapter delivers the main findings of the study at hand, carrying out a descriptive value chain analysis of the Namibian diamond industry. The task begins with demarcating the chain stages, of which in the Namibian case there are four:

1. Production of rough diamonds
2. Sorting, valuating and trading of rough diamonds
3. Cutting and polishing of rough diamonds
4. Jewellery manufacturing and retail

Each of these stages will first be introduced when it comes to agents active in that stage, the descriptions of samples analysed in this study, as well as other characteristics and statistics affecting their role within the chain. In the applicable instances comparisons are drawn from global diamond industry studies. At the end of this section a comprehensive summary is drawn to set stages, agents, relationships as well as diamond and monetary flows in a single diagram. The understanding of this diagram is deepened and broadened in the following section of financial and economic analysis. Findings on cross-chain employment, volume flows, revenue creation in aggregate and per carat form, value addition and division in the economy, as well as calculations on potential value creation are included.

Before moving on to the data based calculations, it is important to note the time frame chosen for the study. All value chain participants were requested to submit data for years 2008 – 2013. For larger companies, primarily Namdeb Holdings and one of the sample cutting and polishing companies, this was a possible task to carry out. For smaller companies in cutting and polishing and especially the small jewellery manufacturers and retailers this proved to be highly cumbersome. The study thus has a main focal time frame and a minor one. Where possible, e.g. total production of rough diamonds and total employment figures, the minor time frame of 2008 – 2013 is used. In this scope the effects are seen of the financial crisis that begun in 2008 and had major implications also for the Namibian diamond industry. The main focus of this study is, however, on the years 2011 and 2012, when the effects of the financial crisis had considerably lessened and the diamond industry was in the stage of fast recovery. For 2011 and 2012 the sample data is also most reliable and of adequate quality for thorough analysis.

4.5.1 Mining of rough diamonds

For the purpose of this study and in the ensuing analysis the single and only producer of rough diamonds in Namibia is Namdeb Holdings, consisting of two company entities, Namdeb Diamond Corporation, mining diamonds on land, and De Beers Marine Namibia (Debmarine), governing the coastal mining operations offshore and inshore (for a detailed description see chapter 4.3).

Year	2008	2009	2010	2011	2012	2013
Namdeb Diamond Corporation	1 039 000	329 000	492 000	346 000	559 408	602 378
Debmarine Namibia	1 055 000	600 000	980 000	990 000	1 100 000	1 160 000
Total production (crts)	**212 200**	**929 000**	**1 472 000**	**1 336 000**	**1 659 408**	**1 762 378**

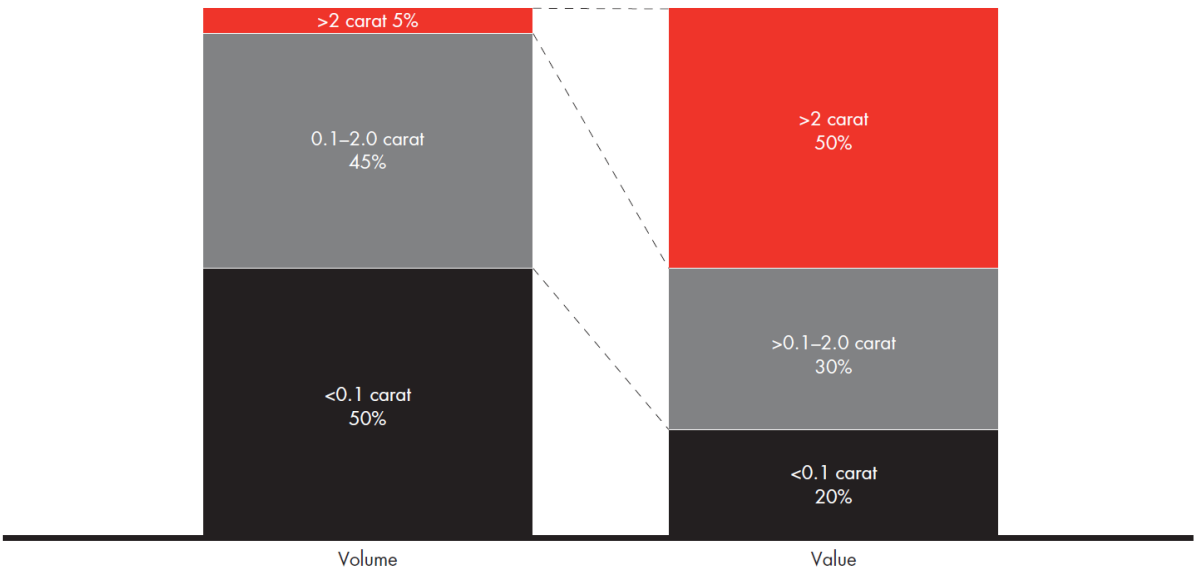
Figure 18: Total Namdeb Holdings production of diamonds in carats, 2008-2013 (Chamber of Mines of Namibia, 2013)

The division of production for the two companies is an important aspect of the first stage of the value chain. Debmarine operations in the coastal regions of Namibia, having started in 1990, are a relatively new addition to the Namdeb mining operations, but have since gradually and steadily gained importance. One of the great financial issues here is the cost structure of operations, which deeply affects the actions of Namdeb Holdings. According to interviews with Namdeb, the revenue-to-cost ratio of land operations is constantly decreasing, currently standing at approximately 80 cents of costs for a dollar of revenue. For marine operations the ratio is also falling but has in recent years stood at a more profitable 60 cents to 1 dollar of revenue. As operations especially on land already have a long history, Namdeb is according to interviews facing a falling per tonne carat yield and the carat profile is turning toward smaller carat sizes. The above figures could not, however, be confirmed by data as Namdeb did not supply the research with numbers on cost structures or carat profiles. Interviewees and general discussions in Namibia often stress that Namdeb is facing a finite resource, rising costs, and that its production is often taken too much for granted. A seemingly critical opinion on the depletion of resources is presented by Sherbourne (2013), who notes that Debmarine production has only been rising throughout the 2000s and beginning of 2010s. This is a valid argument especially considering that Debmarine works on a concession of 6 000 km^2 of which only 130 km^2 has been sampled in detail and only 20 km^2 had been mined by 2004.

The carat profile of Namibian and Namdeb production is very much in the forefront of understanding the value addition possibilities in Namibia. As stated by Sherbourne (2013) and

again in interviews with Namdeb and NDTC, Namibia, due to especially its relatively high labour costs, cannot compete with global cutting and polishing centres in diamonds below a certain size. The carat profile, however, is one of the pieces of information Namdeb has been most reluctant to release. Some facts are known about the output carat profile. In 2005 the average mined rough diamond size was reported at 0,44 carats, which is below cuttable size. Interviews and industry information set the limit of viable cutting size in Namibia to 1,25 rough carats. According to the original agreement of setting up NDTC, the company would supply the Namibian cutting and polishing industry with 16 % of the local production of cuttable diamonds, which were defined to be within the range of 1,25 to 14 carats (Sherbourne, 2013).

The carat profile must be taken into account when considering the calls for local value addition, especially when arguments are presented on how much percentage-wise of local production should be beneficiated locally. Without detailed data on the carat profile it is difficult to assess to which extent local cutting and polishing is economically viable. A distinction should especially be made when talking about the carat volume and total value discussions on shares of local beneficiation. The importance of the volume versus value division argument is well depicted in figure 19. For a typical mine output, diamonds above 2 carats account for only 5 % of total production volume, but as much as 50 % of total value (Bain & Company, Inc., 2011).

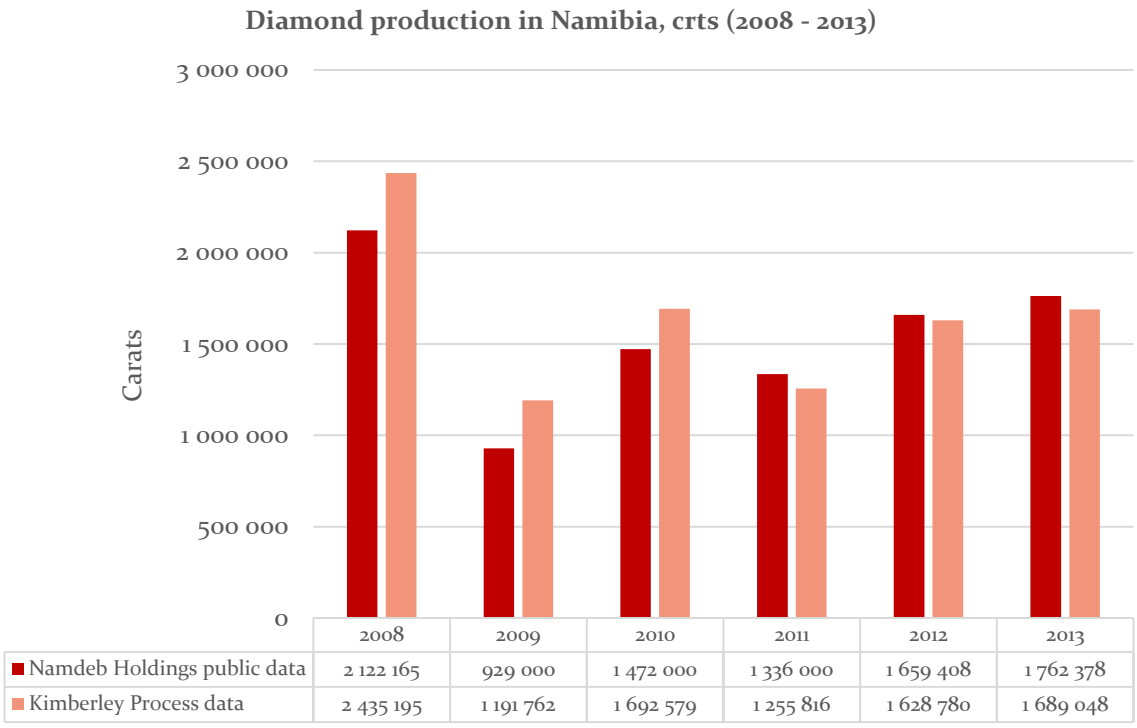


Source: Cormark Securities "Diamond Market Overview," 2009

Figure 19: Large diamonds above 2 carats account for 5 % of mining output volume but 50 % of value (Bain & Company, Inc., 2011, p. 34)

The above argument must be kept in mind in later analysis, especially in extrapolations carried out for volumes across the Namibian value chain. For most part, though, the important conclusions are considered in value terms, which of course is the driving argument for carrying out value chain analysis and not traditional industry analysis. The findings on local sales percentages are further discussed under the next stage of the value chain in chapter 4.5.2.

In addition to rough diamond production figures collected and published by the Chamber of Mines of Namibia (CoM), this study uses data published by the Kimberley Process. Figure 20 shows the total production reported by CoM and the Kimberley Process (Kimberley Process, 2014) side by side.



	2008	2009	2010	2011	2012	2013
Namdeb Holdings public data	2 122 165	929 000	1 472 000	1 336 000	1 659 408	1 762 378
Kimberley Process data	2 435 195	1 191 762	1 692 579	1 255 816	1 628 780	1 689 048

Figure 20: Diamond production in Namibia, crts (2008 – 2013) (Chamber of Mines of Namibia, 2013) (Kimberley Process, 2014)

As can be seen from figure 20, the output figures of Namdeb and total Namibian production figures reported to the Kimberley Process are somewhat different, but seem to match relatively closely. Analysis presented here could not identify the exact reason for the discrepancy, but there are several reasons that might contribute to this. Firstly, even though the CoM data does not show any other production of diamonds in Namibia, there are registered companies that have before 2008 reported production of rough diamonds in Namibia. It might be the case that these companies have not supplied production figures to CoM, but have done so for the

Kimberley Process, which within the diamond industry acts as a powerful barrier to entry, trade and rent controlling the global diamond trade. In essence Kimberley Certificates carry considerable value when rough diamonds are sold, which heavily incentivises producers to acquire them and thus report their production. Another reason might be, as suggested by interviews, that there is delay in reporting within the Namdeb systems, which carries through to Kimberley data.

A further note is also in order concerning the effects of the financial crisis of 2008 visible in above production statistics. Namdeb continued to produce diamonds to the end of 2008 but sales dropped dramatically in 2009. That year Namdeb called a six month production holiday, halting capital expenditures and laying off workers. It also had to seek support from the two shareholders, De Beers and the Namibian Government, to be allowed to maintain overdrafts with the commercial banks in Namibia. When production started again in June, the workforce was a third leaner, down from approximately 3 300 to 2000 (Chamber of Mines of Namibia, 2013). Namdeb also had a large stockpile of unsold diamonds, and actually sought a sales deal outside of DTC by selling a large amount of diamonds to Diamonds India Limited. This deal can actually be seen in figure 21, where the difference of Namdeb production and NDTC sales peak in 2010. Furthermore, Namdeb pleaded with the Namibian government to waive payment of royalties for that year, which the government apparently agreed to. Even though the company suffered from the events of 2009 – 2010, it also allowed it to carry out some adjustments to cost structures and employment that it might have had to do in any case, especially with the gradual diminishing of land activities. (Sherbourne, 2013).

Year	2008	2009	2010	2011	2012	2013
Difference of Namdeb output and NDTC sales	- 12 490	- 142 837	466 500	107 722	36 719	- 59 183

Figure 21: Difference of Namdeb output and NDTC sales, 2008 – 2013

4.5.2 Sorting, valuating and trading of rough diamonds

The Namibia Diamond Trading Company (NDTC) can be regarded as a direct part of Namdeb Holdings as it has the same equal joint ownership structure with De Beers and the Namibian government, but it is important to distinguish it as its own corporate entity and value chain step. This especially as its formation directly followed from the negotiations between the two shareholders and was a step towards further local beneficiation. NDTC purchases all the

production of Namdeb Holdings, sorts, valuates and trades it forward. The so called market transaction between the two companies is already relatively peculiar, as NDTC essentially determines its own purchase price when it pays Namdeb Holdings according to its evaluation of the upstream producer. The specific details of the interaction fall within the confidential agreement between De Beers and the Namibian Government, which thus does not allow for cost structures, carat profiles and specifics of interaction between the two companies to be analysed here.

What has to be discussed, and for which relatively good data was gathered from various sources, is the nature of trading step occurring downstream, meaning the sales of diamonds after they have been sorted and valuated. NDTC sells diamonds through two channels; the De Beers sightholder system to the local cutting and polishing industry, and to the De Beers global sight centre in Gaborone, Botswana. The flows at this stage are very important to understand and a central piece of debate when it comes to local beneficiation.

As stated before and according to Sherbourne (2013), the original agreement between De Beers and the Namibian Government stated that in value terms 16 % of Namibian origin cuttable diamonds were to be made available to local cutting and polishing companies. What was surprising throughout the interviews carried out for this research was the variation in opinions of the agreed and actual percentages supplied to local companies. One example is the National Development Plan 4, which also set this research in motion. The NDP4 document states the following:

> *"In 2012, only 10% of the diamonds mined in Namibia are kept for cutting and polishing by local industry. This is considered insufficient for many of the sightholders to turn a profit, and should be increased to at least 20%."* (NPC, Namibia's fourth national development plan (NDP4), 2012, p. 101)

Throughout interviews and consultations the figure of 10 % kept occurring as the input of Namibian diamonds allocated to local supply in the De Beers and Namibian Government agreement with no reliable source to be identified by the end of this research.

In the light of received data the total input into the Namibian cutting and polishing industry, in both Namibian origin rough and aggregated parcels, is often larger than perceived. From the value chain perspective the origin of inputs is not particularly relevant, unless some companies in the chain get preferential treatment when it comes to prices or quality of their inputs. If not, which would seem to be the case here, the inputs should be regarded in their totality. Without

access to the NDTC founding documents the following is what was possible to be learned on the issue. (Bain & Company, Inc., 2013)

The NDTC sells its products to local cutting and polishing companies according to the De Beers sightholders system, with 10 sights organized annually. As in the global sightholder system, the NDTC chosen sightholders have only the possibility to accept or reject the parcels offered to them. Each sightholder has a value based quota allocation of annual purchases. The sightholders and annual allocations for the sightholder term 2008 – 2011 are presented in figure 22. As evident here, sightholders are chosen for a three year period and then renegotiated. The 2012 – 2015 sightholders are presented in the next chapter.

NDTC sightholder	Total allocation per year (US$m)
Almod*	10
AMC/GemXel Diamonds*	15
Finesse Diamond Corporation	15
Hardstone Processing	3
JKD Namibia*	25
Namcot*	40
NamGem*	40
LLD Diamonds Namibia	40
Laurelton-Reign Diamonds*	25
NU Diamond Manufacturing*	10
Trau Bros Diamonds Namibia*	10

*De Beers sightholders
Source: Insight Namibia

Figure 22: NDTC sightholders and annual purchase allocations 2008 – 2011 (Sherbourne, 2013)

The picture of local sales is not, however, as clear cut as seems at first glance. Firstly, the sightholder system is valuable for sightholders due to the long term stable supply of diamonds,

but also as it creates a long term relationship with the supplier. According to De Beers it also ensures that De Beers, or in this case NDTC, can tailor its supply according to the demand of buyers. This also explains the use of so called aggregated parcels, the famous De Beers London Mix, compiled from De Beers global production at the De Beers Global Sightholder Sales Centre in Gaborone.

The understanding gleaned from studies and interviews is that the NDTC agreement does not state the percentage of Namibian produced diamonds supplied to local industry, but some predetermined minimum percentage of total sales value that needs to become inputs to local beneficiation. In essence a certain value based percentage of diamonds from Namibian production is offered locally, but this is amended with aggregated parcels from the central organization in Botswana. The argument goes that production at any given time in Namibia might not coincide with sightholder needs, and thus it is in the customers' best interest to also be offered the possibility of purchasing aggregated parcels. NDTC did not provide the exact figures of these sales, but an NDTC (2014) presentation contains these figures. Figure 24 depicts the total sales values of NDTC for the years 2008 – 2011. Figure 24 show what this translates into in percentage terms. What is to be noted that the percentage is considerably higher than the previously stated 10 % or 16 % and even higher than the target of 20 % stated in the NDP4, peaking at 62 % of total sales in 2010, but hovering in the vicinity of 25 % for other years.

Figure 24 also provides another important estimate of local sales. How much of the Namibian diamonds in value terms are actually sold locally, or in other words; what is the share of aggregated parcels from total sales? NDTC did not provide these figures, but there is another estimation method that can be used here. The Kimberley Process records all cross-border transactions of rough diamonds, meaning also imports. An assumption is made here that NDTC and the aggregated parcels are primarily responsible for imports of diamonds into Namibia. In essence the other possible import instance would be the cutting and polishing companies active in Namibia. Two facts speak against the second possibility. First, according to sample data received from cutting and polishing companies their import figures account only a few percent of all imports, and the majority of these also fall on a single company. Second, which will become an interesting finding later, is that three out of four sample companies do in reality not cut and polish diamonds locally, but export most out of the country in rough form. In this instance it is viable to assume that they are also not importing diamonds for cutting and polishing purposes. Keeping this in mind it is assumed that NDTC is the sole importer of rough

diamonds into Namibia to arrive at a crude estimate of the share of aggregated parcels out of local sales. As seen in figure 24 the share in 2008 – 2013 was between 60 % and 80 % with 2009 and 2012 as outliers with respective percentages of 114 and 38.

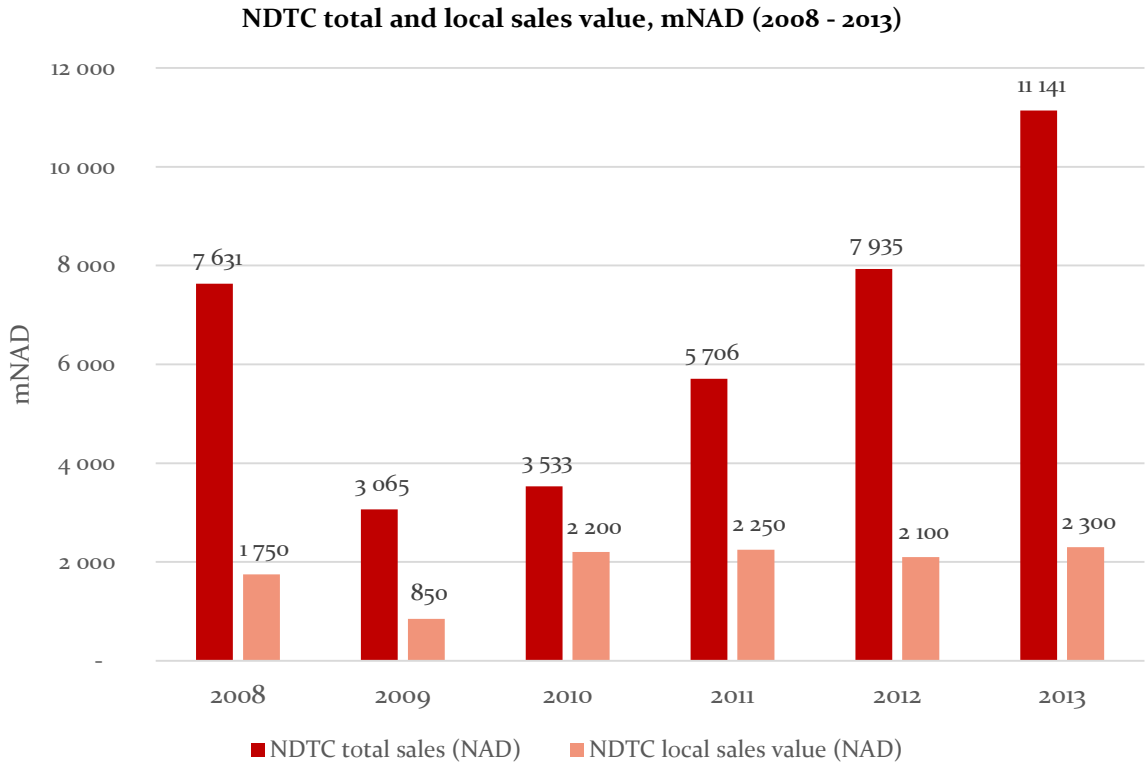


Figure 23: NDTC total and local sales, mNAD (2008 – 2013) (NDTC, 2014)

Year	2008	2009	2010	2011	2012	2013
NDTC total sales value (mNAD)	7 631	3 065	3 533	5 706	7 935	11 141
NDTC local sales value (mNAD)	1 750	850	2 200	2 250	2 100	2 300
NDTC local sales value as a percentage of NDTC total sales value	**23 %**	**28 %**	**62 %**	**39 %**	**26 %**	**21 %**
Kimberley Process import value (mNAD)	1 362	967	1 403	864	1 318	1 915
Kimberley Process imports as a percentage of NDTC local sales	**78 %**	**114 %**	**64 %**	**38 %**	**63 %**	**83 %**

Figure 24: NDTC local sales as percentage of total sales, estimated share of aggregated parcels in local sales (2008 – 2013)

Due to the critical analysis of De Beers in South Africa the article published by Bracking & Sharife (2014) titled *Rough and polished: A case study of the diamond pricing and valuation system* deserves some discussion here. In short the argument put forth by the two authors is

that De Beers in South Africa is carrying out export price undervaluation, import price overvaluation or possibly both indicative of transfer pricing manipulation. According to their opinion this is due to the monopoly position of the company and the consequent ability to assign prices at various stages of the value chain when moving rough diamonds acorss borders. They particularly point to the Price Book of De Beers in valuating the stones, claming that the Government Diamond Valuator does not have the necessary capacity to control whether the set prices actually represent their real value. When it comes to the concerns raised by the article, the authors could very well be talking directly about Namibia and, in fact, point in that direction in the article. Based on the analysis done on the value chain of Namibia, however, some cautionary notes are in order.

The main point of concern here are the assumptions made by Bracking & Sharife. To begin with, their argument on the use of transfer pricing methods relies on the export and import figures produced by the Kimberley Process, which, as the authors correctly point out, show a much higher price per carat for imports compared to exports both in South Africa and Namibia. In fact, the question they pose is: *"Why are South African diamonds apparently worth so much less than imported ones?"* (Bracking & Sharife, 2014, p. 3). This study has already alluded towards a partial answer to this question. Figure 19 presented, in global setting, the volume vs. value spread, which states that a very small proportion of large diamonds account for most of the mining output value. As the Kimberley data only reports the average price per carat for imports and exports and not the carat size breakdown, the higher average per carat import price is exactly what would be expected if imports are cuttable stones imported as inputs for local cutting and polishing.

This, however, is precisely the second argument and assumption made by Bracking & Sharife. As they did not have access to local sales figures due to the confidentiality between the SA Government and De Beers, they proceed to assume that the local beneficiation sector is very small and that a *"vast majority of imported diamonds are re-exported" (Bracking & Sharife (2014), p. 6).* If this is assumption is made, it does certainly seem that transfer pricing occurs and favors corporate over public interest. Based on the information of NDTC, however, the argument does not seem to hold true. Even working with the assumption, which has its limitations, that NDTC is the sole importer of rough diamonds into Namibia, the local sales of aggregated parcels from Botswana would quite comfortably account for all imports.

Even if the Namibian data does not point to the same conclusion made by Bracking & Sharife, the underlying issues they raise still hold true. The fact that the most important agreements concerning pricing methods, local beneficiation, public revenues and natural resource management are not open and transparent to even actors within governments is bound to lead to problematic assumptions, conclusions and policies. As Bracking & Sharife state as one conclusion to their paper, more transparency is required to fully assess the development value of diamond mining. The second argument on the possible information assymetry between the government and corporate interest also seems valid, especially considering the governance position of De Beers within the global diamond value chain, its control over pricing methods, as well as the vast volumes and values of diamonds moved by the company.

4.5.3 Cutting and polishing of rough diamonds

The previous chapter established that the main source of rough diamonds for the cutting and polishing industry in Namibia is NDTC and its sightholder system. Figure 22 also listed the sightholders for the first sightholder period 2008 – 2011. The active companies in this value chain step are presented in figure 25, with sightholders for the period 2012 – 2015 in addition to five companies that are not sightholders but still registered for cutting and polishing activities. In contrast to figure 22, the information on sightholder value allocations for the second term was not been released by NDTC.

Cutting and polishing companies holding an EPZ licence
NDTC sightholders 2012 - 2015
Almod diamonds *
Ankit Gems Namibia *
Diminco Diamond Manufacturing
Hard Stone Processing *
JKD Namibia *
Laurelton – Reign Diamonds *
Namcot Diamonds
Namgem Diamond *
Nu Diamond
Pluczenik Diamond Namibia *
Schachter and Namdar Namibia *
Trau Bros Namibia *
Non-sightholders
AMC - Gemxel
Duicker Investments
Lev Leviev Diamond Namibia
Mars Investment holdings
Nuska Investment

* Affiliated to a global De Beers sightholder

Figure 25: Cutting and polishing companies holding an EPZ licence, NDTC sightholders 2012 – 2015 (ODC and Sherbourne (2013)

It is important to note that all cutting and polishing companies function within the Export Processing Zone (EPZ) policy framework, which makes them exempt from paying corporate income tax and VAT to Namibia among other benefits. In essence these companies are considered to be "foreign" to Namibia, meaning e.g. that purchases done from them by Namibian companies are technically considered imports. This is an important point that will be raised especially in case of business challenges faced by Namibian diamond jewellery manufacturers and retailers.

As the above 17 are EPZ companies, and thus under the supervision of the ODC, they were the recipients of data requests sent out in cooperation with the ODC. Out of these 17, four companies, all NDTC sightholders, responded with data entries and open question answers on value chain challenges. Figure 26 shows the sample size in value of purchases as well as the percentage they represent of NDTC local sales, averaging 15 % in 2008 – 2013.

Year	2008	2009	2010	2011	2012	2013
NDTC total sales value (mNAD)	7 631	3 065	3 533	5 706	7 935	11 141
NDTC local sales value (mNAD)	1 750	850	2 200	2 250	2 100	2 300
NDTC local sales value as a percentage of NDTC total sales value	**23 %**	**28 %**	**62 %**	**39 %**	**26 %**	**21 %**
Sample cutting and polishing purchases (mNAD)	239	132	232	334	315	527
Sample cutting and polishing purchases as a percentage of NDTC local sales	**14 %**	**16 %**	**11 %**	**15 %**	**15 %**	**23 %**

Figure 26: Cutting and polishing sample of four companies represent on average 15 % of total local rough diamond sales

Another important structural note has to be made on the nature of the active companies in Namibia. For the most part the sightholders are affiliated to global companies active in cutting and polishing activities elsewhere in the world. According to data received from the four companies this is evident in quite a few of the important economic realities concerning these companies.

Firstly, for three out of four companies inter-company sales (sales to parent companies) account for 100 % of total sales.

A second important fact concerns the actual cutting and polishing activities carried out in Namibia. When a diamond is cut, there is naturally loss in carat volume. A rough industry proxy states that a rough diamond loses 50 % of its carat volume when processed. For one of

the sample companies this roughly holds during active years. For the remaining three, the case is quite different. An example is set by years 2012 and 2013, when these three companies represent respective 69 % and 83 % of total sample purchases in carat volume. One of the three companies has no cutting and polishing activities, selling 100 % of inputs as rough diamonds through intercompany sales. The remaining two, who started activities in 2012, first seem to have cutting and polishing occurring with an output-input ratio of approximately 60 %. In the next year, however, this jumps to above 90 % for both companies, indicating that they sell most of their input purchased from NDTC onwards in rough form, again solely to parent companies. This again indicates that local sales do not, in reality, say much about local value addition.

The above conclusion is hinted to previously by Sherbourne (2013), when stating that no cutting and polishing companies have chosen to locate their activities in Namibia without the promise of rough diamond supply by NDTC. In reverse, the hypothesis is, that the cutting and polishing companies active in Namibia are there primarily to secure access to lucrative inputs of rough diamonds to local sightholders by NDTC. The reason behind this is often argued to be the high cost of cutting and polishing in Namibia. To some extent, this is also proven by sample data. When looking at the global diamond industry it is clear that the cost of labor is a key competitive driver (figure 27). As the Bain & Company Inc. (2011) corresponding analysis of costs is made for the sample companies in Namibia, a conclusion is reached that when direct costs, excluding the price of diamonds, are taken into account, salaries and wages account for an average of 77 % in the time period 2008 – 2013 (figure 28).

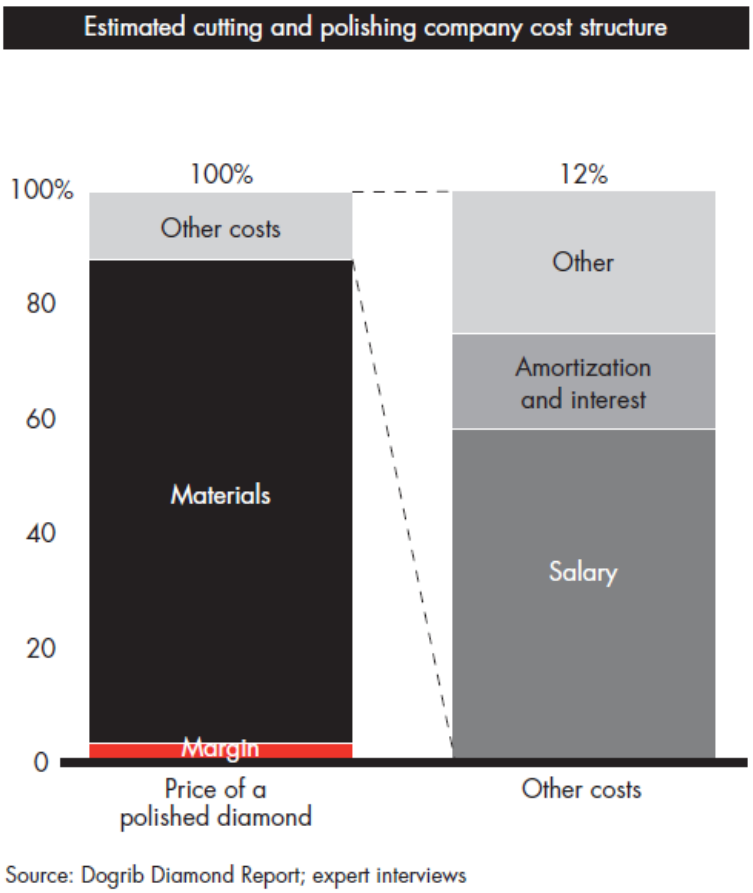


Figure 27: Cost structure of global cutting and polishing (Bain & Company, Inc., 2011, p. 45)

Year	2008	2009	2010	2011	2012	2013
Labor costs as percentage of direct costs excluding price of diamonds	79 %	77 %	79 %	75 %	73 %	78 %

Figure 28: Labour costs account for approximately 77 % of direct cutting and polishing costs excluding price of diamonds

When cutting and polishing costs per carat are considered, a similar picture is drawn. On a global scale China, Southeast Asia and India are able to process a carat of diamond for a per carat cost of below 50 USD, whereas the price in Africa is in the range of 50 – 100 USD (figure 29, Bain & Company, Inc., 2014). The data received from cutting and polishing companies in Namibia mirror these results. For the three companies actually carrying out cutting and polishing activities in Namibia, the average cost per carat for 2008 – 2011 is 111 USD (per carat of output), or 71 USD (per carat of input). Financially it thus makes sense that the companies are exporting stones out of Namibia in rough form and processing them in some of the global cutting and polishing centres. For Namibian local value addition the case is naturally quite the opposite. Further analysis on trade flows, and especially value addition when cut and

polished diamonds enter the following step of jewellery manufacturing as inputs, is presented in the later chapter on financial and economic analysis.

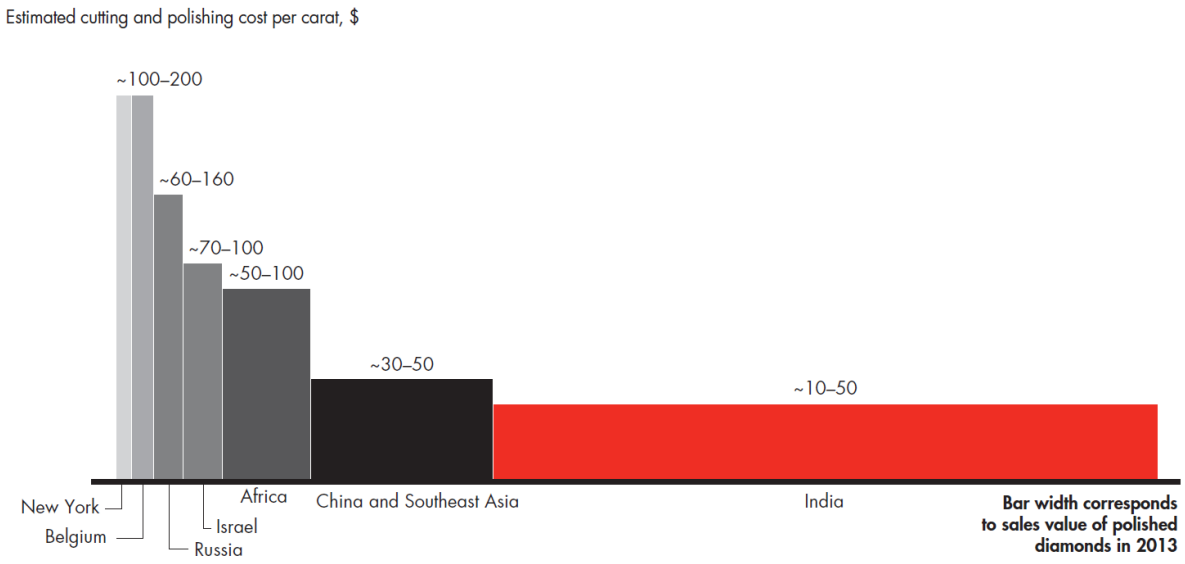


Figure 29: Global cutting and polishing cost per carat in different regions (Bain & Company, Inc., 2014, p. 14)

4.5.4 Diamond jewellery manufacturing and retail

The final stage of the Namibian diamond value chain is populated by approximately 40 – 50 jewellers out of which about 25 also function as retailers. Primarily these are small family owned businesses who in most cases of jewellery manufacturing are run by goldsmiths originally qualified abroad, in many cases Germany. As is understandable, these companies do not only deal in diamonds but as small enterprises have to be diversified in their product portfolio and, in jewellery manufacturing, the raw materials and stones used. Most of these companies conduct their business from shops in the cities of Namibia, primarily Windhoek and Swakopmund. From the active companies three were interviewed and requested to assist in gaining a financial and economic understanding of this value chain step. Figure 30 summarises production of jewellery manufacturing on a global scale, with India and China the largest and fastest growing centres. Africa is not a major contributor to this stage of the value chain.

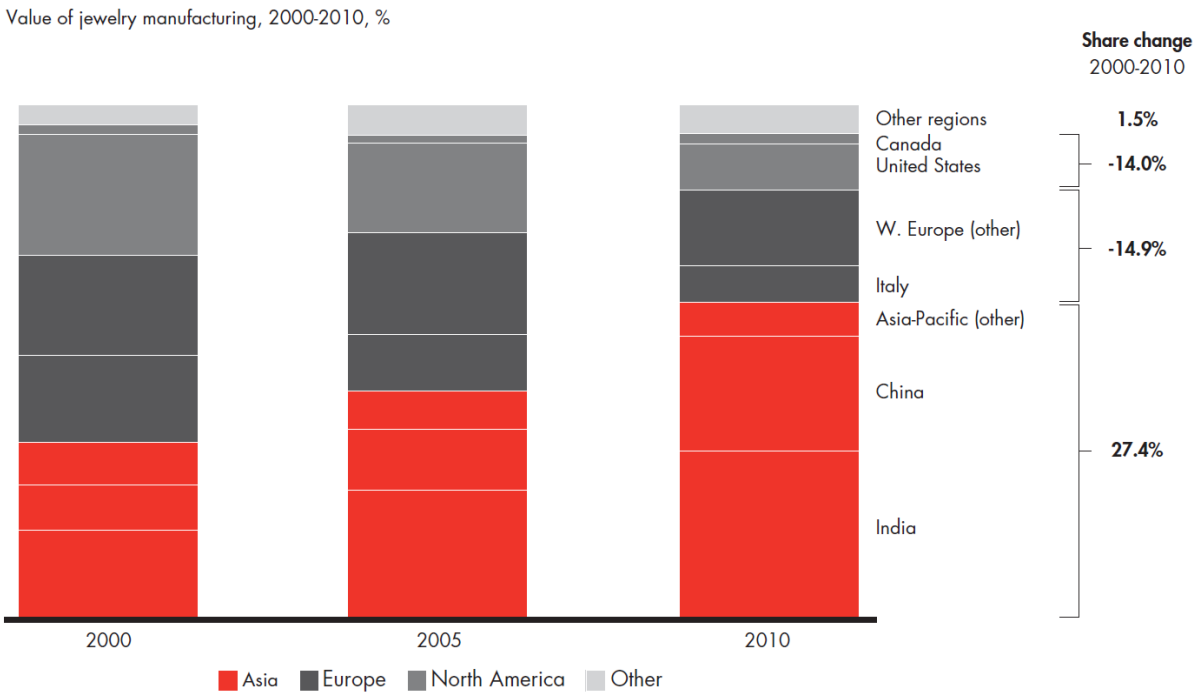


Figure 30: India and China are the largest and fastest growing manufacturers of jewellery (Bain & Company, Inc., 2011, p.49)

Based on interviews the final market for these companies are the socioeconomic upper and rising middle classes of Namibia and Southern Africa as well as to a large extent tourists visiting Namibia. For the interviewed sample approximately 80 % of business takes place through sales from the local shops, but customers also order pieces via internet, often after an initial relationship has been established in the shop. Final markets are geographically located especially in Europe, with a large amount of customers coming from Scandinavia, Germany and the UK, but Asia has also been growing their share of purchases. In general it can be said that the foreign customer portfolio tightly follows the demographics of the Namibian tourism sector for incoming visitors. On a global level the US is by far the largest market for diamond jewellery, but India and China again account for fastest growth (figure 31).

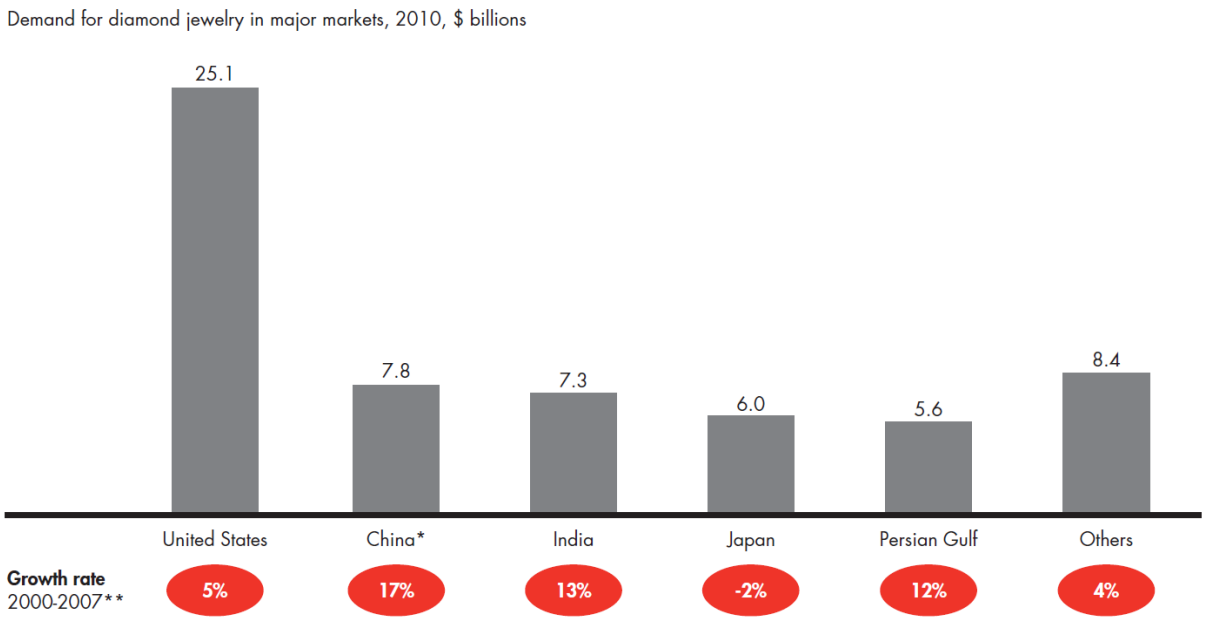


Figure 31: USA dominates the market in demand for diamond jewellery, India and China grow fastest (Bain & Company, Inc., 2011, p. 50)

The diamond jewellery in Namibia carries a special importance to the jewellers as Namibia is well known for high gem quality diamonds mined in the country. As is understandable, many efforts have been made by the local diamond cutters and polishers in cooperation with local jewellers to capitalize on this high quality resource. As an example, one of the cutting polishing companies, Hard Stone Processing Namibia, has created a the Namibian Sun cut, which is designed, mined and cut in Namibia (Hard Stone Processing Namibia, 2015). Another NDTC sightholder, AMC – Gemxel Diamonds, in cooperation with a famous Namibian jeweller Adrian & Meyer created the Atlantis Namibian Diamond brand along the same lines of locally mined, processed and often also set into jewellery locally (The Namibian, 2011). According to interviews, however, the branding efforts are never a straightforward way of capturing market niches and added value. In essence after a diamond is cut and compared to a similar grade diamond from anywhere in the world there is practically no difference between single pieces. Branding efforts are thus attractive, but also require extensive marketing and cross-chain control measures. The Atlantis brand, for example, never truly took flight and according to interviews failed to produce predicted profits.

Acquiring financial data to analyse and understand the economic value creation of the final value chain step in Namibia was not an easy task. Firstly, the companies are small, which means that they do not have ready systems that allow for extraction of sales data, cost structures and

other factors of financial value creation. The challenge is further complicated by the fact that jewellers deal with various raw materials and products, which means that allocating direct revenues and costs to solely diamonds is problematic. Through various consultations and cooperation, only one company active in both diamond jewellery and retail was able to compile useful data to be used in this analysis. This was, however, understood by ODC as the initiator of the study, and it was agreed that even a case example depicting the final step was essential for the value chain analysis to be successful. The data sets acquired also include indirect measures of understanding the final step e.g. the cutting and polishing companies were asked to identify sales to Namibia separately, which allowed estimations to be made on total inputs of diamonds to the end agents in the chain. These calculations and analysis are further presented in the next chapter on financial and economic analysis.

A few remarks on the specific nature of diamonds in jewellery are in order. As stated before, diamonds are by no means a similar commodity to e.g. precious metals like silver and gold. There is a considerable amount of subjectivity present in valuation of diamonds at all stages of the chain. As an example rough diamond valuation by De Beers is carried out by a system that produces approximately 2 000 different value categories for diamonds. In general diamond valuation happens through the "four C's" of *carat (size), colour, clarity and cut.* As diamonds reach the end of the chain there is naturally a plethora of complications that have to be taken into account when considering total value addition potential and related matters. This study had to content itself with mostly dealing in per carat average values, as information on carat size adjusted price portfolios were simply too difficult to compile. Figure 32 introduces some variants of this characteristic by showing how the price of a similar quality and size of diamonds can vary. In the case of Namibian diamond jewellery some information was gleaned from industry interviews, but could not adequately be translated into financial data. One of the facts found was that large diamond naturally carry by far the largest prices and account for a majority of revenue, but smaller diamonds carry largest margins. According to interviews diamond sales in total carat volume terms follow a crude distribution of 50 : 30 : 20 of respective < 0,5 : 0,5 – 1,0 : > 1,0 carats. For profound later analysis the carat size distributions would be a key area to study.

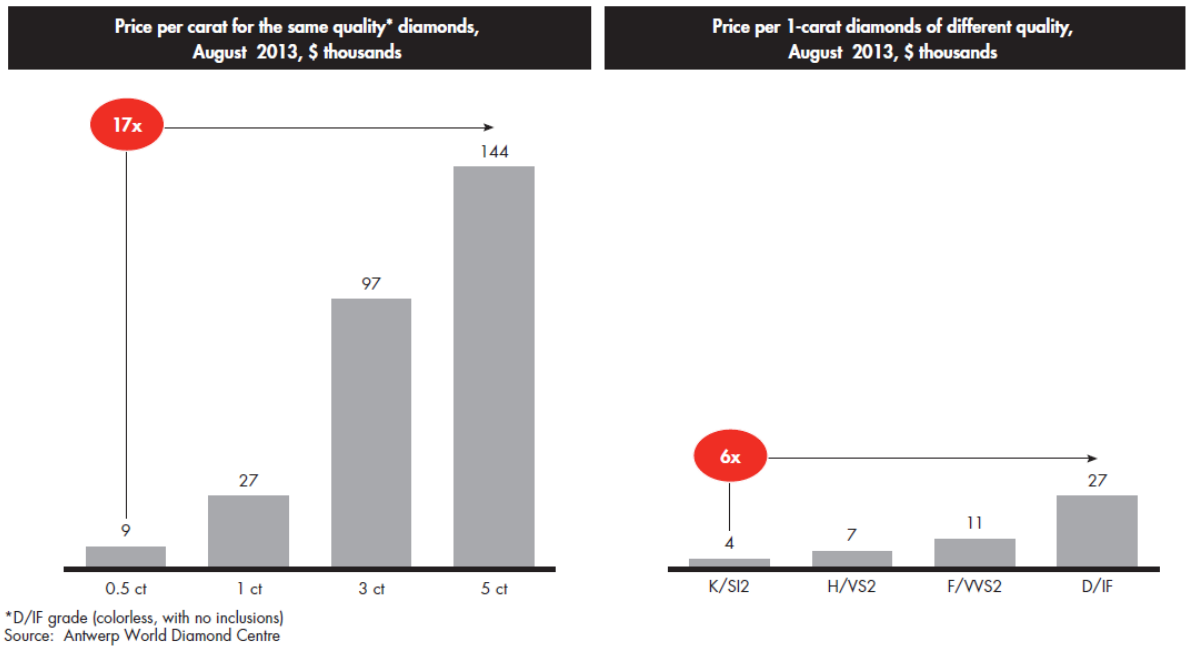


Figure 32: Diamond prices vary considerably according to carat size, colour, clarity and cut (Bain & Company, Inc., 2013, p.43)

Another important consideration, which also translates into a major chain step challenge, is the sourcing of stones for use in jewellery manufacturing. The Namibian jewellers face considerable problems in sourcing Namibian diamonds from local cutters and polishers. In simple terms one of the largest reasons for Namibian diamonds not traveling to the end of the chain seems to be the cumbersome business environment of dealing in diamonds. There are several subcategories of this problem. One of them is the aforementioned affiliation of NDTC sightholders with global cutting and polishing companies, which sees most trade happen intra-company, often in unprocessed diamonds. This, in fact, is not necessarily a consequence of cutters and polishers not wanting to sell locally but also follows regulative structures related to trading in diamonds, especially under the EPZ policies. In essence it seems that from business perspective the national legislative environment acts as a serious value addition hindering barrier of entry, trade and rent at this stage of the value chain. Interviews established that Namibian jewellers find it considerably easier and cheaper to source the diamonds they need from abroad, particularly from South Africa, than a cutter and polisher a few kilometres away in Windhoek. As discussed later, the coordination and trade development between these two value chain steps seems, according to analysis, the most potential for meaningful policy interventions where benefits naturally have to be balanced with various social and economic cost considerations.

4.5.5 A complete depiction of the Namibian diamond value chain

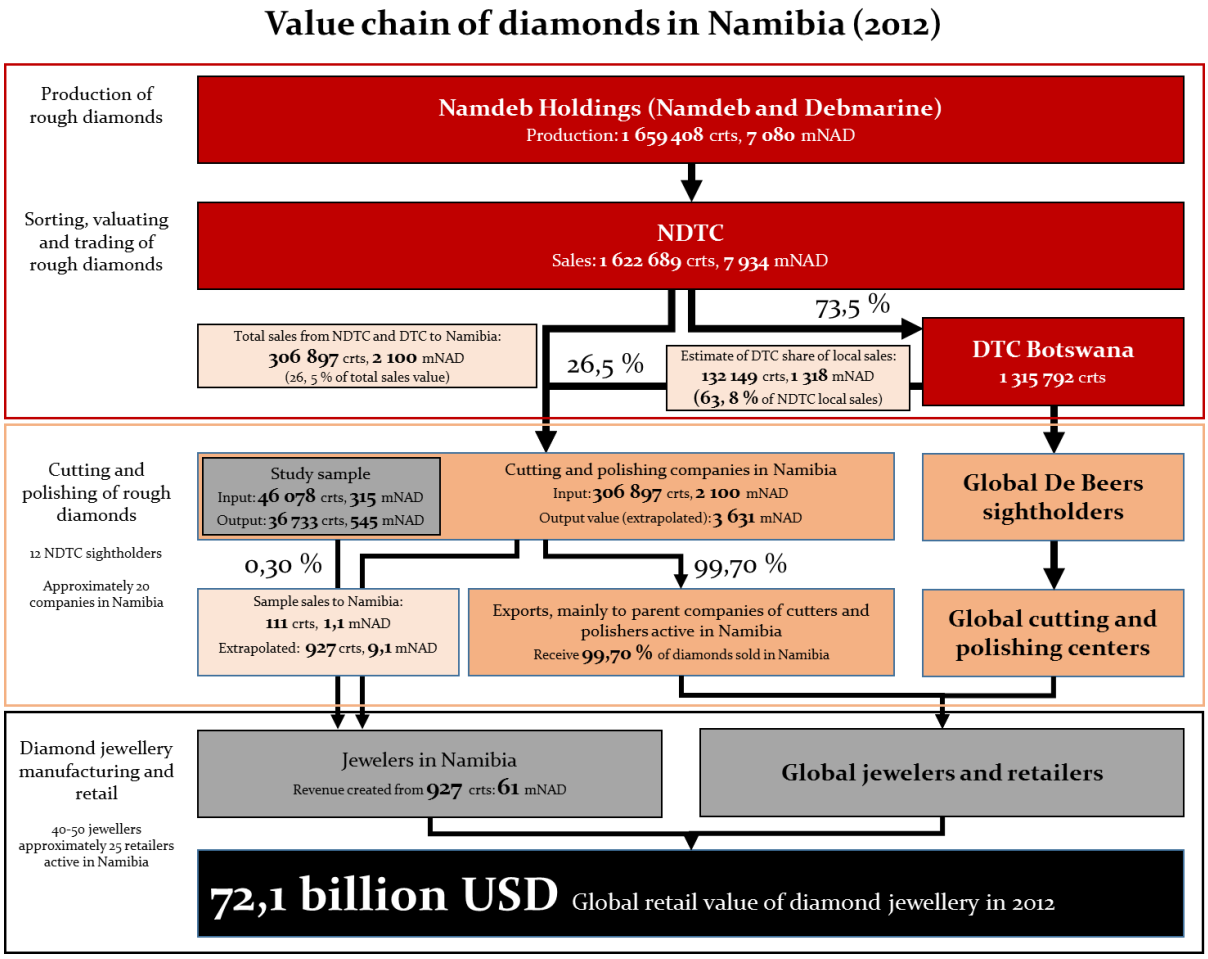


Figure 33: Value chain stages, agents, relationships and volume and value flows of Namibian diamonds in 2012

Figure 33 compiles the information and data acquired throughout the value chain analysis process into a single depiction of the Namibian diamond industry in 2012. As has been explained earlier in this chapter the value chain is divided into four stages.

Namibian diamonds begin their journey in the chain with the volume and value of total Namdeb Holdings production on land and at sea presented at the top of the figure.

Diamonds are then passed to NDTC for sorting, valuating and downstream trading. Some of the Namibian diamonds are sold directly to cutting and polishing companies in Namibia, but to get to the total local sales from NDTC sales of aggregated parcel from DTC Botswana also have to be taken into account. The NDTC total local sales value in NAD terms was acquired from NDTC, but the share of aggregated parcels was not. To arrive at an estimate of this, the Kimberley Process import figures of rough diamonds into Namibia were used, representing 63,8 % of NDTC local sales in 2012. Local sales represent 26,5 % of total value of NDTC sales in 2012.

Local sales from NDTC act as inputs to 12 sightholders active in the cutting and polishing industry of Namibia. Financial data was acquired for four companies active in this stage. In value terms these companies represent approximately 15 % of total NDTC local sales. These companies pass diamonds downstream through two channels. They export them, in three out of four cases to parent companies abroad, or sell them to Namibian jewellery manufacturers. There is evidence that a majority of diamonds are not cut and polished in Namibia, but are actually traded out of the country in rough form. As is evident from the above figure, the share of sales within Namibia is very small, in 2012 it accounted for 0,30 % of total carat volume. According to the analysed data 2012 was not an anomaly in this respect. For sample companies sales to Namibia were less than 1 % for each year in 2008 – 2013.

Local sales from cutting and polishing companies are inputs into diamond jewellery manufacturing and retail in Namibia. These companies sell cut and polished diamonds both loose and set in jewellery to final end users, mostly through retail shops in Namibia.

A complete picture of the structure, agents, relationships and flows in the Namibian diamond value chain has now been drawn and a step further is in order. The next chapter of financial and economic analysis adds detail to the above depiction, providing information on especially revenue and value creation as well as national value distribution.

4.6 Financial and economic analysis

Before financial analysis is presented a few remarks are important with respect to units, exchange rates and financial measures used.

Diamond volumes are measured in carats (crt), which is the equivalent of 0,2 grams (g) or 200 milligrams (mg) on the metric scale.

Prices used in all financial calculations are current prices for the applicable year.

The diamond industry often uses US dollars instead of local currencies. As an example this can be seen in the NDTC sightholder quota allocations explained in chapter 4.5.2. This means that in some value chain calculations it was necessary to convert USD figures into NAD (Namibian dollar) terms. The exchange rates used where acquired from the historic data sets from the Bank of Namibia website. The BoN data sets give the monthly average exchange rates, which were used to calculate average USD/NAD and NAD/USD conversion rates shown in figure 34.

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Average USD/NAD	0,155	0,157	0,149	0,142	0,123	0,120	0,137	0,139	0,122	0,092
Average NAD/USD	6,436	6,351	6,724	7,049	8,143	8,331	7,318	7,216	8,193	10,867

Figure 34: Exchange rates for Namibian dollar to US dollar conversions (Bank of Namibia, 2014)

4.6.1 Employment

Figure 35 shows the employment effects of Namdeb Holdings and the cutting and polishing sector of Namibia. As explained earlier in chapter 4.5.1 Namdeb reduced its workforce considerably when the financial crisis of 2008 hit the company with full force. The cutting and polishing sector sample figures are for employees only in production activities. Employment figures for NDTC and the jewellery sector could not be acquired for this study.

	2008	2009	2010	2011	2012	2013
Namdeb permanent employees	**3278**	**1969**	**2160**	**1969**	**2230**	**2352**
Namdeb temporary employees		180	99	129	170	134
Cutting and polishing sector employment	**1161**	**652**	**884**	**1223**	**1164**	**1036**
Employment in sample cutting and polishing	148	195	177	267	300	145

Figure 35: Employment in diamond mining and cutting and polishing sectors (Chamber of Mines of Namibia, 2013) (NDTC, 2014)

4.6.2 A small volume of Namibian diamonds reach the end of the value chain

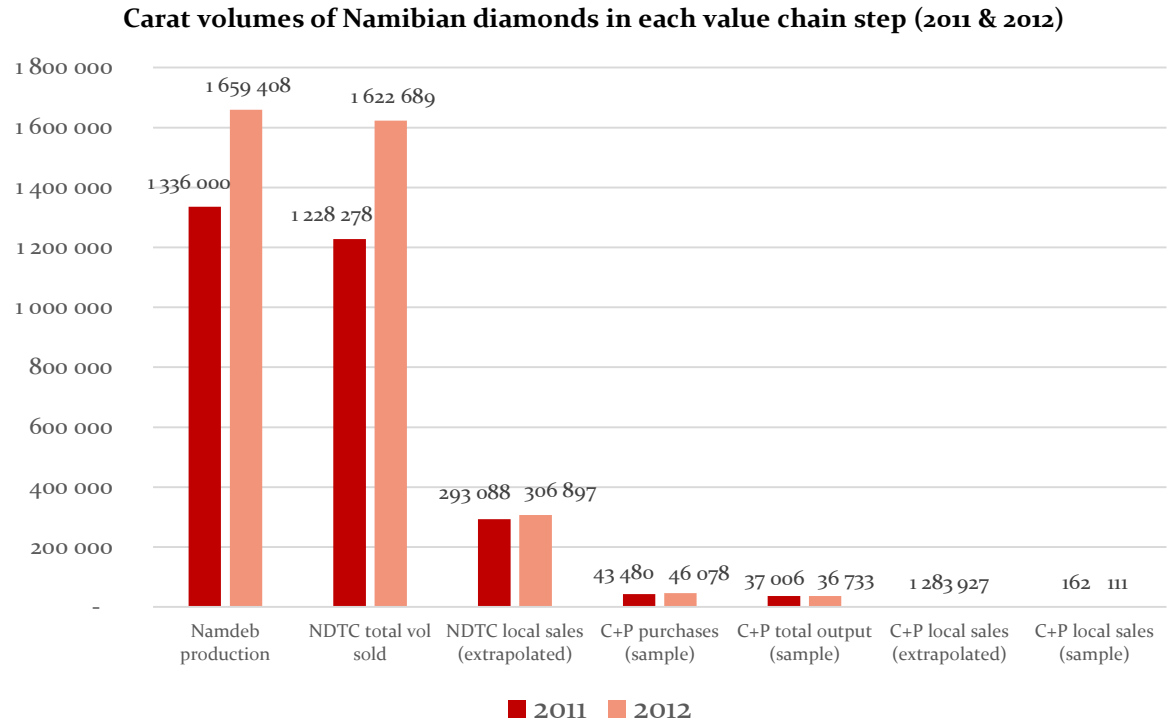


Figure 36: Carat volumes of Namibian diamonds in each value chain step (2011 & 2012)

Figure 36 summarizes the findings on Namibian diamond carat volumes as they are passed on in the national value chain for the years 2011 and 2012. The extrapolated numbers presented in the graph require some elaboration.

The NDTC local sales (extrapolated) is arrived at by combining NDTC data with the sample of cutting and polishing companies. For NDTC only the total local sales NAD value was available without the carat volumes. For the cutting and polishing sample both purchase values and carat volumes are available in the acquired data. It is assumed that the carat distribution with respect to value is the same for all the cutting and polishing companies. Thus the NDTC local sales carat volume is arrived at by taking the cutting and polishing sample purchases as a percentage of NDTC local sales value and assuming that the same percentage holds for the carat volume.

The C+P (cutting and polishing) local sales (extrapolated) figure is arrived at by taking the sample cutting and polishing local sales percentage from C+P output and applying this percentage to the above NDTC local sales (extrapolated) figure. The percentage is thus the same as for C+P local sales (sample) out of C+P total output (sample). As the reader will notice, the NDTC local sales (extrapolated) will in reality incur some carat volume losses as it is cut,

producing a lower output figure. As the output percentage for the sample did not seem representative in reality, the Sales to Namibia percentage is applied directly to the NDTC local sales (extrapolated) figure to arrive at what can be understood as the upper limit of cut and polished diamond volume entering the jewellery manufacturing step.

Another limitation that should be mentioned is the possible carat distribution effects on extrapolations. Diamond prices are not linear as carat size rises, which means that volume extrapolations based on values may be off, especially if some of the sample companies specialise only on diamonds with specific characteristics. With four companies that represent 15 % of total local sales, however, the risk of this should be relatively small.

As can be seen, a very small share of Namibian gem quality diamonds mined in the country travel the entire chain. In fact, according to the sample data, less than 0,5 % of cutting and polishing output end up in the final value chain step of jewellery manufacturing and retail.

4.6.3 Cutting and polishing creates large revenues but low value addition

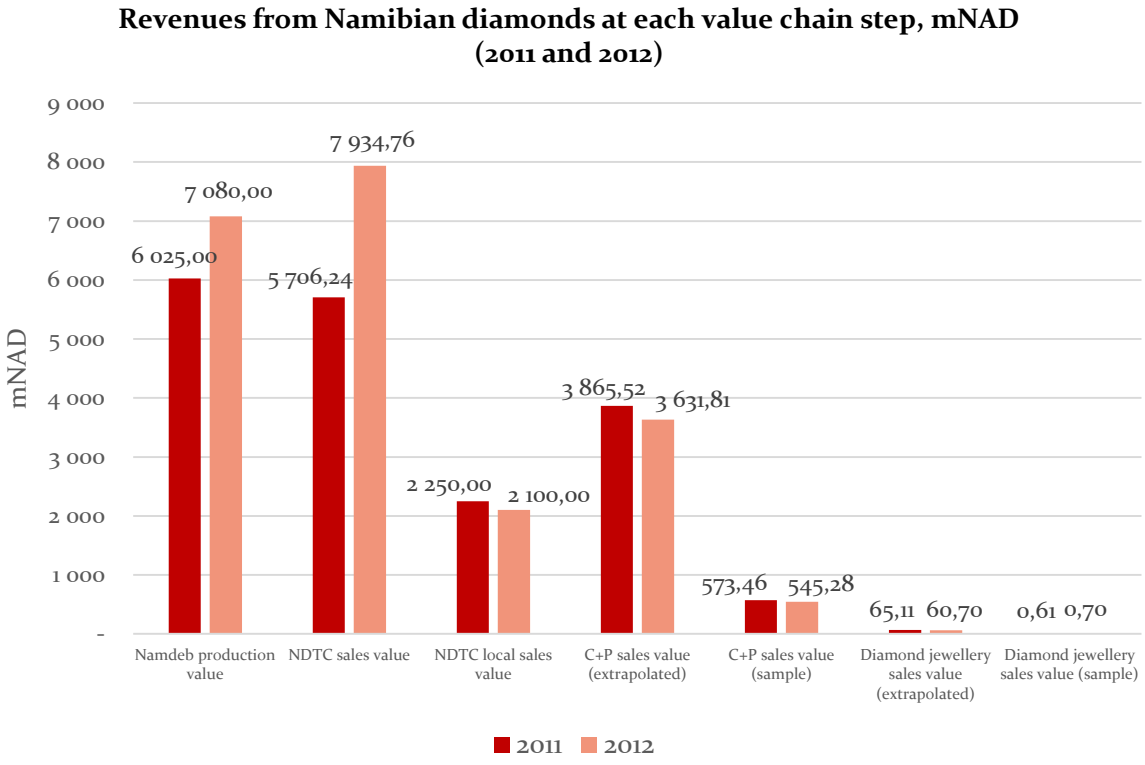


Figure 37: Cutting and polishing creates substantial revenues from NDTC local sales

Figure 37 depicts revenue creation in the Namibian diamond value chain. Namdeb production values are acquired from the Namibian Chamber of Mines, whereas NDTC figures are based

on actual NDTC standard sales value (SSV) data. As NDTC records these in USD terms, the figures in this graph are converted into NAD form based on BoN historical exchange rate data.

Again, the extrapolated figures for C+P (cutting and polishing) and diamond jewellery sales values demand some explanation on assumptions made.

The C+P sales value (extrapolated) was calculated by using the NDTC local sales (extrapolated) carat volume multiplied by the average per carat price received by the four sample companies. Again, the presented extrapolated local sales value actually gives the upper limit of revenues received, as the companies are assumed to sell the same carat volume as is their input. This would mean that the companies sell their all input directly as rough, without processing it in Namibia. This is naturally too strict of an assumption, but follows from the observation that three out of four sample companies actually carry out very little cutting and polishing local activities. Linear transformations to the revenue received can naturally be applied to account for losses in carat volume when actual cutting and polishing take place.

A similar extrapolation is carried out for arriving at the diamond jewellery sales value (extrapolated). The C+P local sales (extrapolated) carat volume calculated previously is multiplied by the average carat price received by the sample jewellery retailer for Namibian diamonds to arrive at an estimate for the total revenue created in 2011 and 2012 in diamond jewellery manufacturing and retail.

It is revealing to contrast the above explained revenue creation throughout the value chain with calculations on value added. Figure 38 shows the results of the value addition calculations for years 2011 and 2012.

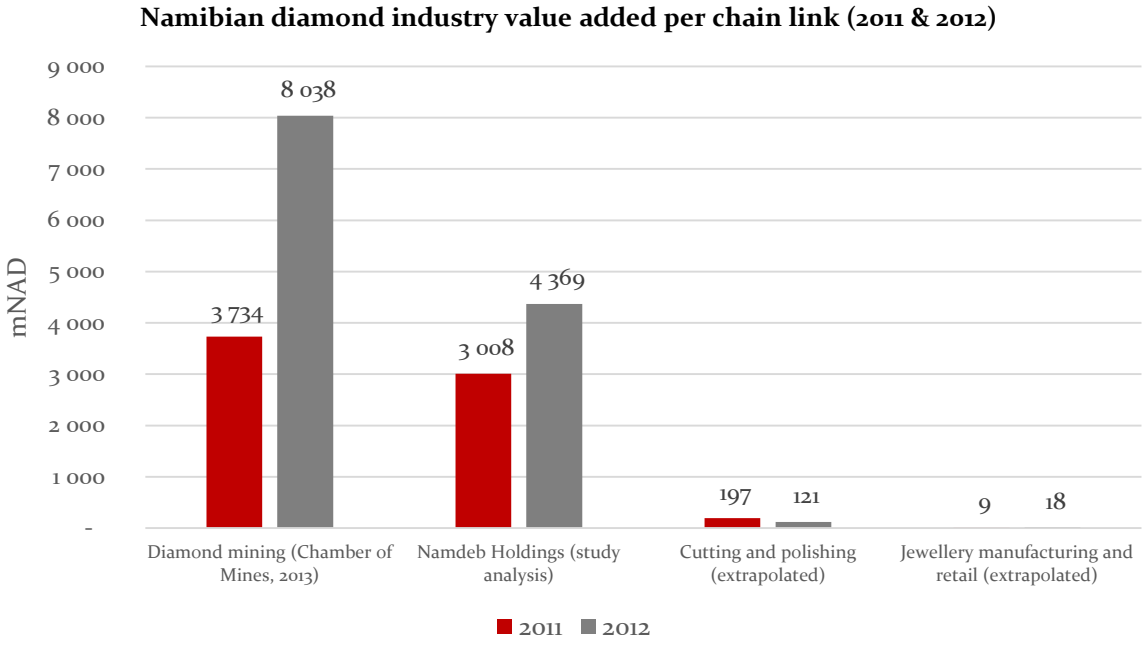


Figure 38: Despite substantial revenue creation, cutting and polishing contributes little to value addition

The first value addition entry is acquired from the Chamber of Mines of Namibia, who calculates a valued added figure for diamond mining in Namibia. CoM calculates this following a formula:

> Value added = Output – Intermediate consumption (Purchases of material inputs + Value of opening stock – Value of closing stock + All other running costs)
>
> *(Source: correspondence with National Statistics agency and CoM, 2014)*

The above CoM figures differ from the value added calculations done in this analysis because the CoM seems to have access to some entries, e.g. cost structures, which were not available for this study.

Value addition in this study for each value chain step is calculated by the following formula:

> VA = personnel remuneration + profit + interest charges + taxes + depreciation

As this is a general guideline for understanding value addition, the above formula needed to be adjusted for data entries collected from the companies. Referring to the data form shown in figure 16, value addition for each value chain step was calculated according to the following formulas:

Namdeb Holdings (study analysis):

> VA = Wages and salaries + Net profit + Royalties paid + Taxes paid + Dividends paid + Fixed investment

Cutting and polishing (extrapolated): To arrive at this figure the value added for the four sample companies was calculated first by the following formula:

> VA = (direct labor costs + indirect labor costs) + (total revenue - total direct costs - total indirect costs) + (investment + depreciation) + taxes paid + payments to financial institutions

Instead of net profit the proxy of *total revenue - total direct costs - total indirect costs* had to be used as the sample companies did not adequately report net profits.

This total sample value added was then divided by the sample carat output volume to arrive at a *value added per carat of output* figure, which was multiplied by the previously explained NDTC local sales (extrapolated) to arrive at the total economic value added for cutting and polishing in Namibia.

Jewellery manufacturing and retail (extrapolated): The sample value addition for the diamond jeweller was first calculated by the following formula:

> VA = direct labour costs + (total revenue from all diamonds - total direct costs) + (depreciation + investments) + taxes + interests

As explained earlier the jewellers create value from also other activities than diamond jewellery. In the above formula this is taken into account as best could by only including direct revenues, labour and other costs incurred from jewellery manufacturing. The same applies for the proxy for profit of *total revenue from all diamonds - total direct costs* as the data set did not include net profit and in any case it would have been for all activities carried out.

After the sample total value addition is calculated for the jeweller it is converted into *value added per carat of output* figure. This, in turn is used with the *C+P local sales (extrapolated)* carat volume from chapter 4.6.2 to arrive at an estimate of total value addition for the diamond jewellery manufacturing and retail sector, presented in the far right of figure 38.

As said before, the contrast between revenue creation and value addition for each chain link is particularly interesting. Cutting and polishing is in extrapolated terms able to create revenues equivalent of 50 – 60 % of total rough diamond mining value. However, cutting and polishing

is only able to create 3 – 7 % of the value addition of rough diamond mining. The picture becomes more detailed if additional data is taken into consideration. Figure 39 presents total incoming and output carat volumes, their relative size in percentages as well as total and per carat of output value addition figures for the sampled four cutting and polishing companies.

Year	2008	2009	2010	2011	2012	2013
Total input volume (carats)	30 470	24 064	53 164	46 127	51 397	73 473
Total output volume (carats)	16 767	22 320	38 499	37 006	36 733	64 289
Total output as percentage of incoming volume	55 %	93 %	72 %	80 %	71 %	88 %
VA per crt of output (NAD)	3 784	3 263	518	672	394	207
Total value added (NAD)	63 439 724	72 821 847	19 960 156	24 861 049	14 458 302	13 320 535

Figure 39: Volume and value addition trends in cutting and polishing

First, it has to be noted that for 2008 the sample only includes a single company, which is also the one for which the output/input (acting as a proxy for cutting and polishing actually taking place in Namibia) is close to the industry rule-of-thumb 50 %. The 2009 sample includes two companies, out of which the other has the output/input ratio of 100 %, meaning it sells everything in rough form. From 2010 onwards all four companies are represented. What is seen is that even as total input volumes rise for 2008 – 2013 total value addition drops. In addition, value addition per carat of output drops for two reasons; the drop in total value addition and a rise in output/input ratio. The second of these indicates that companies carry out less of actual cutting and polishing in Namibia and rather export diamonds out of the country in rough form. Naturally these sample characteristics are carried to the extrapolated figures of value addition presented in e.g. figure 38.

The next heading will continue the analysis of value addition, looking at value addition per chain link and the distribution of value in the national economy.

4.6.4 Relative measures of revenue creation and value addition

The revenue and value addition figures depicted under the previous heading are often misleading, because they do not adequately represent the economic potential withheld by the different value chain steps. In total terms of revenues created and value added, especially the end of the chain, seem small due to the small volume of diamonds reaching the final stages of

processing. This is why it is important to also look at relative figures, in this case in per carat form.

Figure 40 looks at revenue created throughout the value chain in USD per carat form.

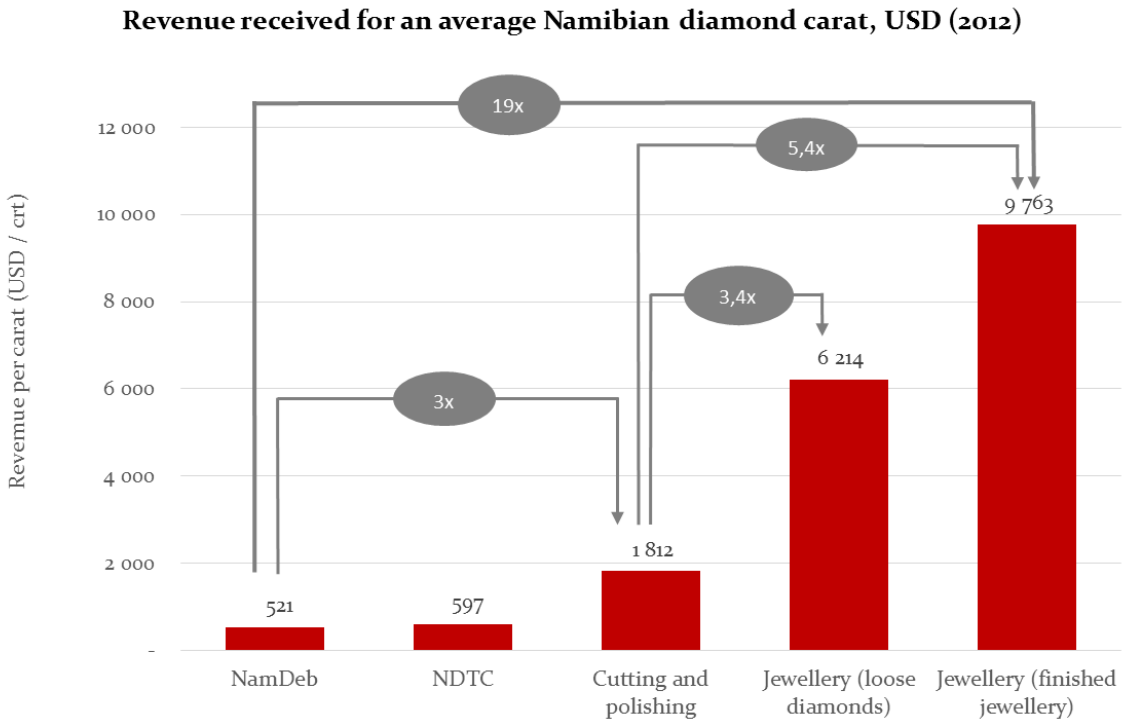


Figure 40: Revenue received for an average Namibian diamond carat, USD (2012)

A few cautionary notes are in order when looking at figure 40. Even though the multipliers seem to hold quite well throughout the time series for the first three steps of the chain, the final stage of diamonds sold in retail by jeweler. As must be kept in mind, the sample is a single small company, for which annual diamond sales volumes are in dozens of carats. This will create substantial variation in the per carat figures calculated. For the entire time series for this single company, however, the average revenue per carat including both loose and jewellery set diamonds holds relatively steady between 6 000 – 7 000 USD. Even if not representative of the entire sector, the case example gives a very important indication of the scale of revenues per carat figures in jewellery retail, especially when this sector is highly competitive both in Namibia and globally, indicating that the prices set by this jeweler are market based and cannot be an absolute anomaly.

The second relative measure essential for understanding the value chain is the value added per carat of output. These are shown in figure 41, again for each value chain step.

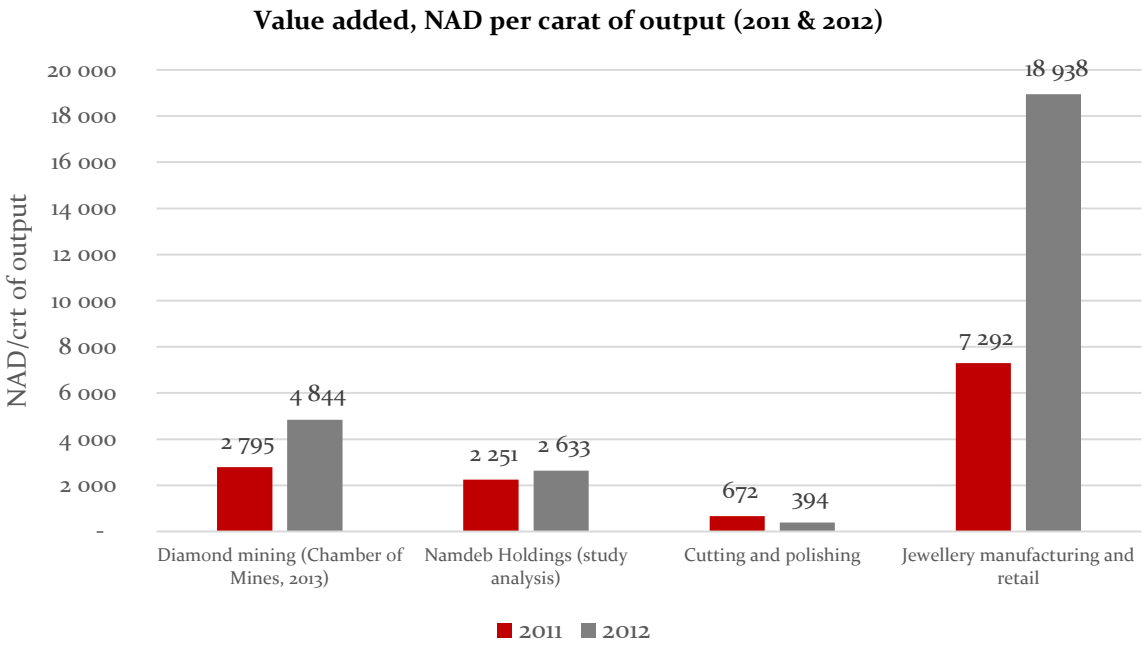


Figure 41: Value added per carat of output for each diamond value chain step (NAD/crt)

Again a very different set of realities compared to figure 38 is met. The relative importance of jewellery manufacturing and retail rises considerably, indicating the ability of the end of the chain in creating value added. Naturally, as stated before, the case example of a single jeweller cannot be considered representative of the entire industry, but gives valuable information on the possible structure of value creation within the industry. It is important also to note that according to this study the highest value addition is achieved both in the beginning and end of the chain. This is actually to be expected based on global industry studies. As shown in figure 13, the beginning and the end of the value chain are able to reap largest margins, whereas the highly competitive middle market achieves lower margins and value addition (Bain & Company, Inc., 2013).

4.6.5 Distribution of value added in the Namibian economy

An additional way of analysing value addition throughout the value chain is to look at the distribution of it to the different actors of the national economy: households (labour income), private enterprises (profit), government (royalties and taxes) and financial institutions (interests). This distribution, as percentages of total value added for sample data collected, are presented in figure 42.

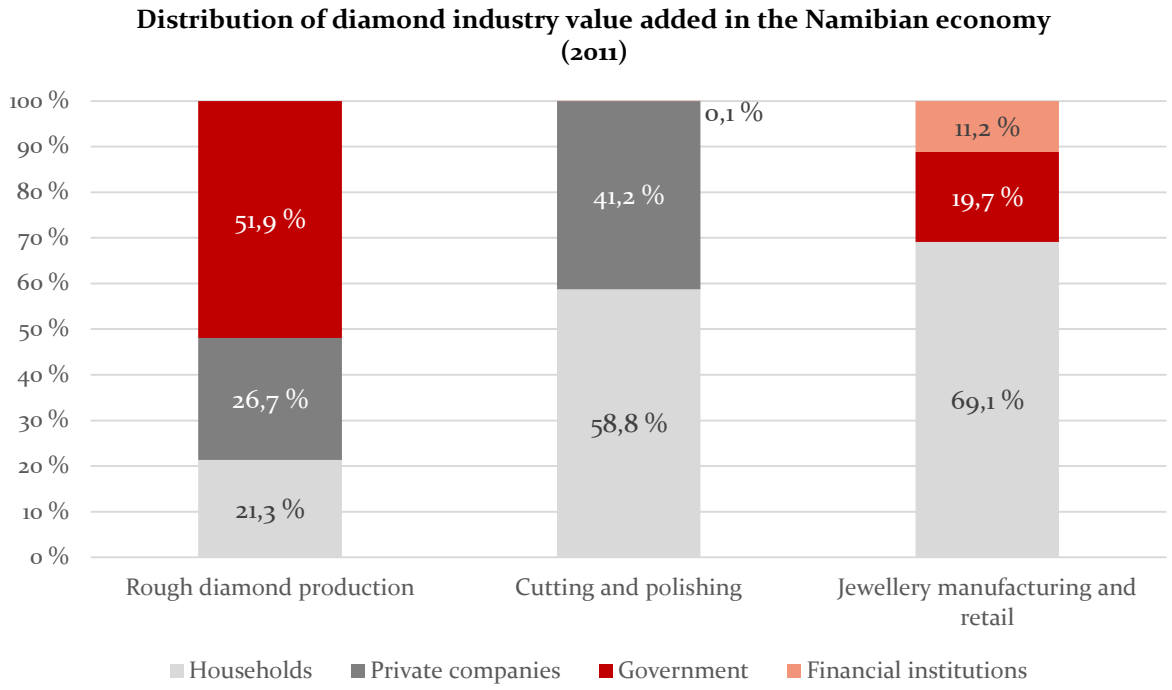


Figure 42: Distribution of diamond industry value added to actors in the Namibian national economy (2012)

The above calculations are done by taking the value added formulas for each value chain step explained under heading 4.6.3 and allocating the total value addition to each of the four recipient groups. Year 2011 is used here instead of 2012 as the net profit for Namdeb Holdings is available in the data set for 2011 but not 2012. Otherwise the two years show very similar distribution of value added.

As can be seen, for rough diamond production the main recipient by far is the government through taxes and revenues. This holds even as dividends in the above calculation are assigned only to private companies, which is not entirely correct as both De Beers and the Namibian government are shareholders of Namdeb Holdings. This is done as the details of dividend distribution between the two shareholders is included in their confidential agreement and thus unknown.

The figures for the second step, cutting and polishing, is rather surprising when looked at from the perspective of government revenue. According to the data on four companies, they pay no taxes or duties to the government, which seems to follow from their activities under the EPZ framework. According to the above calculation the employees are the largest recipient of value added for this stage of the value chain. However, this should be contrasted with the rather small total value addition created by the cutting and polishing industry, especially keeping in mind

the trend of falling total value addition and the fact that it seems that the companies are actually exporting most of the diamonds they purchase in rough form.

The final stage of jewellery manufacturing and retail entails the most balanced distribution of value added. One important technical note has to, however, be considered here. As previously mentioned, the case example data on the jeweller cannot distinguish between profit made on diamond jewellery and other activities. In the previous value addition calculations net profit which is the entrepreneur's share of the value added is calculated as *total revenue from diamonds – total direct costs.* For the case example this actually results in a negative figure, meaning a loss, and it is thus set to zero. In real terms the value added for diamonds is thus probably slightly higher than indicated as total direct costs also hold costs for other than diamond related activities. Also, the net profit is probably higher than zero, changing the above distribution somewhat. In any case it seems that the employees are here also the largest recipient of value added.

4.6.6 Value added potential of the diamond jewellery sector in Namibia

The gathered data on the Namibian diamond volume flows, revenues and value additions allow for one more interesting piece of analysis, namely calculating value addition potential within the chain. This is naturally a purely technical calculation and does not propose it possible nor necessarily an optimal solution. The following calculation is carried out concentrating on the end of the chain, which according to various aspects of analysis seems to hold most structural rather than business and market related barriers combined with the highest potential. It is assumed here that the previous value chain steps function relatively effectively, with the NDTC local sales (figure 24) representing at least roughly the type and volume of gem quality diamonds that would be suitable for cutting and polishing in Namibia and subsequent input into diamond jewellery. Thus the analysis focuses on the seemingly small percentage of diamonds sold by cutting and polishing companies onwards into Namibian jewellers. Previously the extrapolated volumes and revenues did not take into consideration the fact that when diamonds are cut there is naturally loss in carat volume. This correction is now built into the following calculations.

Figure 43 carries out these chain structure adjustments to arrive at the potential value of the diamond jewellery sector under two scenarios where 100 % of the NDTC locally sold diamonds are cut and polished in Namibia. The two scenarios mean a 50 % and 80 % loss in carat volume due to processing. These carat volumes are then assumed to be sold in their entirety as inputs

to the diamond jewellery manufacturing and retail sector. Finally, the carat volumes are multiplied by the value addition per carat for the sample jewellery company to arrive at a total value addition estimate. It is of course very unlikely that existing companies and markets could immediately absorb raised input volumes of diamonds and that they would have the markets ready for them. Another cautionary note concerns the carat distribution of diamonds. The calculation done here assumes that the carat distribution of the case example jeweller actually matches the entire market, which is naturally unrealistic. The data, however, includes the distribution of purchased diamonds for the jeweller and shows a fairly steady 10 : 50 : 30 : 10 distribution of diamonds sized (in carats) < 0,3 : 0,3 – 07 : 0,7 – 1,0 : >1,0, which now becomes also the assumption for the carat distribution that the cutting and polishing companies supply to the end of chain industry.

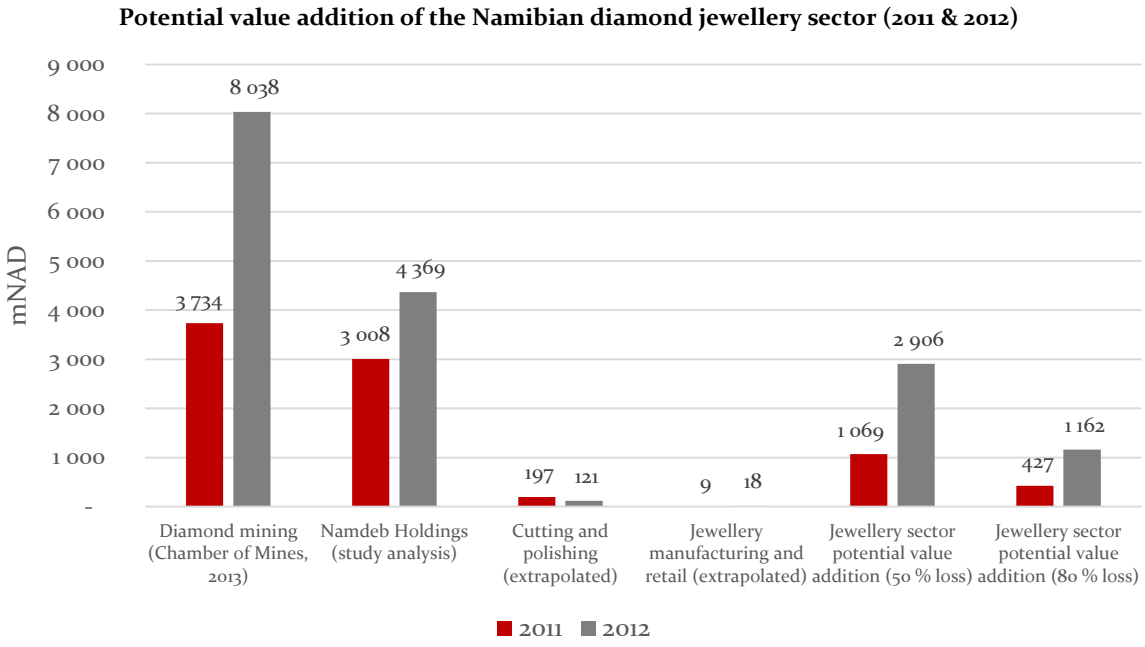


Figure 43: The potential value addition of the Namibian diamond jewellery sector (2011 & 2012)

The data collected also allows for a more realistic comparative potential calculation to be done. As stated in NDP4, the aim during its period is to raise the input of Namibian origin rough diamonds into local cutting and polishing to 20 %. In figure 44 the value addition effect of this aim is calculated for years 2011 and 2012. It must be noted here that unlike NDP4 states, the share of Namibian rough diamond input into local cutting and polishing was in these years already between 10 and 20 %. In this calculation, however, the input of Namibian mined rough diamonds is set to 20 % of total NDTC sales in value terms. The aggregated parcel input from DTC is set to be the same as in previous calculations. Based on these adjusted carat volumes,

a new total value addition contribution is calculated for the chain segment (Cutting and polishing 20 % Nam (extrapolated)) with the figure also showing the value addition increase compared to the baseline scenario (Cutting and polishing (extrapolated)).

To contrast this effect, and to highlight the importance of the end of the chain in value creation, another hypothetical calculation is also presented in figure 44. It is first assumed that all input into cutting polishing is actually processed in the country with a 50 % carat loss rate. Out of this output an arbitrarily chosen share of 10 % in carat terms is made available as inputs to jewellery manufacturing and retail, and the subsequent total value addition contribution is calculated (Jewellery sector value addition (50 % loss, 10 % of C+P output)). The increases to value addition compared to the baseline figures (Jewellery manufacturing and retail (extrapolated)) are shown above the data points. It is important to bear in mind that at the moment this share is approximately 0,5 % of cutting and polishing output. As the reader will note, this 10 % input into the end of the chain does not, in fact, require all of the input into cutting and polishing to be cut and polished locally, only a share that produces the 10 % input into jewellery of the hypothetical cutting and polishing output.

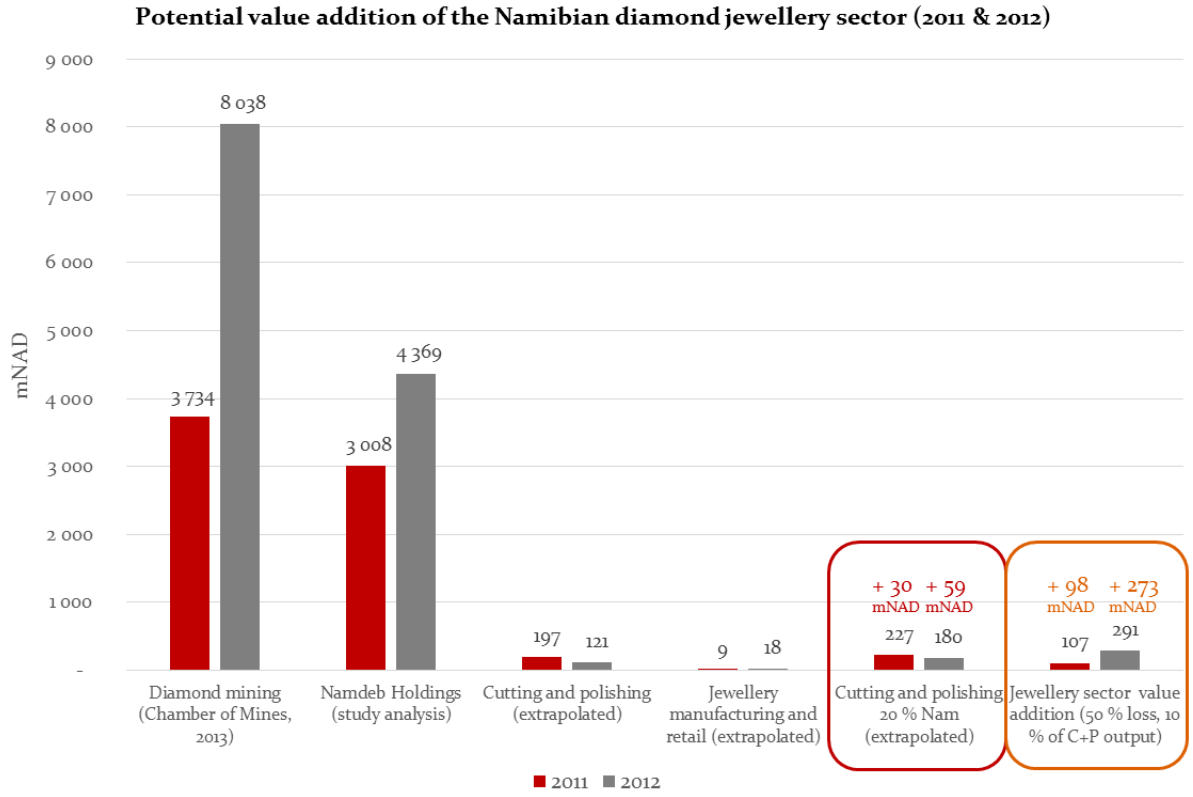


Figure 44: Contrasting value addition effects of higher inputs into cutting and polishing in comparison with jewellery manufacturing

The calculation again highlights the importance of the end of the chain in creating value added returns nationally. It also exemplifies the rather low comparative value addition power of the middle market. With a rather small diamond input raise into jewellery manufacturing and retail, the end of the chain is, according to this calculation, able to become as important of an industry as cutting and polishing in valued added terms. As already stated, the 10 % input into jewellery manufacturing was chosen quite randomly, mostly to mirror the hypothetical raise from 10 to 20 % as inputs to cutting and polishing aimed at by NDP4. In real terms the 10 % could represent a certain niche in qualities and sizes of diamonds that could be profitably developed into jewellery by Namibian jewellers. It is also important to note that the development of the end of the chain does not bar aiming at the targets stated in NDP4. Here, they are set against each other to portray the chain segments' relative importance in value creation, and to take into account the fact that in the presence of scarcity policy focus choices may be mutually exclusive. It is the task of further analysis to assess cost-benefit structures and relative difficulties in turning these possible scenarios into reality. In an optimal solution both chain links would be targeted for policy development as absolute value addition is witnessed in both cases of increased inputs. The availability of data often referred to before also creates its own very tangible limitations. These hypothetical calculations are carried out to demonstrate the usefulness of value chain analysis as a tool for understanding economic structures on the aggregate level.

Figures 43 and 44 show, as expected from previous calculations, that the diamond jewellery sector could be a substantial contributor to the Namibian economy if more of the cutting and polishing inputs were actually cut within the country and, which is even more important, become inputs to the end of the chain actors. As the analysis shows the middle market is not particularly successful in value addition, in Namibia nor globally. In this regard the discussion on local beneficiation that concentrates to a great extent on higher cutting and polishing input shares, and not the flow of diamonds downstream from this chain link, seems incomplete. What has been hinted at already, and will be raised as an important conclusion in this study, is that the national policy structures concerning the trade of diamonds from cutting and polishing industry to local jewellers seem a very promising point of entry for more local value addition. This and other possible value chain development issues will be discussed in further detail in the next chapter where the challenges raised in questionnaires and interviews of each value chain step are considered.

4.7 Industry opinions on characteristics and challenges of the value chain

The previous chapter carried out a systematic and thorough financial and economic analysis of the diamond value chain in Namibia. To get to the underlying reasons behind the figures it is important to take a look at opinions of the industry agents on characteristics and challenges evident in their environment. To this end interviews were conducted and open ended question forms issued to the chain agents. This chapter raises some of the most important topics discussed for each of the value chain steps. The opinions of Namdeb Holdings and NDTC are considered together, covering the first two stages of the chain demarcation used in this study. For the cutting and polishing industry four companies responded to the questionnaire presented in figure 17. For the jewellery manufacturing and retail sector interviews were conducted with three companies, out of which one company also responded to the questionnaire.

Before delving into the chain link specific considerations, some opinions and observations are presented on the *governance structures* and *barriers to entry, trade and rent* of the Namibian diamond value chain.

4.7.1 Governance structure of the Namibian diamond value chain

The governance structure of the Namibian diamond value chain is relatively straight forward, in particular due to the historical impact of the De Beers diamond empire on the global value chain of diamonds and the company's subsequent relationship with Southern Africa and Namibia.

Firstly, the Namibian diamond value chain is a *producer driven chain*, in this case Namdeb Holdings holding the position of the lead firm. Namdeb Holdings governs both vital technologies, represented perfectly by the world leader position in marine mining held by Debmarine Namibia, and access to critical resources, in this case practically a sole mining right to Namibian diamonds, as well as an access to global capital through company owners of De Beers and the Namibian government. (Gereffi & Korzeniewicz, 1994).

Second, the global diamond value chain in general and the Namibian chain in particular is very close to a pure example of a snake-type value chain as described by Baldwin & Venables (2013). As described in chapter 3.2.1.2, the snake is characterised by a production process where goods move downstream of a sequentially ordered chain and each stage adds value to the good. The authors indeed state state that both snakes and the second variety, spiders, are rarely met in their pure form but that most production processes exhibit characteristics of both extremes. When looking at especially the Namibian value chain we see that in this regard the

diamond chain is peculiar as it is only in the end of the chain, in jewellery manufacturing, that another component is added that can be manufctured parallel to the diamond, namely the piece of jewellery, watch or other product the diamond is set in. Still, the diamond is the main value creating component in the final product due to its relative price. Of course the substantial marketing efforts that create the culturally framed (Bracking & Sharife, 2014) value of a diamond can be seen as another component that adds a spider-like "limb" to the process of producing diamond jewllery. In the underlying theoretical models related to value chains we found Baldwin & Venables and Costinot, Vogel & Wang (2013) stating that both snakes and spiders might be subject to coordination failures where companies carry out inefficient amounts of offhsoring. Again, the diamond chain seems to exhibit the opposite nature as the industry is able to very effectively benefit from wage differentials globally with most of the middle market being off-shored to the cutting and polishing centres of India and Asia. Actually, the local beneficiation demands of many developing nations would seem to go against the fall of unbundling costs by trying to hold on to some of the stages of the chain. This makes the issue of local value addition at least based on the theoretical considerations quite problematic. At least this is so for the middle market, where it seems that both productivity or cost competitiveness and quality issues are simply against, e.g. Namibia. With respect to the modelled considerations but also the financial analysis done on the Namibian chain it can again be stated that the local value addition efforts could benefit from targeting the end of the chain showing substantial value addition potential, but also unique quality and differentiation possibilities that do not go against the unbundling costs.

Third, Gereffi et al. (2005) suggest three factors that determine the type of governance structure found in a given chain; *complexity of transaction, codifiability of information and capabilities of suppliers* (for a more detailed explanation of these, see chapter 3.2.2.2). In the case of the Namibian diamond value chain a high complexity of transactions is found, evident in high requirements on information about diamonds as raw material, downstream relationships as well as information on barriers to entry, trade and rent, such as the Kimberley Process. With regard to codifiability the diamond chain in question scores high. In real terms the downstream companies in cutting and polishing and jewellery manufacturing, understanding their carat own distribution and quality needs, could relatively easily change suppliers. This is, however, not possible especially for the middle market of cutting and polishing as their main hurdle within the chain is to secure access to the rough material where the few global giants hold considerable power. This also relates to the last determinant, capabilities of suppliers, where the diamond

chain scores low. In the case of diamond mining capabilities actually refer to access to mining technology, capital and, above all else, access to resources and mining rights in diamond rich countries. There are thus few suppliers on the global market, and in Namibia, practically only one, Namdeb Holdings. This combination of (high, high, low) on the three determinants points to a governance structure of a *captive chain*, where the lead supplier dominates the chain, but grants the following chain links enough resources and market access to make an exit from the supply relationship unattractive. In the case of Namibia the high governance power of Namdeb is quite evident. The following link of cutting and polishing is essentially wholly dependent on the NDTC decisions of sightholders on their survival on the market. As Sherbourne (2013) states, the global diamond market has, indeed, changed considerably in the last 10 – 15 years from nearly complete De Beers dominance to a situation where, some experts argue, if sightholder get a bad deal from DTC/NDTC, they can increasingly source there diamonds elsewhere. He continues, though, that in reality sightholders seem very reluctant to let go of the privileged position of a stable and tailor-made supply from DTC/NDTC and would go to extreme measures in maintaining this supply.

In conclusion, then, it can be stated that the Namibian diamond value chain is a captive producer driven value chain, where the decisions and governance modes of Namdeb Holdings as the lead supplier affect the entire downstream chain, particularly the cutting and polishing industry. Through De Beers and Namibian Government decisions, Namdeb holds the power to basically affect many of the business decisions made by the following chain link through trade legislation, EPZ policy measures, local cutting and polishing requirements and so on. The decisions of Namdeb Holdings/NDTC also carry a weight all the way to the end of the chain to Namibian jewellery manufacturers and retailers through the choice of NDTC sightholders and particularly details of the EPZ framework. The latter affects the end of the chain directly through demands and trade restrictions placed upon cutting and polishing companies that are all EPZ license holders. Also, the trends of global trade and production as shown in Baldwin & Venables (2013) and Costinot, Vogel & Wang (2013) also explain why the middle market is unbundling and offshoring its activities and why local value addition hopes are to some extent going against the economic rationale of individual companies. The case seems to be different for the end of the chain, which also exhibits greatest local beneficiation potential.

4.7.2 Barriers to entry, trade and rent in the Namibian diamond value chain

As explained in chapter 3.2.2.1, barriers to entry, trade and rent arise from various sources. Firstly, as proposed by Ricardo, economic rents are based on unequal ownership and access to scarce resources. Second, following the work of Schumpeter, scarcity can be constructed through the intentional actions of the entrepreneur in the process of innovation. Innovation creates so called dynamic barriers to rent, which means that the process occurs in cycles with innovators being able to capture extra profits for some time before competition catches up and pushes rents and prices down again. This dynamic nature of rents is the driver of capitalism and creates continuous change in the economy. (Kaplinsky, 2000). Barriers also refer to another process active within value chains, namely the ability of agents to protect themselves from competition through acquiring scarce resources or constructing other barriers exemplified by branding, certification schemes and designation of origin (Roduner, 2005).

These issues of competition and intentional efforts of agents creating barriers are closely related to the theories discussed in chapter 3. Firstly, it was shown by Sutton (2007b) that global competition exhibits a so-called moving capability window, which sets a lower boundary of quality and productivity which also act as a barrier of entry. This seems particularly relevant in the case of the Namibian diamond value chain when it comes to local value addition efforts. In the case of the middle market of cutting and polishing, the problem seems to be a combination of wage costs, labour legislation, scale effects and location costs that place Namibia under this access threshold in comparison to e.g. India as the hub of diamond cutting and polishing. It is exemplified by the fact Sherbourne (2013) states when he argues that no cutting and polishing company has opted to locate in Namibia without the promise of rough diamond supply from NDTC. In essence, he then states that the fundamental economic realities speak against locating that part of the value chain in Namibia unless there is a bundling benefit for the company evident in the access to rough from NDTC. In a different form the same capability window issue is present when access to global value chains is considered for the end of the chain, namely diamond jewellery. The issue here seems both more complex and beneficial for Namibia. For the middle market the weight of the cost competitiveness on location decisions seems hard to tackle, but in diamond jewellery the case of quality rises in relative importance. It would seem that there Namibia is already able to put forth a unique and differentiated product offering within the global quality capability window. The importance of this was also highlighted by Neary (2015), stating that especially in differentiated products quality competence was very important for successful export companies. Both Neary and

Sutton then conclude on the cost versus quality competence discussion by saying that on the long run export market competitiveness cannot be based on cost competitiveness but on investments in quality. In this light, when further efforts for local beneficiation are put forth in both cutting and polishing and jewellery manufacturing, the main efforts should be in finding the unique differentiated products that Namibia could truly compete in and focus on raising the quality of these products throughout the value chain steps. In effect, this is what was discussed as a possible value chain strategy under chapter 4.6.6 when it was suggested that a niche group of Namibian diamonds could be identified that would then travel the entire chain within Namibian borders.

Keeping the above in mind, it would seem the beginning of the chain, diamond mining in Namibia, is quite well within the global capability window as suggested by Sutton. As concluded many times throughout this study, De Beers has been particularly successful in acquiring access to diamond resources, applying extensive marketing strategies to enhance the symbolic image of diamonds and governing the value chain in a way that has downstream agents largely dependent on the supply of rough diamonds. In this regard the De Beers/NDTC sightholder system is a significant barrier to entry, trade and rent. As Sherbourne (2013) acknowledges, however, the global diamond industry has changed considerably after the turn of the millennia with De Beers now governing about 40 % of global rough diamond trade compared to as much as 80 % for most of the 20th century. Still, it seems that De Beers sightholders would be extremely reluctant to let go their sightholder status if they were unhappy with the deal they are getting from the lead company. De Beers seems to be able to impose quite extensive restrictions on its sightholders, and, in fact, the status of a sightholder seems a prerequisite of becoming a significant agent in the diamond value chain, again both globally and especially in Namibia. On the national level it is the greatest barrier to entry, trade and rent for the cutting and polishing segment as no companies active in this part of the chain have chosen to locate in Namibia without access to Namdeb origin rough diamonds. On the other hand, it is particularly this power that enables also Namibia to capture much of the value inherent in the first step of the chain. As was seen in financial analysis as well, the Namibian government and the labour force of Namdeb are benefitting substantial amounts through taxes, royalties, dividends and wages. In this regard it seems that the local beneficiation efforts are well advised to concentrate on the remainder of the chain.

On a broader level the previously explained Kimberley Process (KP) is also an industry relevant global barrier to entry, trade and rent, put into place to ensure that economic rents are

not channelled into conflict areas and to safeguard the rest of the industry from a tarnished image.

The Namibian diamond industry is naturally highly regulated by the Namibian legislative structures, which present the value chain with multiple barriers. The prominent role of Namdeb Holdings through the 50:50 venture of De Beers and the government in all essence guarantees that at least on a larger scale the beginning of the chain will be dominated by a single player into the foreseeable future. The entry into the next downstream link does also not seem considerably easier. When NDTC was set up in 2007, the Diamond Commissioner of Namibia announced a moratorium on the issuing of new cutting and polishing licenses, which tied the number of agents at this step to 17 license holders (Sherbourne, 2013). It is also worth noting that all these companies function under the Export Processing Zone (EPZ) framework outlined in chapter 4.3.1, which sets limitations to the way they conduct their business. In fact, it seems based on the interviews with the end of the chain jewellery agents, that the EPZ legislation in particular sets barriers to the flow of diamonds from cutters and polishers to jewellers. There are first of all restrictions on sales allowed within the South African Customs Union (SACU). In addition, and which pertains to the nature of the diamonds business, the transactions allowed between EPZ companies and Namibian jewellers face significant bureaucratic and security measures. One of the main worries put forth by Namibian jewellers with respect to local beneficiation at the end of the chain was, that in comparison to the local market, sourcing diamonds was considerably easier from abroad for example neighbouring South Africa. In this regard calls for local beneficiation are to some extent in conflict with legislative structures. In the policy sphere advantages of restrictions should be weighed against easing them in search for possible value addition gains, particularly as the economic analysis points to substantial potential in downstream activities.

The national legislative structures and the EPZ are closely related to another barrier rising in importance, namely international trade agreements. It seems that these are particularly relevant in the emergence of new regional value chains, as exemplified by the cases of China and South-East Asia by e.g. Baldwin (WTO, 2013). The problem here is that international agreements seem to substantially hinder the creation of the African value chain due to e.g. local content restrictions (Hoekman, 2013).

The role of Namdeb Holdings, the productivity and quality realities of the global diamond industry, the Kimberley Process, licenses on cutting and polishing and the later moratorium on

their issuance as well as the EPZ framework and international trade agreements act as the most important barriers to entry, trade and rent within the Namibian diamond value chain. The analysis will now move to the chain link specific challenges learned through interviews and questionnaires. Each chain link is discussed individually. Within each of them segment specific barriers are identified in addition to the ones introduced here.

4.7.3 Challenges of rough diamond production and trading

In contrast to the aggregate financial analysis the aim of the interviews and questionnaires was to give chain participants the possibility to voice their own views on the challenges they are faced with. In this regard they represent the individual agent opinions on reasons behind financial and diamond flow issues discussed earlier. For the first phase of the Namibian diamond value chain representatives of Namdeb Holdings and NDTC were interviewed.

The main concern stated by the beginning of the chain representatives had to do with decreasing mining output yields and the subsequent changes in cost structures. According to them, the cost structure of land operations is already such that this part of diamond mining will gradually be phased out. Sherbourne (2013) also states this as a likely event during the ongoing decade. The marine operations still seem to be in a healthy state with growth to be expected. The possible gradual yield changes are a challenge from another perspective, namely financial responsibilities toward the national Government. According to interviewees the changing output and business environment is often neglected in discussions on taxation and royalties. The diamond industry is already the target of differential treatment in comparison to rest of the mining industry with 10 % of all revenues paid as royalties and 55 % corporate tax on profit compared to 32 % being the standard tax on profit for most Namibian companies. These higher tax burdens were, according to interviewees, based on historical financial realities that have since changed and do not today mirror the global market competition very well. In addition to these, legacy issues concerning personnel policies as well as running of schools, hospitals and other services in mining towns were stated as something that should gradually be phased out as they have nothing to do with the core business of Namdeb Holdings and should eventually be part of government service provision. Letting go of these is naturally a political issue, but again reflect the change of business realities and is essential to maintaining a competitive edge on the global market.

On a broader scale the challenge of Namdeb Holdings as part of De Beers is the changing competitive environment, where De Beers is no longer the sole global powerhouse it used to

be up until 1990s. As seen in figure 9, there is already considerable rivalry among the top four producers, especially bearing in mind that De Beers used to hold up to 80 % of worldwide rough diamond production for most of the 20th century. This raised competition naturally sets boundaries on De Beers governance of the global diamond chain, meaning that at least in theory cutters and polishers have more possible sources to access raw material. In essence this is about creating and managing scarcity in the market, through which extra economic rents can be extracted. It seems plausible to assume that these scarcity management issues are behind the confidentiality agreements between De Beers and Namibian government, as they hold vital information pertaining to output profile information as well as marketing strategies that allow the company to hold on to its global market leadership position. In this regard, and which was stated also by the interviewees, it is also the Namibian national interest to keep diamond mining as profitable as possible, given the revenues the country receives from the industry. This is a plausible argument also based on the value addition share calculations carried out in the previous chapter, identifying the Namibian government as the largest recipient of value added in diamond mining.

Keeping the above in mind, the beginning of the chain, both in Namibia and globally, is faced with higher local beneficiation demands by source countries (McKinsey & Company, 2014). According to the interviews there are two issues that should be considered here. Firstly, the Namdeb view is that in value terms the share of Namibian diamond production viable to be cut locally is approximately 30 %, stated in interviews to be in the range of 1 – 10,6 carats. When diamonds from both Namibia and DTC aggregated parcels are considered, the inputs into local beneficiation are already close to this share. Analysis of NDTC local sales in this study supports this estimate, but global industry studies set the initial value based share of 1 – 10,6 carats into some question. As figure 19 previously showed, for a typical mine the above 2 carat stones account for more than 50 % of all value. Considering, in global comparison, the very high average per carat price of Namibian diamonds stated by Kimberley Process (2014) statistics, the value termed share of 30 % seems low. Of course, this is only based on deductive assumptions, as the carat profiles fall within the core of Namdeb confidential data.

The second concern raised by beginning of chain representatives is that present political opinion seems to favour vertical integration as a means to higher local beneficiation. This is something not seen as viable, lending also from experiences in the beginning of the 2000s, where Namdeb ran the cutting and polishing company NamGem for some time. During that time the company failed to become profitable. De Beers points to similar experiences

elsewhere, with cutting and polishing operations run in Botswana until 2003 and sold as unprofitable, as well as a factory in Portugal, which also closed down in 2005 (Sherbourne, 2013). Experts argue that these experiences are a recognition of the fact that downstream integration is far from the core capabilities of De Beers and Namdeb, and should thus not be advocated as a viable possibility (Joint Value Addition Committee of Namibia, 2014).

4.7.4 Challenges of the Namibian cutting and polishing industry

As indicated in figure 17 the value chain agents were asked to answer a short three question open answer questionnaire to map their activities and challenges as participants of the Namibian diamond industry. Responses were received from four cutting and polishing companies that are also NDTC sightholders. The responses are a good way to begin analysing the challenges of this part of the chain. After the responses other views learned in the interviews are presented.

The questions and responses given by companies are given below. For question 2 the responses are divided into four categories. The answers are corrected for spelling.

1. **What do you as an active diamond industry company see as the most important reasons / competitive advantages for doing business in Namibia?**

    i. We have a guaranteed supply of rough and we are operating in an EPZ zone.
    ii. Namibia is a beautiful country.
    iii. Setting up a factory in Namibia is a challenge. The people of Namibia are hard workers and friendly.
    iv. The main motto is to create employment in this country and to transfer skills to the locals to make them productive in the diamond field.
    v. We want to see Namibia as Botswana, which is now considered a hub of the diamond industry.
    vi. The Namibian goods are the best goods in the African continent, and there is a good demand for the goods on the world market.
    vii. The most significant competitive advantage, substantially exceeding all others in importance, is the prospect of access to adequate quantities and qualities of locally-mined rough diamonds.
    viii. A secondary advantage is a stable, relatively transparent operating and regulatory environment.
    ix. Availability of rough diamonds direct from the source.
    x. EPZ system for manufacturing companies.

It is worth nothing that the answers can be grouped under three categories. Firstly, the most important incentive of the companies to be located in Namibia seems to be access to rough diamonds. Second, the EPZ status is very important to the companies, though it seems plausible to assume that the first incentive of access to rough diamonds is paramount, meaning that even though the EPZ licence was not available to the companies, they would still locate their activities in Namibia as access to rough diamonds is on the global scale a scarce resource. Third, the companies indicate transfer of skills and local beneficiation as an important consideration to them. As is already pointed out here by one company, and becomes more evident in responses to question 2, the costs of cutting and polishing in Namibia are high in comparison to other locations in the world. The local beneficiation and business cost arguments are thus at least to some extent contradictory.

2. What are the main business challenges you as an active diamond industry company are facing in Namibia?

Financial and cost issues

i. Manufacturing is very expensive. This comes from the fact that labour, electricity, transport etc. costs are very high. It makes manufacturing here not very competitive in comparison to the Asian markets.

ii. Labour turnover in this industry is very high, and as every single material has to be imported, the cost of production is high.

iii. Diminishing manufacturing margins caused by increased competition from lower-cost Asian manufacturing centres, and from other centres around the globe where manufacturing is subsidized and/or has greater supporting infrastructure (e.g., feeder services) than in Namibia.

iv. Banks and insurance companies have neither experience nor desire to work with the diamond business. Their services are too expensive in comparison to the services in other diamond manufacturing countries. This is the reason why all diamond manufacturing factories have financing and insurance from foreign companies and service payments in hard currency must go overseas.

v. International Transport Companies charge three times higher for goods transfer because they think that Namibia is a country with high security risks.

Regulatory environment

i. We have a few problems which start from the purchase of goods until we receive the goods in the factory. Even if the payment is done in time there is a lag in opening of diamond parcels and putting it into manufacturing. To open the parcel the police, customs and Ministry of Mines and Energy are all involved. The transactions should happen like in London; as soon as the payment is done the customer receives the goods.

ii. Goods transfers for import and export purposes are very complicated and slow. It takes a minimum of one week for customs and clearing procedures in Namibia. In other diamond countries it takes from 2 hours to one day maximum. The diamond business is very capital intensive and companies pay financial institutions interest for each day the delivery of goods is delayed.

iii. The Mining Union of Namibia creates a lot of problems for all diamond manufacturing companies because they do not understand the difference between mining and manufacturing. MUN managers do not want to work together with factory management to create a system which will accommodate the interests of both employees and the companies at same time. MUN simply turns the workers against companies.

Availability of diamonds

i. There is an absence of actual access to adequate quantities and qualities of locally-mined diamonds. Those available under the terms of GRN's agreements with DeBeers have proven unpredictable and insufficient up through this year (2014). Though there is hope now that those agreements are being renegotiated.

ii. There are no privileges to domestic manufacturing companies in Namibia. Prices for rough are the same for Namibian and overseas buyers. In India, Russia and Israel there are special supporting policies for domestic manufacturing companies through the lower rough prices (Russia) or special financing with lower interest rates (State Bank of India).

Skills and resources

i. Lack of skilled workforce.

As seen above, throughout the four groups of responses the underlying argument concerns the relative cost of cutting and polishing in Namibia. Whether it is the high direct cost of labour – electricity, transport or security – or the indirect costs – delivery lags, financing premiums or location costs due to Namibia being classified as "high risk" – the arguments are related to comparisons made with respect to the large diamond hubs in Asia, India, Russia or Israel. In essence this continues the theme set by questions 1, meaning that the main incentive of the companies locating in Namibia is the access to rough diamonds. A related and important argument was also raised in discussions with Namdeb, where it was as stressed that location cost differentials are not only result of higher wages, but also of labour legislation, which for example in India allow for longer working hours.

3. What do you think about the method of value chain analysis in understanding and developing your industry?

i. I believe there has never been any real study done on the cost of manufacturing. It is an illusion that since a company manufactures diamonds and not clothes that there are millions of profits that are not shared with the locals. They have not understood that the goods are very expensive and that manufacturing in Namibia is also very expensive, which makes it very uncompetitive in comparison to the rest of the world. Maybe an analysis will develop a more in-depth understanding, which can be shared with Ministries, employees and any other stakeholder in this industry.

ii. Value chain analysis will help to study the industry well in all areas so that Namibia can encourage foreign direct investment into the country, which will create more employment and growth to the economy.

iii. Perhaps useful but also extremely limited in this case, as only a very small part of the relevant value chain is accounted for by diamond manufacturing, and the fate of manufacturers is deeply dependent on different parts of the value chain, both upstream (mining) and downstream (sorting, wholesaling, distribution, and retailing).

The third question was put into the questionnaire to capture some of the dispositions of the companies towards the analysis done. The responses reflect the opinion repeated in interviews that the global dynamics of the cutting and polishing industry as a highly competitive creating a small portion of industry margins and value added is not often understood. Based on global

industry analysis and data acquired for the sample of companies active in Namibia this seems to be the reality the companies are facing.

In addition to the above considerations few remarks are in order from discussions with the industry representatives. Firstly, one company stated that the main reason they are not selling diamonds to local jewellers is that the EPZ regulations do not allow it. This is why they sell a 100 % of their output into Europe. If this were to be changed and they wanted to supply the local market, they would need to apply for a different status within the EPZ framework. Second, market penetration in cut and polished diamonds and downstream jewellery manufacturing requires a steady supply of high quality goods the interviewees saw as still not present in Namibia. The market penetration argument was repeated in a different form as some interviewees pointed out the relatively small size of the African market, which would mean that for significant industry development the target markets would be in USA, China, India and Japan, which according to global industry analysis are the main markets of final consumption. Here the remoteness of Namibia with respect to these markets presents additional challenges that do not, however, take into account the potential growth of home markets on the African continent.

4.7.5 Challenges of jewellery manufacturing and retail in Namibia

To gain an understanding of the final value chain link for Namibian diamonds three jewellery manufacturing and retail companies were contacted and asked for support in the study. As stated before, one of these was able to compile financial data for its operations and provided responses to the questionnaire. All three were, however, interviewed. The responses from the single questionnaire and the interviews are summarized in this chapter and organized under applicable categories.

Skills, training and quality

There are various intertwined issues that can be grouped under this heading. Before describing the topics raised in the activities run by jewellers themselves, a few remarks on upstream activities are in order.

When it comes to inputs required by Namibian jewellers, two separate issues arose in interviews. Firstly, on a national level the jewellers saw the lack of gold and silver refining in Namibia as a competitive disadvantage, particularly as Namibia is a gold producing country, albeit on a relatively small scale. The second concern that has direct consequences with end customers is that local cutters and polishers do not supply certificates for their stones, which is

a substantial hindrance especially when dealing with certain market areas such as the Far and Middle East. For the time being certification and grading services are not available in Namibia due to the small size of the market. When it comes to acquiring certification elsewhere, the procedures by e.g. Gemmological Institute of America (GIA) take too long a time to be worthwhile. With respect to cutting and polishing the jewellers feel that especially the skills for fancy cuts are lacking on the Namibian market, which goes counter to what the market realities would require. On this front Namibian jewellers are dependent on specialized foreign, e.g. South African, suppliers for certain input needs end customers have. On a global scale Namibia cannot compete in labour and other costs, which means that the advantage has to come from higher productivity, differentiation and design aspects. For this to happen differentiation has to occur already in the cutting and polishing phase as designing jewellery is at best a joint effort of both value chain steps.

The above input challenges of differentiation continue, according to the industry representatives, at the end of the chain. A fundamental issue is the acquiring of high quality goldsmith labour. On a broader level it is a result of inadequate vocational training, both in cutting and polishing and in the jewellery sector. Locally these skills are hard to come by, and the companies have to source these skills from abroad, which is also problematic due to cumbersome and slow legislation when it comes to acquiring work permits. In order to solve the overall availability problem of high quality craftsmanship the Jewellers Association of Namibia (JASSONA) members have organized apprenticeship type vocational training, which according to the German goldsmith tradition takes four years. During this period the apprentices are employed at the jewellery workshops, attend 2-4 week theoretical periods normally twice a year and gain the designated trade title of a goldsmith at the end of their training. The apprenticeship system offered by JASSONA has, however, faced challenges that have resulted in the fact that the last apprentices graduated in 2013. JASSONA members pointed to several problems within the system. Firstly, as the training is based on the German standard, the education includes courses on basic mathematics, physics and chemistry, which students are often unable to pass with the educational history they have. Second, the jewellers pointed to more culture related issues, where there often seems to be friction between the apprentices and the training bodies. The apprentices often feel underprivileged to begin with, which on many occasions has brought problems in committing to the relatively long track of becoming a goldsmith. Such matters are particularly important in the jewellery trade as for the relatively small companies training incurs considerable investments. Jewellers also pointed out

that design and creativity that is able to compete on the international markets require substantial amounts of long term planning, trust and commitment. The creation of differentiation and adequate quality requires much more than only mechanical skills.

Legislative structures

When diamond inputs from Namibian cutters and polishers to jewellers were discussed, the jewellers, similarly to cutters and polishers, pointed to the relative difficulty of trading in diamonds even regionally. It was often repeated that the purchasing of diamonds was easier from e.g. South Africa than the local companies literally only a few kilometres away. The EPZ legislation was seen as the main framework from which challenges arise. Diamonds sourced from these companies have to in essence be imported by jewellers, which entails cumbersome responsibilities for both selling and purchasing parties. This is particularly problematic from the point of view of jewellers, for whom the main customers are tourists. Jewellery pieces are often done to the specific needs of individual customers, which means sourcing of particular types of diamonds on a short notice and requires fast responses from jewellery manufacturers. Lags created by legislative structures affect the jewellery market in many ways, particularly considering the type of firms active in jewellery manufacturing in Namibia. As the companies are small businesses, often family owned, they face limitation when it comes to particularly production delays. The inputs themselves are expensive, including precious stones and metals, and holding inventory is often not financially viable, particularly when Namibia does not have established financing opportunities when it comes to dealing in these materials. Due to the scale of business the companies are very much dependent on spot market prices, which naturally adds risk and volatility to their activities. Jewellers stated concrete examples of lags in renewing gold working certifications, VAT refund procedures and gaining manufacturer status licenses as negatively affecting their business. At best, these market and trade characteristics could be taken into account when considering local value addition measures, particularly considering the value addition potential inherent at the end of the chain.

Chain governance issues

The jewellers were also able to point out certain governance and power related issues, which affect Namibian value addition from diamonds. Firstly, cutting and polishing companies have an incentive to cut the value chain short by selling processed diamonds directly to end customers, particularly tourists. This is understandable from the point of view of individual companies but should be understood as having an effect on local value addition. Especially if

jewellers are at the same time faced with considerable legislative burden in sourcing the same stones that could feed into the end of the chain. Second, and as an example of positive value chain coordination, at least one cutter and polisher was identified in giving local jewellers training in marketing and branding skills when it came to differentiation of Namibian diamonds. The identification of this type of key actors and means of enhancing chain coordination are very relevant when it comes to value chain upgrading.

Development opportunities in jewellery manufacturing and retail

The jewellers presented multiple views on the characteristics of Namibian jewellery that hold value adding potential. The high quality of diamonds mined in Namibia, according to the jewellers, often translates into end customer perception of "my diamond is of high quality". This perception is enhanced by the fact that Namibian jewellers often craft individual pieces according to customer specifications. Branding efforts such as the Namibian Sun cut by Hard Stone Processing (Hard Stone Processing Namibia, 2015) are good examples of differentiation along these lines. Namibian jewellers are also seen to have European and Namibian design aspects intertwined in their pieces, which helps in accessing export markets and creating a niche market for the goods. For this to happen on a larger scale, however, jewellers felt that additional casting equipment and expert skills would need to be invested in. Identifying market access possibilities and linkages would need to happen before these investments would become viable.

5 Conclusions

ODC as the initiator of the study and mining in the Namibian economy

This study was initiated by the Offshore Development Company (ODC) under the Ministry of Trade and Industry (MTI) of Namibia in support of value addition and industrialization efforts in the country. ODC had identified the need to conduct a comprehensive study on the value chains of precious minerals in Namibia. Within the precious minerals sector diamonds were chosen as the first to be studied due to their relative importance for particularly export earnings in Namibia, the already established formal industry structure as well as the identification of diamonds as a strategic mineral by the National Development Plan 4 (NPC, 2012). This study acts as a prefeasibility study into value chain analysis as a tool for analysing the mineral sector in Namibia at large. In this regard the aim was to test value chain analysis and its compatibility, strengths and limitations in national industrial policy planning in addition to gaining information on the Namibian diamond value chain.

Namibia is an upper middle income country for whom the mining industry, both historically and today, is an important economic contributor (World Bank, 2013). Throughout the country's independence from 1990 up until today mining and quarrying has contributed a relatively steady 10 % to Namibian GDP (Bank of Namibia, 2013) (National Statistics Agency, 2013). Within mining and quarrying diamonds are the largest GDP contributor, alone accounting for on average 7 % of total GDP in current prices of 2013 during 1990 to 2012. In 2012 the contribution was 8,36 %. The importance of diamonds for the national economy is even more evident when foreign trade is examined. In 2010 – 2013 the average export contribution of diamonds alone was 22 % (Bank of Namibia, 2014). The mining industry has, however, from national value creation perspective suffered from two structural characteristics. The industry contributes roughly a tenth of all national production, but employed only 1,8 % of total work force at the time of the last available labour survey in 2012, in absolute terms 11 240 people (Namibia Statistics Agency, 2013). Also, most raw material commodities are exported out of the country in unprocessed or semi-processed form. Sector analysis carried out in the country identifies mining as a key national industry. (Humavindu & Stage, 2013).

Value chain analysis benefits from economic theory and empirics

The Namibian diamond industry is analysed in this study through the tool of value chain analysis (VCA). As stated by Kaplinsky & Morris (2002): "The value chain describes the full range of activities, which are required to bring a product or service from conception, through

the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use". Production in itself is, however, only part of value chain analysis as evident in Roduner (2005) who emphasizes that value chain as a concept tries to understand the vertical integration and linkages of production and distribution processes. This thesis and value chain analysis in general benefit greatly from fundamental economic theoretical and empirical research on global production and trade. In the theoretical background it was shown that models approach international production through specialization, technological development and factor price differences. An important question is how participation affects countries at varying levels of development, in basic models portrayed as North and South exhibiting high and low wage and technological sophistication levels. The basic model introduced by Kümmritz (2015) is contrasted by Li & Liu (2014) who show that the overall effects to North are ambiguous, with negative terms of trade effects possibly pushing total gains to negative. On the other hand, Baldwin & Robert-Nicoud (2014) show that gains to South are also ambiguous as Northern output increase may lead to a proportional decrease in the South, pushing again the overall effects to negative. This may be conditioned by technological spillovers that lead to convergence of technologies and an overall output rise, though Kümmritz states that spillovers requires absorptive capacity in the form of a fostering environment, which may be lacking in especially developing countries. Kümmritz also tests this by empirical methods and finds that indeed high and middle income countries have benefitted from participation in GVCs, but low income countries have on average not gained from them.

The above models of global production are further developed when geographical concentration is studied. A model by Krugman & Venables (1995) showed that based on falling transportation costs, wage differentials and scale effects, both the conventional argument of the core benefiting at the expense of the periphery and the later offshoring argument that the periphery gains are paid by the core, actually have some backing from theory, but this happens in stages and the aggregate effects are far from clear. This model was also paired with the Baldwin (WTO, 2013) continuation that as production grew more complex, coordination costs of this complexity made proximity again important, which worked against the Krugman & Venables argument of falling transportation costs. The rise of ICT has since, however, been responsible for mostly eradicating this unbundling barrier and the advantage of the core has thus deteriorated.

The effects of technology and its changes were also studied in reference to the workhorse model of Costinot, Vogel & Wang (2013), who showed that firstly, countries with a higher level of technological sophistication specialize in later stages of production. Their model also shows that global technological change results in all countries moving up the value chain but when this change materializes in more complex value chains it increase inequality among nations. If the change comes as a uniform effectivity change across the value chain, it reduces inequality, but has the possibility of leading to welfare loss in technologically advanced countries. Main findings on local technological change on the other hand show that the effects are very different for the top and bottom of the chain. At the top, local technological change always moves the nation up in the chain, but the inequality of nations may either fall or rise. What the authors find surprising is that at the bottom rich countries benefit disproportionately more from being pushed up the chain, but at the top this is not always so. Baldwin & Venables (2013) augment Costinot et al. by noting that with minor modifications to their model the decisions of single companies create inefficient solutions and coordination failures, through overshooting or insufficient offshoring.

Value chain analysis contains descriptive and analytical tools

Beyond theoretical considerations VCA is first and foremost a descriptive tool, describing characteristics of production through agents present in the chain, the activities they carry out as well as commodity, service, monetary and value addition flows and distributions present in the chain (Kaplinsky & Morris, IDRC, 2002). In this regard industry specific financial and economic data is the backbone of VCA. VCA also deals in analytical constructs that try to asses why the described flows and distributions are as they are found to be. These are *barriers to entry, trade and rent* – the structures limiting the possibilities of actors to enter, exit and exist within value chains – and *governance structures* (Gereffi & Korzeniewicz, 1994) – the relative power of actors to influence the nature of the entire chain and the inter-firm division of tasks, capital, capabilities and value. Based on understanding from both descriptive and analytical tools, VCA suggests ways of developing the value chain, namely through different forms of *benchmarking* and *upgrading*.

The Namibian diamond value chain is divided into four links

The Namibian diamond value chain was analysed according to the above theoretical VCA framework and looked at against the global diamond industry study backdrop (e.g. (Bain & Company, Inc., 2014) (McKinsey & Company, 2014). In contrast to global depictions of the

diamond value chain, which often have at least six chain links, the Namibian chain was more meaningful to divide into four steps: production of rough diamonds; sorting, valuating and trading of rough diamonds; cutting and polishing of rough diamonds; and finally jewellery manufacturing and retail. As shown in the complete depiction of the Namibian diamond value chain in figure 33, the two first steps concerning rough diamond mining and trading are firmly held by Namdeb Holdings and Namibia Diamond Trading Company (NDTC), both 50:50 joint ventures between the global mining giant De Beers and the Government of Namibia. The next step is populated by 17 companies holding a diamond cutting and polishing licence in Namibia. The end of the chain entails 40 – 50 companies that carry out diamond jewellery manufacturing and retail, with approximately 25 of these only active in retail.

Methodology included financial data, interviews and questionnaires

Descriptive financial and economic analysis is the fundamental starting point of VCA, based on which the analytical and development tools can be applied. Keeping this in mind the main aim of this study was to gain a preliminary understanding of the economic realities within the Namibian diamond value chain. This was done by consulting companies throughout the chain to compile data that would allow the economic value addition in Namibia to be understood. Namdeb Holdings produces public financial reports that were used for the beginning of the chain analysis. The ODC has active correspondence with 17 cutting and polishing companies as they are Export Processing Zone (EPZ) license holders and ODC is their main government contact point. Financial and open answer questionnaires were sent to these companies, out of which four companies provided answers to both parts. These four companies are sightholders, i.e. long term trading contract holders, of NDTC, the rough diamond trading centre for diamond produced by Namdeb Holdings. For the end of the chain actors three Namibian jewellery manufacturing and retail companies were interviewed, out of which one was able to supply financial data to be used in this analysis. Even though this single case example at the end of the chain creates limitations in accuracy and representation, it plays a vital role in describing the strengths of value chain analysis as a tool for understanding industry economic realities and gleaning initial results of value creation dynamics in the Namibian diamond value chain.

Main findings of financial and economic analysis

The financial and economic analysis produced several findings on trade flows and economic value creation in all stages of the Namibian diamond value chain.

The first area of interest was the input of rough diamonds from NDTC into the local cutting and polishing industry. The inputs come from two sources channelled through the rough diamond trading centre NDTC. Firstly, NDTC sells a share of the Namdeb Holdings Namibian rough diamond production directly to local cutters and polishers. This share has been agreed upon in the confidential agreement between De Beers and the Namibian government, which the study did not have access to. The share is set as a value based percentage of total production value. According to Sherbourne (2013) this share is 16 %, though for example in the NDP4 (NPC, 2012) it is identified to have been 10 % in 2012. Both figures of 10 % and 16 % occurred frequently throughout industry consultations also on the government level. The second feed in channel into Namibian cutting and polishing industry comes from the De Beers global Diamond Trading Centre (DTC) located in Botswana. The DTC aggregates rough diamond production from De Beers mines in Namibia, South Africa, Botswana and Canada and offers these in aggregated parcels to De Beers global sightholders. Some of these aggregated parcels are also offered to Namibian cutters and polishers through NDTC. In total the inputs from NDTC to Namibian cutters and polishers were for the period 2008 – 2013 on average 33 % of NDTC local sales, though this period had two outlier entries in 2010 and 2011, which push the percentage up. The standard estimate for local sales would, according to the data, be 25 % of total NDTC sales. From value chain analysis perspective the source of inputs is not particularly important. What matters more is the total volume of inputs, particularly when global value chains are characterised by intermediate inputs in different stages of production passing frequently in both directions of national borders (WTO, 2013).

The second area of particular interest was the cutting and polishing industry, for which data was received from four companies, representing on average in 2008 – 2013 15 % of NDTC local sales. The first finding, based on analysing carat volume data on input of rough diamonds and output of cut and polished diamonds, was that the sample companies carry out rather limited cutting and polishing activities in Namibia. For three out of the four companies a stylized fact was that they actually chose not to cut and polish almost any of their inputs locally, but trade them out of the country in rough form, mostly through inter-firm transactions. A second important finding was that inputs from cutters and polishers into downstream activities in Namibia are very small. On average in 2008 – 2013 the share of cutting and polishing output sold to Namibian companies was 0,4 %.

In addition to carat volume considerations revenue and value addition aspects throughout the chain were thoroughly analysed. To arrive at estimates of total national flows as well as revenue

and value addition contributions the sample data was used to create extrapolated aggregate figures. The details of how calculations were done are found in chapter 4. These calculations produced important insights into the financial aspects of the diamond value chain. Analysis showed that the cutting and polishing industry is able to create substantial revenues. For example, in 2012 the total revenues were approximately 3,8 billion NAD, which is the equivalent of 68 % of total NDTC sales. In the following 2011 they were estimated at 3,6 billion NAD or 46 % of total NDTC sales. These revenues are, however, set into very different light when looked at from the perspective of value addition. In 2011 and 2012 the above revenues were able to create 197 and 121 million NAD in respective value added to the Namibian economy. When compared to the value addition of diamond mining, which cutting and polishing still rivalled in revenue terms, the picture is quite different. The 197 and 121 million NAD value addition stand at equivalents of 6,5 % and 2,8 % of total diamond mining value addition in 2011 and 2012. When looked at through global industry studies this is not a surprise. The middle market is highly competed, with both largest revenue increases and profit margins created in the beginning and end of the chain (Bain & Company, Inc., 2011). This dynamic was something that the cutting and polishing companies also raised in interviews as an issue often not understood in local beneficiation discussions.

Value addition calculations thus highlighted the relatively small contribution of cutting and polishing in comparison to total revenues received and diamond volumes traded. In contrast another characteristic expected from global industry studies also became evident in the calculations. The end of the chain is able to create both substantial revenue increases and value addition compared to the middle market. As an example, in 2012 the per carat revenue received for an average Namibian diamond increased approximately fivefold when set in jewellery in comparison to the price received by the cutter and polisher. In comparison to the price per carat of gem quality diamond received by the diamond mining company the price increase was approximately nine-fold, which follows very close to the eight-fold increase from mine to jewellery estimated by the global industry studies (Bain & Company, Inc., 2013).

When it came to comparative importance of different chain steps in value addition the data collected allowed for some crude but useful hypothetical scenarios to be crafted. Out of these the most enlightening was the following two scenario calculation. First, as stated as and NDP4 target, the share of Namibian diamonds sold directly to Namibian cutters and polishers was raised in 2011 and 2012 to 20 % of Namibian production value. The calculation was done ceteris paribus, e.g. holding the input of aggregated DTC parcels as constant. When this input

increase was accounted for, the value addition figures for cutting and polishing increased from 197 and 121 to 227 (+ 30) and 180 (+ 59) million NAD. To demonstrate the importance of the end of chain value addition, another hypothetical calculation was done. First, the total carat volume purchased by cutters and polishers in 2011 and 2012 was assumed to be cut with a 50 % carat volume loss during processing. 10 % of this output was then assumed to become inputs into jewellery manufacturing and retail and the subsequent hypothetical total value addition was calculated. The value additions for this chain segment rose from 9 to 107 (+ 98) million NAD in 2011 and from 18 to 291 (+273) million NAD in 2012, raising the end of the chain to a very similar total value addition league in comparison to the middle market. There are three important lessons to be learned here. First, the end of the chain holds considerable potential in local value addition, even with the current NDTC inputs into cutting and polishing, but only if these inputs are truly channelled to local end of chain agents. Second, the data samples, especially through the single case example of a jeweller, set considerable accuracy limitations to the calculations. The calculations done are very sensitive to year-by-year fluctuations in company sales and costs, which are amplified by previously mentioned extrapolations. This is closely related to lesson three, namely that the above calculations are to a great extent done to demonstrate how value chain analysis can be used to estimate economy-wide value addition impacts and to highlight the importance of access to company specific accurate data.

Findings on governance structures and barriers to entry, trade and rent

In addition to carrying out descriptive value chain analysis for which the findings were summarised above, the conducted study also looked at the Namibian diamond value chain through analytical tools of governance structures and barriers to entry, trade and rent.

The value chain was shown to have the characteristics of a snake-type producer driven captive chain, with Namdeb Holdings as the lead producer who dominates the chain, but grants the following chain links enough resources and market access to make an exit from the supply relationship unattractive for downstream companies (Gereffi & Korzeniewicz, 1994) (Gereffi;Humphrey;& Sturgeon, 2005) (Baldwin & Venables, 2013). The governance position of the producer is in the Namibian case gained through leadership in technology and access to critical resources, particularly the diamond mining rights in Namibia.

The following main barriers to entry, trade and rent were identified. The moving capability window of global competition affects particularly the cutting and polishing and the jewellery manufacturing industries (Sutton, 2007b). The impossibility of choosing cost competitiveness

over quality competence as stated by Neary et al. (2015) should guide policy planning. The mining as well as cutting and polishing licenses directly limit chain participation in Namibia. The NDTC sightholder status determines whether a cutting and polishing company has access to Namibian rough diamonds and evidently acts as a raison d'être for companies in this part of the national value chain. The Kimberley Process that seeks to limit trading of conflict diamonds by demanding certificates of origin for all rough diamonds poses an international barrier of trade. The Export Processing Zone (EPZ) status of cutting and polishing companies limits the middle and end chain agents' business activities in various ways, but may also have adverse effects on creation of national and regional value chains. Furthermore, international trade agreements Namibia is part of have significant effects on particularly the possibility of creating African or regional value chains.

Challenges of specific chain links

In addition to the above cross cutting themes, chain link specific challenges were mapped. In the beginning of the chain the eventual depletion and the following gradual changes in diamond mining yields and cost structures were identified as an important challenge. Both in Namibia and globally diamond mining companies are facing fiercer competition and calls for more local value addition (McKinsey & Company, 2014). In the Namibian case this is very much evident in Namdeb Holdings' activities through the partnership of De Beers and the Namibian government. Analysis done on value added distributions in the national economy shows that the Namibian government is able to retain more than 50 % of value added created in mining.

According to financial analysis and industry consultations the main reason for the existence of the cutting and polishing industry in Namibia is the access to high quality diamonds mined locally. This stems from the local beneficiation demands of the Namibian government evident in the share of direct and DTC aggregate parcel sales to the local markets. On the global scale the Namibian cutters and polishers are challenged by relatively high location costs in comparison to large diamond processing hubs particularly in India and Asia. The regulatory environment and the ease of doing business also seem cumbersome in comparison to the global markets. In contrast, the companies point to a stable political and regulatory environment as a competitive advantage in Namibia. As seen before in the financial analysis the main challenge from the perspective of national value addition is to channel more of the cutting and polishing output to the end of the chain where the value addition gains are highest.

The end of the chain challenges are tightly linked to the mid-chain barriers to entry, trade and rent, particularly to the regulatory environment in which the cutters and polishers function. Out of these the EPZ legislation seems most important. To some extent it directly limits sales within Namibia, but also creates relative cost differentials, through which Namibian jewellers actually prefer to source their diamonds abroad, e.g. South Africa. It is particularly these relative differences between Namibia and other countries that should be assessed through the value chain approach. These international competitive considerations are tightly linked to the theoretical aspects of the moving quality window of Sutton (2007b) and the cost versus quality discussion of Neary et al. (2015). The gains now acquired in security and control from tight regulation should be weighed against potential gains in local value addition from easing the business environment especially in trading diamonds to the end of the chain. In addition to gaining access to diamonds, the competitive aspects of the market have to be considered. On a global scale Namibia cannot compete in labour and other direct production costs, which means that the advantage has to come from higher productivity, differentiation, design and quality aspects. For this to happen differentiation has to occur already in the cutting and polishing phase as creation of high quality jewellery starts with differentiation already in the cutting of the diamond. Profitable differentiation and industry growth also require skill building, particularly in the form of vocational training, which for now the Namibian jewellers identify as lacking or inadequate. Here analysing and targeting challenges the jewellers have faced in offering apprenticeship positions will be an important policy development point of entry.

Compatibility of VCA for industry analysis in Namibia and final words

Taking the above findings from descriptive and analytical tools into consideration it can be stated that value chain analysis seems to function as a balanced approach to understanding economic benefits created in an industry, the distribution of value to economic agents and the limitations these agents face in their activities. The starting point and main hurdle of value chain analysis is the acquiring of accurate data from agents throughout the chain. From policy perspective the financial transparency and reporting demands set on companies are at the heart of gaining an accurate picture of value addition within a nation. In concrete terms, and pertaining to the diamond value chain analysed, the data collected from e.g. cutting and polishing companies under the EPZ framework could be aligned to fit the purposes of VCA. Also, as in the case of Namibian jewellers, some chain segments clearly stand to benefit from accurate depiction of their contribution to national value addition and may be readily willing to supply financial data to VCA based research efforts.

Based on the limited analysis done it seems that the end of the chain holds the most promising potential for local value addition. The main challenge here is to ensure that the local cutting and polishing industry is competitive in some possibly niche section of their industry, and that this diamond output reaches the Namibian jewellers as inputs into their final products. Support is needed at the end of the chain in gaining market access and relevant skills in raising productivity and quality through differentiation. Re-evaluating and possibly lowering legislation related barriers to entry, trade and rent may also have significant impacts on end of chain activities creating higher total national value addition.

On the aggregate national economy level it is also important to carry out comparative key sector analysis along the lines of Humavindu & Stage (2013) to identify those industries that have the highest impact on employment creation and value addition as the national government is always working under scarce resources in its development efforts. Value chain analysis is a powerful tool that can be linked to industry comparisons, but as stated before, further input-output data needs to be collected on the aggregate level to allow this. According to government agencies consulted such efforts, e.g. renewing the Namibian Social Accounting Matrix, are currently underway. Through such efforts both the mineral sector and other industries can be accurately studied through value chain analysis to provide a balanced and useful depiction of the national economy to function as the foundation of effective policy planning.

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