Chapter 2 - A template for empirical Resource-Based Theory research

2.1 Introduction
Since Barney's 1991 seminal article on the resource-based view (RBV) of the firm this inside-out perspective on competitive advantage emerged to become a prominent theory (RBT) within the field of strategic management. In addition the theory has increasingly proven valuable within other disciplines as well. However, despite the theory’s widespread use for over two decades, there is still a quest for more rigorous research methods (Rouse and Daellenbach 1999; 2002; Levitas and Chi 2002; Newbert 2007; 2008; Armstrong and Shimizu 2007; Barney et al. 2011). The theory’s central tenet is that if a firm’s immobile resources are Valuable and Rare (VR) they have the potential to result in a competitive advantage. If, in addition, they are Inimitable and Non-substitutable (VRIN), they have the potential to result in a sustained competitive advantage (Barney 1991). While intuitive, operationalizing the constructs appeared more problematic. One of the problems was that in early empirical research, resources under study were argued to be VRIN, while these resource characteristics were not actually measured (Armstrong and Shimizu 2007; Newbert 2007). In response conceptual-level studies were conducted measuring resource characteristics (cf. Newbert 2008; Ainuddin et al. 2007), but the limitation of these studies is that the methods employed did not allow for the identification of specific resources important to firms’ competitive advantage. While the importance of the resource-characteristics was analyzed, it remained unclear which firm resources carried these characteristics. Knowing specifically which resources should be prioritized in obtaining and sustaining a competitive advantage is not only one of the aims of RBT research for scholars, but has high managerial implications as well (Rouse and Daellenbach 1999; Armstrong and Shimizu 2007). Another limitation with conceptual-level studies is that the characteristics of resources are measured independently from one another. Newbert (2008), for example, measures Value and Rareness of firms’ resource/capability bundles, but does not do so with a conjoint measure for value and rareness. We argue that a conjoint measure is important since the theory makes clear that a resource needs to be simultaneously Valuable and Rare in order to have the potential to result in a competitive advantage, and not either valuable, or rare.

It is clear that methodological challenges still persist in empirical RBT research. Armstrong and Shimizu (2007) and more recently Barney et al. (2011) therefore underscored the importance of more mixed-method RBT research. Indeed mixed-methods can result in increased rigor, reliability and validity of results.
(Hoskisson, Eden, Lau, and Wright 2000), yet how such mixed-method research should be carried out remains unclear. In the current study we contribute to existing literature by developing and testing a mixed-method research template for empirical RBT research that differs from prior research methods in that 1) it allows identifying specifically which resources and capabilities are relevant to firms’ competitive advantages and which ones are not; 2) it allows identifying the relative importance of each of the resources and capabilities in creating a competitive advantage; and 3) it measures Value and Rareness of resources and capabilities conjointly for each resource / capability rather than independently.

We decided to test the potential of the template in an extreme setting where competitive advantage and comparative resource (dis)advantages are not obvious. We tested the template among commodity producers in a developing country, or more specifically among small-scale sesame seed farmers in the Northwest of Ethiopia. Similar to the study on comparative resource (dis-)advantages by Sirmon, Gove, and Hitt (2008), the homogeneous character of production and marketing of sesame allows to easily understand the production and marketing processes. Through various data collection techniques, including focus group discussions with industry experts, we were able to define a complete list of resources and capabilities including the ways in which these resources and capabilities vary. Technology hardly plays a role in this context of traditional rain-fed agriculture and hence results are not affected by fast technological changes that are difficult to observe from the outside. While this setting allows us to test the robustness of the RBT’s central tenets and of the template, additionally we contribute to strategic management research in bottom-of-the-pyramid (BoP) markets which are argued to provide “intriguing and fertile ground[s] for organizational research” (Barney et al. 2011: 1310; See also Bruton 2010; Bruton, Ahlstrom, and Obloj 2008; Bruton, Filatotchev, and Wright 2013).

We proceed as follows: In the next section we discuss the RBT and challenges encountered in empirical studies. We discuss what needs to be measured and then provide a template suggesting how it can be measured. We continue with an illustration of how we used the template to collect data among sesame seed farmers in Ethiopia, after which we conclude our findings.

### 2.2 Empirical RBT research

Penrose (1959) was the first to propose that potential sources of competitive advantage reside inside firms’ resource bases, but it was not until Barney’s 1991 seminal article that the Resource-Based Theory became widely adopted. In this seminal article Barney was the first to conceptualize attributes of strategic resources: resources that have the potential to result in (sustained) competitive advantage. The theory assumes resources to be heterogeneously distributed among firms and imperfectly mobile. Barney argued that firm-specific immobile
resources which are simultaneously Valuable and Rare (VR) have the potential to result in a competitive advantage, whereas resources which are in addition Inimitable and Non-substitutable (VRIN) could lead to a sustained competitive advantage. The theory became widely adopted and was further developed through contributions focusing on clearer distinctions between resources and capabilities (Amit and Schoemaker 1993), conceptualization of dynamic capabilities (Teece, Pisano, and Shuen 1997; Eisenhardt and Martin 2000), further precision in definitions of resource attributes Value and Rareness, and competitive advantage (Priem and Butler 2001a, 2001b, Barney 2001), studies on resource exploitation and management (Mahoney and Pandian 1992; Sirmon et al. 2008), and conceptualizations of asymmetries (Miller 2003), comparative resources advantages (Jacobides and Winter 2005; Sirmon et al. 2008), resource management and orchestration (Helfat et al. 2007; Sirmon and Hitt 2009), and series of temporary competitive advantage (Sirmon, Hitt, and Ireland 2007).

However, despite the theory's prominence for over two decades, the field of strategic management is still struggling to find rigorous methods for empirical RBT studies. Empirical RBT studies were criticized for (1) lack of statistical support, and (2) not actually measuring the (VRIN) attributes of resources and capabilities (Newbert 2007; Armstrong and Shimizu 2007; Levitas and Chi 2002).

The stock of empirical RBT articles is vastly lagging behind the stock of theoretical articles (Armstrong and Shimizu 2007). While this is not uncommon when a theory is under development, it is a problem that very little statistical support was found in empirical RBT studies. Armstrong and Shimizu (2007) argue that it is unclear whether low levels of empirical support should be attributed to the theory or to the methods employed. More rigorous studies need to be conducted in which researchers “creatively operationalize constructs and empirically measure theorized outcomes” (p. 962). Armstrong and Shimizu provide some directions for further empirical RBT research, but are not very detailed as to how to measure the constructs. More recently Barney et al. (2011) underscored the importance of further development of empirical RBT methodologies, yet no specific way of how to do that is suggested. Below we will first discuss what we need to measure and next we suggest a template discussing in detail how to measure it.

2.3 What do we need to measure?
Resources are defined in terms of factors, inputs, or assets (both tangible and intangible) that a firm owns, controls, or has access to (Amit and Schoemaker 1993; Barney 1991; Wernerfelt 1984; Grant 1991; Eisenhardt and Martin 2000; Helfat and Peteraf 2003).

Resources are typically categorised into physical capital resources, human capital resources, organizational capital resources, knowhow, financial assets,
technological resources, legal capital, and intangible capital (Barney 1991; Amit and Schoemaker 1993; Grant 1991; Mahoney and Pandian 1992). Examples include brand names, in-house knowledge of technology or unique knowledge, employment of skilled personnel, trade contracts, machinery, efficient procedures, capital, patents, and reputation (Wernerfelt 1984; Grant 1991; Crook, Ketchen, Combs, and Todd 2008).

Capabilities concern firms’ capacities to utilize, bundle, develop, configure, and, or deploy resources (Amit and Schoemaker 1993; Grant 1991; Teece et al. 1997; Helfat and Peteraf 2003).

**Comparative resource advantages and performance**

Competing firms differ in their resource endowments: there are comparative resource (dis-)advantages (Eisenhardt and Martin 2000; Sirmon et al. 2008) resulting in different performance outcomes, or competitive (dis)advantage.

In most research what is meant with the attribute ‘rareness’ seems to speak for itself. Often it is not defined and when it is, it is defined as a resource that is not possessed or exploited by a large number of other firms (cf. Ainuddin et al. 2007; Newbert 2008). What constitutes “large” is not clear. According to Barney (1991: 107) “as long as the number of firms that possess a particular [...] resource (or bundle of [...] resources) is less than the number of firms needed to generate perfect competition dynamics in an industry [...], that resource has the potential of generating a competitive advantage”. However, how to measure the number of firms needed to generate perfect competition is not clear and said to be “difficult” (Barney 2001: 44). The attribute ‘value’ has been subject of more debate, particularly when Priem and Butler (2001a; 2001 b; see also Barney 2001) demonstrated tautology in relationships as proposed in the RBT framework. Competitive advantage was defined by Barney (1991: 102; emphasis not in original) as a firm "implementing a value creating strategy not simultaneously being implemented by any current or potential competitors". Following Barney’s definitions, Priem and Butler demonstrated that in the RBT’s central relationship both the explanans and the explanandum were defined in terms of value and rarity. Priem and Butler (2001a) argued that the value of resources ultimately is determined exogenously, by the market. They also suggested a different definition for competitive advantage in which competing firms are compared based on their performance. Priem and Butler refer to Schoemaker’s (1990: 1179 as cited in Priem and Butler 2001a: 29) definition who defines competitive advantage as a firm “systematically creating above average returns”. The resource-attribute ‘Value’ is defined in literature as a resource’s potential to exploit opportunities or neutralize threats in the environment / market (Sirmon et al. 2008). ‘Value’ has also been defined in terms of reducing costs (Barney 1991; Newbert 2008), however we do not follow this definition. Reducing costs
may go at the expense of exploiting opportunities or neutralizing threats. It is therefore not by definition benefiting firms to lower costs. Minimizing costs, on the other hand, does benefit firms, but then again minimized costs are, ceteris paribus, translated in higher profits or can be considered a performance indicator in itself.

**Sustained competitive advantage**
While the theory hypothesizes about sources of *sustained* competitive advantage, in the current chapter we do not study *sustained* competitive advantage. Hence, we do not study the resource attributes Inimitability and Non-substitutability. While this is common in empirical studies that measure resource attributes (Newbert 2008), we have more reasons to focus on Value and Rareness. A first reason is that we want to address the problem that in studies in which Value and Rareness have been measured, they have been analyzed as independent variables (cf. Newbert 2008; Ainuddin *et al.* 2007). This is problematic because resources need to be simultaneously valuable and rare. Suppose that in a survey respondents have to rate one firm resource on a scale of 1 to 5 for both value and rareness. Respondent 1 may rate the resource value with 5, but the rareness with 1. Respondent 2 may do the opposite. When, after all respondents filled out a survey, the value and rareness scores are analyzed independently, both Value and Rareness can be significantly related to competitive advantage, but what remains unknown is whether firms which score high on both value *and* rareness simultaneously perform better than firms which do not. Both conditions for a competitive advantage have to be met and should not be measured independently, but conjointly instead. While valuable resources have the potential to improve performance, the potential advantage vis-à-vis competitors, will be even stronger the rarer these resources get. Secondly, studying sustained competitive advantage requires the collection of longitudinal data, which does not fit the purpose of the current study. And finally, but certainly not least, the importance of *sustained* competitive advantage is increasingly being discussed. The continuous and sometimes increasingly changing and dynamic nature of firms’ environments, make the term ‘sustained’ obsolete, or at least difficult to interpret. Instead, scholars started speaking of, among other things, “series of temporary competitive advantage” (Sirmon *et al.* 2007; see also Priem and Butler 2001a; 2001b). In line with this Armstrong and Shimizu (2007: 968-969), referring to Wiggins and Ruefli (2002), note that “a recent study of 6,772 firms in 40 industries over 25 years showed that only four firms achieved 20 years or more of persistent superior financial performance relative to their industry peers based on the Tobin’s q metric, and only 32 firms achieved 20 years or more of persistent superior performance based on return on assets.”

**Resources or resource attributes?**
In short what we want to measure is the relationship between Valuable and Rare
resources / capabilities and performance (competitive advantage). To date this has resulted in two different interpretations: Some scholars interpreted this as identifying specific resources leading to a competitive advantage (cf. Rouse and Daellenbach 1999; 2002), whereas others interpreted this as identifying the attributes (VR(IN)) of resources leading to a competitive advantage without being specific about which resources possess these attributes. At best labels of resources / capabilities such as ‘human capital’ or ‘financial resources’ are provided (cf. Newbert 2008, Ainuddin et al. 2007). We argue that we can be more specific both with respect to the resources as well as with respect to the characteristics of the resources. This means that unlike previous studies measuring specific resources we should not a priori select specific resources and capabilities and argue why they are VRIN, or possess at least one of these characteristics (Armstrong and Shimizu 2007; Priem and Butler 2001b; Newbert 2007), but instead actually measure the VR characteristics of specific resources and capabilities.

In doing so we are not just interested in VR resources and capabilities which demonstrate to significantly and positively affect performance, but also in those resources and capabilities which do not. As Armstrong and Shimizu (2007: 978) formulated it: “the major concern of RBV researchers has been, “What resources are contributing to high performance?” The flip side of this question is “what resources are not?” Understanding the difference in importance helps managers prioritize resources.

2.4 How do we measure it?
Rouse and Daellenbach (1999) argued that studying resources which are specific to a certain firm can only be done through ethnographic field studies in which the firm is turned inside-out and the black-box is opened. They argue that large-sample surveys would not be able to uncover firm-specificities. Others agree, but argue that quantitative data collection and analysis is needed in order to convincingly test whether identified resources and capabilities are VR and to what extent these characteristics contribute to performance (Armstrong and Shimizu 2007; Newbert 2008; Rouse and Daellenbach 2002). Following these discussions two trade-offs seem to result: Firstly we either identify specific resources important to an organization’s competitive advantage but not its characteristics or we identify only the characteristics of firms’ resources without being clear on which resources matter precisely and to what extent. Secondly, resulting from the first trade-off, being unknowledgeable about which resources matter to a firm’s competitive advantage while studying resource characteristics, the researcher can only but rely on respondents’ subjective judgments concerning the resources’ characteristics. This is also what we see in the data collection of conceptual-level studies such as the ones from Newbert (2008) and Ainuddin et
al. (2007): the researchers in these cases are not capable of rating firms’ resources and capabilities for Value, Rareness (and Inimitability and Non-substitutability), and therefore ask respondents to do so. We argue that the trade-offs can be countered when suggestions of Rouse and Daellenbach (1999) and Newbert (2008) are merged, as also Armstrong and Shimizu (2007) and Barney et al. (2011) acknowledge. Armstrong and Shimizu (2007: 967) argue that “[s]ince it is difficult for researchers to objectively observe such dimensions as value and inimitability of resources, developing an appropriate survey based on in-depth interviews with firms or experts in the industry should mitigate the construct measurement.”

What we want to know is which VR resources and capabilities contribute to competitive advantage. To identify both specific resources and their characteristics in an objective way, we suggest a template involving three steps:

1. Select an industry and collect data on current market opportunities and threats for industry incumbents.
2. Identify the variance in which competing firms respond to opportunities and threats by means of deploying resources and assess the variance in the resources’ potential to contribute to competitive advantage, i.e. assess comparative resource (dis)advantages.
3. Analyze the relationship between comparative resource (dis)advantages and performance.

Steps 1 and 2 concern qualitative data which are collected by means of interviews, focus group discussions and the study of trade and industry journals, as well as other secondary data. In step 3 the findings are analyzed using large-sample survey data in order to provide strong evidence and to rank resources in order of importance. The qualitative data will increase the depth, validity, and reliability of the quantitative data and the overall study (Hoskisson et al. 2000; Eisenhardt 1989, 1991; Rouse and Daellenbach 1999; Armstrong and Shimizu 2007).

Step 1
First an industry needs to be selected. There is much to say about what should be taken into account when selecting an industry. Since Armstrong and Shimizu (2007) have given this issue considerable thought we refer to their study in order to determine how to select an industry.

Although a study across different industries is possible, Rouse and Daellenbach (1999) and Hitt, Bierman, Shimizu, and Kochhar (2001) among others argue that if strategic resources are to be identified and measured and analyzed for competing firms it is helpful to focus on one industry. Hitt et al. (2001: 18) furthermore argue that “an industry in which critical resources are evident and
measurable must be identified.” While we argue that in-depth qualitative research preceding quantitative data collection, as in this template, also allows to identify and measure critical resources in an industry where they are not evident, researchers must of course take into account time constraints. In depth qualitative research can be problematic because of its time-consuming nature. Nonetheless we need to warn for over-confidence concerning the assessment of critical resources. Without incorporating data from industry experts and trade and industry journals, resources may be identified which seem strategic but in practice are not (see also Priem and Butler 2001b and Armstrong and Shimizu 2007). In essence a quick assessment of critical resources means jumping quickly to step 3 of this template, which does not add to rigor and robustness unless there are very convincing arguments that the way in which resources are identified and measured is valid and reliable. Past research may provide convincing data.

Once an industry is selected secondary data and industry experts can be consulted in order to gain a clear and comprehensive understanding of what the opportunities and threats are that the industry actors encounter. It is a study of buyer demands and market trends and dynamism.

Step 2
Competing firms each respond differently to opportunities and threats. The question is to what extent they manage to exploit opportunities and, or, neutralize threats. Since the attribute ‘Value’ of resources is defined in terms of its potential to exploit opportunities and, or, neutralize threats, step 2 provides insights in what makes resources in a certain industry valuable. The more a resource contributes to the exploitation of an opportunity or the neutralization of a threat, the more valuable it is. Valuable resources give a comparative resource advantage, whereas resources that are not valuable give a comparative resource disadvantage.

Since it may not be obvious at face value what makes resources valuable, or it may be difficult to obtain a complete and detailed picture we suggest in this stage to organize focus group discussions involving industry experts from different backgrounds and to make use of Delphi techniques. During the discussions the question how firms use resources to exploit opportunities or neutralize threats will be reiterated until all explanations and alternative explanations have been discussed and general consensus is reached with respect to comparative resource (dis)advantages. Multiple focus group discussions may be needed to reach a complete and comprehensive understanding of the dynamics at play (See also Eisenhardt 1989; 1991; Eisenhardt and Graebner 2007; Yin 2003).
In order to prepare for step 3 ‘Value’ scores need to be given to the resources. In conceptual-level studies, such as the one by Newbert (2008), scholars made use of Likert-scales to determine Value. Similarly, understanding the variance in which resources are deployed, on a scale of 1 to 5, scores can be given to rate comparative resource advantages (maximum score of 5) and disadvantages (minimum score of 1).

**Step 3**

After step 2 a number of potentially strategic resources are known. Respondents can be asked objective data about resources and capabilities that they deploy while the qualitative data can be used to interpret the survey data and provide value scores. We argue that given that an in-depth understanding of an industry is developed, this results in higher validity and reliability, and more depth than methods such as employed by Newbert (2008). Newbert asked respondents themselves to rate their firms’ resources for Value and Rareness.

Using Ordinary Least Squares (OLS) regression techniques the relationship between comparative resource (dis)advantages and competitive advantage can be studied. The quantitative analysis is not only important to identify the relative importance of Valuable resources, but also to study the Rareness attribute of the resources and capabilities. The beauty of measuring specific resources, as we suggest in this template, is that Rareness can be derived from the frequency of the Value scores. The rareness characteristic is displayed in the sample’s distribution. For example: If only a few respondents score between 4 and 5 for Value on a scale of 1-5, the resource is obviously rare. Hence there is therefore no need to measure rareness separately. Similarly, if all respondents score a 5 for Value, then the resources is valuable but not rare. Because there is no variance in this hypothetical situation, no significant relationship can result from statistical analyses.

There are two things we can do with Rareness in a variable’s distribution. Let us first consider linear regression. In linear regression the variance of predictor and outcome variables are compared. If there is a certain degree of similarity in the variance, a significant relationship, either positive or negative, results. Data are assumed to be normally distributed around the median. In other words, the distribution of the variables is assumed to have a bell-shape. Not all data, however, are normally distributed. Data can be positively skewed as well as negatively skewed. The pictures below demonstrate what this looks like:
Skewness is of particular interest for the RBT. Given the theory’s study of outperforming firms, one may expect positive skewness of the outcome variable. In other words: the majority of respondents performs up to the middle value on the x-axis of the distribution, while a minority of firms outperforms the others. If it were the other way around, a study of competitive disadvantage would make more sense. Provided that data points consistently demonstrate approximately similar positions in distributions of predictor and outcome variables, then the more similar the predictor and outcome variables are skewed, the higher the predicting power of the predictor variables. Hence, the most important thing to know first is whether there is a significant relationship. If this relationship is non-existent than data points do not consistently demonstrate approximately similar positions in distributions of predictor and outcome variables. However, if they do, a next step would be to compare skewness. Ceteris paribus, the explanatory power of predictor variables that are significantly related to the outcome variable, increases the more the distribution of the predictor variables resembles the distribution of the outcome variable. In other words, assuming a positively skewed outcome variable, the explanatory power is highest for significantly positively skewed predictor variables, decreases for normally distributed variables and is likely absent for significantly negatively skewed variables, ceteris paribus.

We must note however, that according to the central limit theorem looking at the shape of distributions is particularly relevant for small sample sizes. The central limit theorem argues that skewness declines and normality increases with sample size. Visual representations of the skewness of variables only gives a suggestion concerning their relevance, but because the explanatory power of predictor variables is dependent on other things as well, no conclusions can be drawn from the distribution alone. However, in light of the Rareness attribute, negatively skewed predictor variables are unlikely to relate to the outcome variable significantly.

For large sample sizes we suggest not to make use of OLS, but of quantile regression instead. Quantile regression has the interesting feature of being able to study with greater specificity the effect of predictor variables in the lower and
higher tails of the distribution of the outcome variable (Koenker and Hallock 2001). Given that the RBT is particularly interested in firms with a competitive advantage, that is, those firms that perform above average, quantile regression can tell with greater detail the type of resources that matter for firms with different performance outcomes. Quantile regression is informative of the resource-attribute Rareness in that a more efficient utilization of resources and capabilities by the minority of outperforming firms, as displayed in higher coefficients, indicates that a small (rare) portion of the firms is better capable of deploying resources efficiently than the remaining majority. In other words, efficient deployment of the resources is rare.

2.5 An example: the template in practice
To demonstrate how the template works, we applied it in an empirical RBT study in which we test the theory’s basic tenets. We decided to collect our data among small-scale sesame seed farmers in Ethiopia.

Collecting data among commodity producers may seem counterintuitive given the nature of commodity production. Commodity production is characterized by similar inputs and outputs (Henderson, Dicken, Hess, Coe, and Yeung 2002; Gereffi et al. 2005), whereas the RBT’s main assumption is firm heterogeneity. Despite relative similarity between commodity producers, there is variance in the way resources and capabilities are deployed and in their performance. Commodity producers face opportunities and threats in the market and need to deploy their resources and capabilities in response to these opportunities and threats. As such it provides an ideal ground to test the variances in terms of resource (dis)advantages and performance.

*Step 1*
In our search for a sample we decided that we would be looking for commodity producers that would produce commodities for commercial purposes. In case of farming this means that any group of farmers only producing crops for home consumption was excluded. For our sample we needed commodity producers who pursue profits. In addition the sample had to consist of commodity producers producing commodities for export, in order to avoid situations in which firms from developing countries participate in difficult to study informal and complex local trade channels. Finally we were looking for small firms in order to be able to have a sufficiently large number of observations, which brought us quickly to small-scale farming. In the mineral extraction industry firms (commodity producers) are often large in size, but small in number. In farming there are still many sole proprietors who differ from one another in terms of inputs used and performance. This creates good possibilities to test our template. Following our criteria we decided to collect data from sesame seed farmers in the Northwest of Ethiopia in a county named Kafta-Humera. Kafta-Humera is a large area with
tens of thousands of sesame seed farmers. Almost all sesame is being exported. A small portion of sesame stays within the country to serve as sowing seed or to be consumed in luxury hotels in the capital city Addis Ababa. Humera is the main town of the county and is located on the border with Eritrea (a border which cannot be crossed), and some 20 kilometers away from Sudan. A minority of farmers also produce sorghum. In the past farmers also tried to grow cotton, but it appeared difficult to harvest good quality cotton in this area without irrigation. In this drought-prone, hot part of Ethiopia sesame and sorghum are the only crops that can grow well. In theory irrigation would allow for more crops to be produced, but to date irrigation is not taking place except for a few farms close to a river. Most farmers only grow sesame, since this crop generates the highest revenues, though it is a risky crop to grow. Harvests fail relatively easy. The area consists mainly of small-scale farmers, although there is a group of large-scale farmers leasing 130 hectare (ha) up to 6700 ha of land.

Having identified a sector, we continued step 1 by collecting data on opportunities and threats for sesame seed farmers. We visited Ethiopia 6 times to collect data and spent in total over 6 months in the country. The first time we only visited the capital city Addis Ababa. The next 4 times we spent most time in Kafta-Humera. The sixth visit we presented our findings to industry experts in order to verify our results. In total we conducted 131 interviews, held different focus group discussions with industry experts and collected survey data among 375 farmers.

Industry experts explained the practices in sesame farming. Sesame farming is relatively new to Ethiopia. The past decade production increased by tenfold. It grows on land that was hardly cultivated before. Much of the land in this border-region called Tigray, which is ideal for sesame production, was not cultivated before due to wars that took place in this area. Images of this region went global during the first ‘Live-Aid’ concert. The soil is therefore fertile, yet massive deforestation also results in erosion and desertification. Resulting from the past, another challenge is illiteracy among particularly the older farmers. Most older farmers either fled to Sudan as refugee or fought in the wars and have received no or little education.

Opportunities exist for farmers by increasing agronomical yield and quality. In addition the price is generally lowest right after the harvest and increases gradually up to the time that the new farming season starts. Most farmers sell their sesame directly after harvest such that they can repay loans which they obtained to finance inputs, but speculating on price is an opportunity to earn

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1 In Ethiopia all land is owned by the State and can be leased for periods up to 99 years. There are inheritance rights for small-scale farmers owning up to 30 ha, whereas large-scale farmers are officially guaranteed contract renewal if they meet the requirements as written in law and contract.
more money with the produce. Threats come from unpredictable weather conditions such as sudden strong wind and shortage of or excess rainfall. Shortage of rainfall reduces the oil content of the seed and therefore weight, but also the number of seeds the plant provides. Excess rainfall may make the soil too humid and makes weeds grow very fast, resulting in smothering of the crop. A final threat is the threat of theft. Sesame is sometimes stored on the field or in homes without proper locks, and therefore attracts thieves. Through trainings governmental and non-governmental organizations (GOs / NGOs) aim to educate farmers on good agricultural practices, yet little is at hand to manage variation in rainfall.

Step 2
Understanding what happens in the sesame seed production and marketing, the next thing to get clear is how farmers respond to opportunities and threats. During the early phases of data collection we held group interviews with leaders and members of cooperatives of small-scale farmers. Our next step was to organize focus group discussions with experts but excluding the small-scale farmers since they would be part of the subsequent survey. During two focus group discussions in total 24 experts participated. Experts included local researchers, large-scale farmers, traders, consultants, and NGO staff. All of them had been working with sesame in the county Kafta-Humera for at least three years. The focus group discussions resulted in the following full list of resources and capabilities.

- Plowing and sowing
  - Number of times of plowing
  - Time of sowing
  - Type of seeds used
- Weeding
  - Weeding after flowering in the previous year
  - Number of times of weeding
  - Time of weeding
- Harvesting
  - Time of harvesting
- Storage
  - Floor materials
  - Wall materials
  - Roof materials
  - House or not
  - Plastic shelter on the field or not
- Labor
  - Provisions to hired laborers (food, water, shelter, et cetera)
  - Repeated contracts with hired laborers
Number of household members working on the farm

- Location
  - One of the ‘favored’ locations
  - Soil quality
  - Distance between the respondent’s home and field
  - Distance from the respondent to a large-scale farmer

- Time of selling
  - Generally speaking the later the better

- Number of animals (as proxy for capital)
  - Generally speaking the more the better

All participants of the focus group discussions reached consensus that this were indeed the resources and capabilities for farmers and agreed that the way in which variety was explained was complete. The conclusions from the focus group discussions were once again validated with three sesame agronomy and marketing consultants who reaffirmed the findings.

The above list illustrates that each of the resources / capabilities consists of 1-5 different items which can each vary again. A Value score for each resource / capability is a weighed score of each of the items. In line with our template we resembled a 5-point Likert scale by giving scores of 1-5 for six of the resources / capabilities. Time of selling and number of animals are measured in the number of weeks after harvest that the sesame was sold and the exact number of animals they have respectively. Since it can generally be argued that the later one sells and the more animals one has the better it is, these two variables are not given scores from 1-5.

Though each of the items is scored for Value we decided not to measure the items independently but make composite measures instead. The main reason lies in the argumentation of the focus group discussants who argued that the composited items cannot be seen independently. The items of each of the resources and capabilities are interrelated and affect the Value of the resource/ capability (bundle). Consider for example plowing and sowing. The timing of sowing is important, but the extent to which it is valuable depends on what seeds are sown and in what soil (i.e. how many times is it plowed?). Plowing and sowing go inseparably together. Sowing is done simultaneously with plowing. The interesting feature of composite measures is that with greater specificity distinctions are made between those farmers who perform well on all items versus those who perform well on only one or two. In other words the group that scores 5 for time of sowing is larger than the group of farmers that scores 5 for each of the three items. Hence we distinguish those farmers who exploit the best time for sowing by making use of sowing the right seeds in well-plowed soils from those who do not and expect this to improve the linear relationship. We also ran
regression analyses without the composite measures and indeed the $R^2$ and the number of significant coefficients was much lower. The composite measures add specificity because all of the composite measures except storage (for which there is a clear continuum from comparative disadvantage to comparative advantage) consist of one or two items that can have only two or three values (1 and 5 or 1, 3, and 5). As such these items give a positive (score 5) or negative (score 1) weight to the other item(s) which can have all integer values from 1-5. Since those items for which there are only two or three values are typically significantly positively skewed, those respondents who score well on each of the items is clearly a smaller group than those who score well on only 1 of them. There are, for example, two types of seeds that can be used for sowing: the traditional and the improved variety. The vast majority of farmers uses the traditional seed and are given a score 1, while the others receive a score 5. Because of these two options the group of respondents who score a 5 for the time of sowing is divided into two groups: one that additionally scores a 5 for the type of seeds used and one that does not.

Plowing and sowing is important for both the (opportunities) agronomical yield and quality. Plowing is done preferably three times (although many farmers plow only once), and sowing is done preferably in the first week of the second period (of two periods) of rainfall, using improved rather than traditional seeds.

Similarly there is a variety in the way farmers weed and harvest, which may also be important capabilities to improve agronomical yield and quality. Storage is important to prevent theft, damage on the crop resulting from humidity, and lost harvest because of strong winds. Labor is important in order to obtain good quality and agronomical yields and to avoid theft. Careful weeding is important in order not to damage the crop, yet as many weeds have to be removed as possible in order to give the crop the space to grow well. Location is important because of soil fertility, capacity of land to avoid water-logging, proximity to asphalt roads and proximity to large-scale farmers and the farmers’ homes. Farmers can live up to 80 kilometers from their fields. Proximity to large-scale farmers is important because large-scale farmers own tractors and plowing machines. Given their ownership of these machines they will plow sufficiently and at the right times. Bordering fields of small-scale farmers can, if paid for, relatively easy be included in the plowing and sowing process of large-scale farmers. Finally, the time of selling is important in order to obtain a high price. Generally speaking the price is lowest just after harvest time and increases gradually throughout the following year.

In addition to the sesame farm (firm)-specific resources and capabilities, experts pointed to the importance of farmers’ private assets, particularly animals. It makes sense that as sole proprietor the value or number of private assets can
influence firm performance. Animals are considered particularly important because animals such as goats, sheep, oxen, donkeys, and camels often function as the savings accounts of farmers who do not have bank accounts. In bad sesame production years, animals can be sold, while in good sesame production years animals will reproduce. Animals can function as collateral when obtaining loans and allow farmers to take more risks (in the hope of higher returns) when farming.

For each of the resources and capabilities we determined how to calculate Value scores but in order to avoid lengthiness, we will describe only one. The Value scores of other resources and capabilities are calculated in similar ways.

Example: Plowing and Sowing
We already identified that for plowing and sowing the number of times of plowing is important, the timing of sowing, and the type of seed used. All this affects both quality and quantity (agronomical yield). From the focus group discussions we know that of these three aspects of plowing and sowing, the time of sowing is most important, followed by the number of times of plowing, and finally the type of seed used.

We also know from the focus group discussions and the interviews with industry experts that generally speaking there are seven moments on which farmers can sow (time of sowing). The right time depends on the rainfall. After a dry period of around 7 to 8 months, it starts raining in Kafta-Humera. The first rainfall usually takes about two weeks. After these two weeks it is dry for a short period of time and then it starts raining again for about 3 – 4 months. The best time to sow is in the first week of the second period of rainfall because the moist soil together with sufficient new rainfall allows the seed to germinate and grow well. The risk of sowing earlier is that the period between the first and second rainfall takes long which may the seed cause to germinate and then die. However, the seed should not be sowed too late either since this would prevent the crop to mature before the dry season starts and too much humidity can make the seed ‘drown’. We asked farmers objectively when they sowed the seeds. The answer was coded using seven options:

1. Before the first rainfall
2. In the first week of the first rainfall
3. In the second week of the first rainfall
4. Between the first and second rainfall
5. In the first week of the second rainfall
6. In the second week of the second rainfall
7. After the second week of the second rainfall.
For this part of plowing and sowing respondents would get a score 5 if the answer was code 4, a score 4 if the answer was code 3, a score 3 if the answer was code 2, a score 2 if the answer was code 4, 6, or 7, and a score 1 if the answer was code 1.

Plowing is preferably done three times. The minimum is one time, since sowing is done simultaneously with plowing. So for this part of plowing and sowing farmers scored a 5 if they plowed 3 times, a 3 if they plowed 2 times, and a 1 if they plowed only once.

Finally, there are two types of seeds: the traditional seed and the improved seed. The improved seed is said to result in better yields and better resistance to drought. If farmers used the improved seed they would get a score 5, otherwise a score 1.

Next we had to come to one score for plowing and sowing. Given the varying importance of the three different parts we did not just add the three scores and divided them by 3. Instead we multiplied the score for the timing of sowing by 3, the score for the number of times of plowing by 2, and the score for the type of seed used was not multiplied. We added the multiplied scores and the score for the type of seed used and divided by 6.

In this way we asked questions about farmers’ comparative resource (dis)advantages in an objective way while interpreting the results using the qualitative data.

In addition to the predictor variables we included four control variables in the analysis: 1) age of the firm, 2) (il)literacy, 3) village, and 4) cooperative membership, i.e. we control for the effect of membership of a cooperative as compared to non-membership.

**Step 3**

Once we identified the resources and capabilities and determined how to measure them we set out a survey among 375 small-scale sesame seed farmers in Kafta-Humera. We already discussed above why we chose to collect data in Kafta-Humera. In addition we need to add that we only collected data from ‘lowland’ villages in order to assure that respondents made use of the same sesame variety. We collected data in five villages (75 respondents per village). The data were collected from January to May 2013. We followed guidelines for doing strategic management research in developing countries as outlined by Hoskisson *et al.* (2000). This means that we worked together with local researchers and collected the survey data by means of face-to-face interviews. Given absence of electricity and mail delivery infrastructure we also had no other choice but to collect the data from each of the 375 respondents face-to-face. Issues with respect to language terms and understanding of concepts were investigated by means of
conducting pilot studies from November to December 2012. Hoskisson et al. (2000) also suggest to make use of mixed methods and multiple informants to increase reliability and validity, which is already an integrated part of the template.

After data collection we were able the use the data of 367 observations. We excluded eight observations because of missing data.

The measurement of independent variables is mentioned above. Concerning the dependent variable we used profit per hectare (ha). We used the average price farmers received for their sesame and multiplied it by their agronomical yields. We deducted costs using a standard costs model for sesame based on secondary data from different NGOs working in the area with sesame seed farmers. We did so because while farmers were willing to openly share data on the price they received and the number of quintals they harvested, they appeared more hesitant to share costs. We do not exactly know the reason. Not all farmers may be aware of the exact costs they made because they do not record costs (42.7% of the respondents are illiterate), but farmers may also be hesitant to inform on the exact profits they made to avoid tax or out of fear for organized crime (Hoskisson et al. 2000). Indeed we found many inconsistencies in the data on costs as provided by the respondents. Using a standard costs model, we argue, will lead to more reliable data. We subtracted the costs from the revenues and divided total profit by the number of hectares used for sesame production.

**Results step 3**

We made use of both OLS and quantile regression techniques to analyze our data. Table 1 below provides the descriptive statistics and the correlations table. Given the large number of predictor variables the control variables are excluded from the correlations table. These can, however, be provided upon request. We do note that there are no multicollinearity problems. This is evident from the correlations but also from the VIF scores, which are all close to 1.

The results from the regression analyses can be found in table 2. Table two consists of five columns. The first column demonstrates the results from the OLS regression, the second to fourth column the results from the quantile regression for quantiles .25, .50 (median), and .75. The fifth column provides the results for skewness.

We can see from table 2 that the quantile regression results in different coefficients than the OLS regression. However, since there is overlap between the confidence intervals of the different quantiles and the OLS, none of the coefficients is significantly different from the coefficients of the OLS regression. As such in our case quantile regression does not provide a better estimation of profit than does OLS regression. Nonetheless we consider the results interesting
as an exemplary demonstration of how the template works. The coefficients increase with every quantile for the significant resources and capabilities storage, labor, and number of animals (although the latter one has the lowest coefficient for the median quantile which is significant at a 10% level). Location appears not to be significantly related for the upper quantile, while the time of selling is of most significance for the median quantile.
### Table 1 - Descriptive Statistics and Correlations

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>St. Dev.</th>
<th>N</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td>1</td>
<td>Profit</td>
<td>3345.26</td>
<td>4960.10</td>
<td>369</td>
<td>.999+</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Plowing Sowing</td>
<td>2.5820</td>
<td>.6670</td>
<td>370</td>
<td>.099+</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Weeding</td>
<td>3.4581</td>
<td>.6520</td>
<td>370</td>
<td>.024</td>
<td>.036</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Harvesting</td>
<td>3.9811</td>
<td>.6520</td>
<td>370</td>
<td>.149**</td>
<td>-.045</td>
<td>.005</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Storage</td>
<td>2.6104</td>
<td>1.4012</td>
<td>370</td>
<td>.265***</td>
<td>.004</td>
<td>.096+</td>
<td>.110*</td>
<td>.026</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Labor</td>
<td>1.8502</td>
<td>.3030</td>
<td>370</td>
<td>.023</td>
<td>-.024</td>
<td>-.092+</td>
<td>.096+</td>
<td>.018</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Location</td>
<td>3.2162</td>
<td>.5767</td>
<td>370</td>
<td>.118*</td>
<td>.007</td>
<td>.170**</td>
<td>-.018</td>
<td>-.034</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td>Animals</td>
<td>16.3875</td>
<td>33.6405</td>
<td>369</td>
<td>.206***</td>
<td>.133*</td>
<td>.092+</td>
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<td>.170**</td>
<td>-.018</td>
<td>-.034</td>
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<tr>
<td>9</td>
<td>Time of selling</td>
<td>4.4478</td>
<td>4.6277</td>
<td>369</td>
<td>.267***</td>
<td>.014</td>
<td>.033</td>
<td>.109*</td>
<td>.220***</td>
<td>-.030</td>
<td>.033</td>
<td>.060</td>
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</tbody>
</table>

*** is significant at $p < .001$  ** is significant at $p < .01$  * is significant at $p < .05$  + is significant at $p < .1$

### Table 2 - results from regression analyses and tests for skewness - outcome variable Profit per ha in 1000 ETB

<table>
<thead>
<tr>
<th>Resource / capability</th>
<th>OLS</th>
<th>Quantile1 (.25)</th>
<th>Quantile2 (.50)</th>
<th>Quantile3 (.75)</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plowing and Sowing</td>
<td>.5778</td>
<td>.2025</td>
<td>.4799</td>
<td>.8129</td>
<td>-.10</td>
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<tr>
<td>Weeding</td>
<td>-.2765</td>
<td>-.2616</td>
<td>-.2382</td>
<td>.1409</td>
<td>0.17</td>
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<tr>
<td>Harvesting</td>
<td>.5298</td>
<td>.4185</td>
<td>.5564</td>
<td>.9473</td>
<td>-3.23***</td>
</tr>
<tr>
<td>Storage</td>
<td>.7666***</td>
<td>.6070***</td>
<td>.8221***</td>
<td>.9409***</td>
<td>0.20</td>
</tr>
<tr>
<td>Labor</td>
<td>4.3256***</td>
<td>3.2784***</td>
<td>3.9817***</td>
<td>4.8037**</td>
<td>0.93***</td>
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<tr>
<td>Location</td>
<td>.6165</td>
<td>.8311*</td>
<td>1.1176*</td>
<td>.1154</td>
<td>0.01</td>
</tr>
<tr>
<td>Animals</td>
<td>.0220**</td>
<td>.0212**</td>
<td>.0156*</td>
<td>.0238*</td>
<td>6.63***</td>
</tr>
<tr>
<td>Time of selling</td>
<td>.2361***</td>
<td>.1511**</td>
<td>.2771***</td>
<td>.2173*</td>
<td>1.63***</td>
</tr>
<tr>
<td>Farm age</td>
<td>.0018</td>
<td>-.0221</td>
<td>-.0060</td>
<td>-.0190</td>
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</tr>
<tr>
<td>Literacy</td>
<td>.9023</td>
<td>5523</td>
<td>3812</td>
<td>1.0560</td>
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<tr>
<td>Village 2</td>
<td>2.3494**</td>
<td>1.1903</td>
<td>2.4240**</td>
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<td>Village 3</td>
<td>.7697</td>
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<td>-.2017</td>
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<td>Village 4</td>
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<td>.2128</td>
<td>-.0869</td>
<td>.0249</td>
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<td>Village 5</td>
<td>.2083</td>
<td>-.1752</td>
<td>-.6822</td>
<td>-.2303</td>
<td></td>
</tr>
<tr>
<td>Cooperative membership</td>
<td>-.11508*</td>
<td>-.10124*</td>
<td>-.6463</td>
<td>-.7074</td>
<td></td>
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<tr>
<td>(pseudo) $R^2$</td>
<td>28.35</td>
<td>17.58</td>
<td>18.87</td>
<td>18.90</td>
<td></td>
</tr>
</tbody>
</table>

*** is significant at $p < .001$  ** is significant at $p < .01$  * is significant at $p < .05$  + is significant at $p < .1$
2.6 Discussion and conclusion

Our aims with designing a template for empirical RBT research were to be able to collect in-depth data in a reliable way, to identify specific resources and their relative importance, and to develop a conjoint measure for Value and Rareness. Collecting data according to our template made our understanding of the industry comprehensive and the data robust. We have been able to identify which resources and capabilities contribute to performance and through the coefficients following from the analysis are able to rank the resources and capabilities in order of importance. We therefore argue that the template we designed can further empirical RBT research.

The quantile regression does not provide a better estimation than OLS. Nonetheless we do still consider its results relevant. For the purpose of demonstrating how the template works, we consider the results relevant, particularly because the increasing coefficients for most quantiles exemplary demonstrate our argument. With larger samples the standard errors will reduce, increasing the relevance of quantile regression. We can also derive from the table that, as expected, the significantly negatively skewed variable cannot explain profit. Only normally distributed variables (those variables which are not significantly skewed) and significantly positively skewed variables can explain performance. As discussed in the literature section this is not to say that if a variable is significantly positively skewed that it can explain performance by definition. In short this means that both value and rareness are required characteristics of resources and capabilities in order to contribute to competitive advantage. If valuable resources do not carry the characteristic of rareness in its distributions than the resources will not be significantly related to competitive advantage.

We conclude that the template can further empirical RBT research. In line with Armstrong and Shimizu (2007) we argue that low levels of empirical support are not attributable to the theory but to methods employed instead. With the current template RBT research can be conducted with increased rigor and detail. Interviews and focus group discussions with industry experts can reveal specific resources and hence open “the black box” in line with the argument by Rouse and Daellenbach (1999) that it is important to know which resources contribute to firms’ competitive advantages. In addition the context, which ultimately determines ‘value’ of resources (Priem and Butler 2001a) is taken into account. The survey data can provide convincing evidence base on a large sample (Armstrong and Shimizu 2007). With the focus on positively skewed and normally distributed predictor variables we can, in line with the theory, put more emphasis on outperforming firms, those with a competitive advantage, rather
than the average firm and study resources that are simultaneously Valuable and Rare.

Besides the relevance to scholars the template has high managerial implications as well. The practical relevance comes from the specificity with respect to resources and which should preferably be given priority in order to improve a firm’s competitiveness.

**Limitations**
There are a number of limitations to the research we conducted. Firstly data are collected in a country and language foreign to the authors. We had to engage in a continuous reiterative process when collecting data in order to make sure that everything was well understood and correctly and completely translated. Despite techniques to deal with foreignness, there will always remain a part of foreignness when collecting data. Furthermore the collection of data according to the template is time consuming. Although data collection in industrialized countries will cost much less time, data collection still involves interviewing, focus group discussions, and the use of a survey.

**Further research**
We suggest further research to make use of larger samples in order to benefit from the benefits quantile regression brings. In order to explain clearly the different steps of the template we did not use advanced quantitative analyses in our current study, but more advanced quantitative analyses such as Structural Equation Modelling can further increase insights on the value of resources and conditions under which resources and capabilities are valuable. Longitudinal research can also be used to study the development of resources and capabilities within firms and how certain resources become valuable whereas others become less valuable. This is much in line with the concepts of dynamic capabilities and asymmetries. Longitudinal resources can furthermore be used to test the relevance of the resource characteristics ‘Inimitability’ and ‘Non-substitutability’ in VRIN.