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Strategic resources and smallholder performance at the bottom of the pyramid

RESEARCH ARTICLE

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Abstract

In a competitive business environment at the Bottom of the Pyramid smallholders supplying global value chains may be thought to be at the whims of downstream large-scale players and local market forces, leaving no room for strategic entrepreneurial behavior. In such a context we test the relationship between the use of strategic resources and firm performance. We adopt the Resource Based Theory and show that seemingly homogenous smallholders deploy resources differently and, consequently, some do outperform others. We argue that the 'resource-based theory' results in a more fine-grained understanding of smallholder performance than approaches generally applied in agricultural economics. We develop a mixed-method approach that allows one to pinpoint relevant, industry-specific resources, and allows for empirical identification of the relative contribution of each resource to competitive advantage. The results show that proper use of quality labor, storage facilities, time of selling, and availability of animals are key capabilities.

Keywords: resource-based theory, competitive advantage, mixed method, smallholder performance
JEL code: L25; L70; Q12; Q13

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1. Introduction

Since Barney's (1991) seminal article the 'resource-based theory' (RBT) of the firm has become a prominent theory within the field of strategic management (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). The contribution of this study to extant literature is threefold. First, we observe that our study is one of the first that applies the insights of the RBT in a bottom of the pyramid (BoP) context. Second, we develop a novel method to measure value and rareness of resources involved simultaneously. Finally, we apply the method and present empirical results that confirm the importance of strategic resources in creating a competitive position for seemingly homogenous smallholders.

We studied producers in a developing country, or more specifically small-scale sesame seed farmers in the Northwest of Ethiopia. Similar to the study on comparative resource advantages by Sirmon *et al.* (2008), the homogeneous character of production and marketing of sesame allows to relatively easily understand the production and marketing processes. Through various data collection techniques, including focus group discussions with industry experts, we were able to define and classify a list of relevant resources and capabilities. Technology plays a limited 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.

This setting allows us to test the RBT's central tenets in bottom-of-the-pyramid (BoP) markets which are argued to provide 'intriguing and fertile ground(s) for organizational research' (Barney *et al.,* 2011; see also Bruton, 2010; Bruton *et al.,* 2008; Bruton *et al.*, 2013; Robson *et al.*, 2009) and address Karnani's (2007) plea to emphasize income generating opportunities instead of viewing the poor primarily as consumers. The relevance is demonstrated by Kimhi (2010) who argues that encouraging rural entrepreneurship favors both income growth and income distribution. In studying the use of strategic resources by primary producers of agricultural products, in the vulnerable first stage of a global value chain (cf. Cucagna and Goldsmith, 2017), in an ecologically and institutionally daunting environment (cf. Olthaar *et al.,* 2017), we show that even these small farmers are able to deploy strategic resources. Those that do, do significantly better than those who do not.

Despite the widespread use of RBT for nearly three decades, a robust rigorous research method has not emerged (Arend, 2006; Armstrong and Shimizu, 2007; Barney *et al.,* 2011; Levitas and Chi, 2002; Newbert, 2007, 2008; Rouse and Daellenbach, 1999, 2002). A major problem 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; Bowman and Ambrosini, 2007; Newbert, 2007; Rangone, 1999). In response conceptual-level studies were conducted measuring the VRIN resource characteristics (cf. Ainuddin *et al.,* 2007; Newbert, 2008). The limitation of these studies is that the methods employed did not allow identifying the specific resources that 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, but has high managerial implications as well (Armstrong and Shimizu, 2007; Rouse and Daellenbach, 1999).

Another limitation of existing 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 VR in order to have the potential to result in a competitive advantage.

Armstrong and Shimizu (2007) and more recently Barney *et al.* (2011) underscored the importance of more mixed-method RBT research. Indeed mixed-methods can result in increased rigor, reliability and validity of results (Hoskisson *et al.*, 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: (1) that it allows to classify relevant, industry-specific, resources and capabilities; and (2) that it allows to empirically identify the relative importance of each of the resources and capabilities in creating a competitive advantage by measuring firm-specific deployment of resources. In doing so, we argue and show that valuable resources and capabilities are not normally distributed but rather distributed in a skewed manner among firms. The proposed method leads to a more fine-grained understanding of critical capabilities and firm performance in agriculture than a straightforward analysis of revenues and costs of production factors, which is common in agricultural economics. The results show that proper deployment of strategic capabilities such as the use of quality labor, storage facilities, time of selling, and availability of animals to cover financial needs, are key capabilities, which are even more decisive than the deployment of recommended agricultural production techniques concerning plowing, sowing, weeding and harvesting. This does not imply that the latter capabilities can be neglected, what it does say is that these firms should pay proper attention to investments in those capabilities that may lead to a competitive advantage (see also Lai *et al.,* 2018), capabilities that are not necessarily related to production techniques.

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 by demonstrating how we used the template to collect data among sesame seed farmers in Ethiopia, after which we conclude our findings.

2. Strategic resources and their contribution to competitiveness: resource-based theory

Penrose (1959) first proposed that potential sources of competitive advantage reside inside firms' resource bases. Barney (1991) conceptualized attributes of strategic resources; resources that have the potential to result in (sustained) competitive advantage. RBT assumes resources to be heterogeneously distributed among firms and imperfectly mobile. Barney argued that firm-specific immobile resources which are simultaneously VR have the potential to result in a competitive advantage, whereas resources which are in addition VRIN could lead to a sustained competitive advantage (Huang *et al.,* 2015).

Further contributions focused on clearer distinctions between resources and capabilities (Amit and Schoemaker, 1993), conceptualization of dynamic capabilities (Eisenhardt and Martin 2000; Teece *et al.*, 1997), further precision in definitions of resource attributes VR, and competitive advantage (Barney, 2001; Priem and Butler, 2001a,b), studies on resource exploitation and management (Mahoney and Pandian, 1992; Sirmon *et al.,* 2008), and conceptualizations of asymmetries (Miller, 2003), comparative resource advantages (Jacobides and Hitt, 2005; Sirmon *et al.,* 2008), resource management and orchestration (Helfat *et al.,* 2007; Sirmon and Hitt, 2009), and series of temporary competitive advantage (Sirmon *et al.*, 2007). Despite the theory's intuitive appeal and prominence particularly in the area of strategic management for nearly three decades, little research has been devoted to develop and apply 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).

Empirical support for RBT lags behind its theoretical development (Armstrong and Shimizu, 2007) – the intuitive appeal of RBT has not yet fully been substantiated in empirical studies. Armstrong and Shimizu (2007) wonder if low levels of empirical support should be attributed to the theory or to the methods employed. They argue that researchers should 'creatively operationalize constructs and empirically measure theorized outcomes', providing some directions for further empirical RBT research without being too detailed. More recently Barney *et al.* (2011) underlined the importance of further development of empirical RBT methodologies as well, without being overly specific.

The intuitive appeal that the RBT offers in explaining relative firm performance may thus be best substantiated by seeking to develop a methodological approach to RBT studies. An area of research in which firms face daunting circumstances and seem ill positioned to differentiate themselves from others, is an appropriate setting for empirical research. We focus on entrepreneurs in the barren Humera region of Ethiopia who grow what many would consider a homogenous crop mostly for the global commodity market: sesame.

3. Valuable, rare, inimitable and non-substitutable resources: conceptual considerations

Competing firms differ in their resource endowments: there are comparative resource advantages (Eisenhardt and Martin, 2000; Sirmon *et al.,* 2008) resulting in different performance outcomes, or competitive advantage. Amit and Schoemaker (1993) distinguish resources and capabilities. Resources are defined in terms of stocks of available factors that are owned or controlled by the firm. Resources are typically categorized into physical capital resources, human capital resources, financial assets and technological resources (Amit and Schoemaker, 1993; Barney, 1991; Crook *et al.*, 2008; Grant, 1991; Mahoney and Pandian, 1992).

Capabilities concern firms' capacities to utilize, bundle, develop, configure, and, or deploy resources. Capabilities are often developed in functional areas, e.g. brand management in marketing, operations management in production and repeated product and process innovations (Amit and Schoemaker, 1993; Grant, 1991; Helfat and Peteraf, 2003; Teece *et al.,* 1997). As resources are tradable it is expected that strategic assets that fulfil the VRIN criteria are mainly rooted in the capabilities that distinguish the firm from its competitors (Amit and Schoemaker, 1993; Clougherty and Moliterno, 2010; Newbert, 2008). Therefore, we focus our analysis on capabilities. The results of the focus group discussions presented in Section 5 confirm that valuable resources concern capabilities: bundles of resources, e.g. proper harvesting, raising of animals, use of quality labor. As much of the RBT literature defines capabilities as a resource (see Barney, 1991) we use the concepts interchangeably, but for clarity we note that in most cases we refer to capabilities as defined by Amit and Schoemaker (1993).

3.1 Comparative resource advantages and performance

A key tenet of the RBT is that resources which are simultaneously VR have the potential to result in a competitive advantage. In most research 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)

> '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).

The attribute 'value' has been subject to more debate, particularly when Priem and Butler (2001a,b; see also Barney, 2001) demonstrated tautology in the relationships as proposed in the RBT framework. Competitive advantage was defined by Barney (1991; emphasis not in original) as a firm 'implementing a value creating strategy not simultaneously being implemented by any current or potential competitor'. Following Barney's definitions, Priem and Butler (2001a) 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 (2001a) refer to Schoemaker's (1990) definition who defines competitive advantage as a firm 'systematically creating above average returns'. The resource-attribute 'value' is defined in the literature as a resource's potential to exploit opportunities or neutralize threats in the environment/market (Sirmon *et al.* 2008; see also Companys and McMullen, 2007). '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.

Finally, we note that the studies in which VR has been measured, both attributes have been analyzed as independent variables (cf. Ainuddin *et al.,* 2007; Newbert, 2008). This is problematic because resources need to be simultaneously VR. While valuable resources have the potential to improve performance, the potential advantage vis-à-vis competitors, will be stronger the more unique the resources get. We argue that an indicator that measures both attributes at the same time is needed to reflect the comparative resource advantages.

3.2 Sustained competitive advantage

While the theory hypothesizes about sources of sustained competitive advantage, in the current article we do not study sustained competitive advantage. Hence, we do not study the resource attributes 'inimitability' and 'non-substitutability'. Studying sustained competitive advantage requires the collection of longitudinal data, which, regrettably, are not provided in our dataset. Moreover, the importance of sustained competitive advantage is being discussed more and more (Huang *et al.,* 2015). 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,b). In line with this Armstrong and Shimizu (2007), 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.

3.3 Resources or resource attributes

We want to analyze the relationship between VR resources/capabilities and performance (competitive advantage). Some scholars focused on the identification of specific resources leading to a competitive advantage. 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 state that large-sample surveys would not be able to uncover firm-specificities. Others agree, but argue that quantitative data collection and analysis are 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). These studies analyzed the attributes VR(IN) of resources leading to a competitive advantage without being specific about which resources possess these attributes.

The downside of these latter studies is that 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. For example, in the studies of Ainuddin *et al.* (2007) and Newbert (2008) the researchers are not able to rate firms' resources and capabilities for VR(IN), and therefore simply ask respondents to do so. At best, labels of resources / capabilities such as 'human capital' or 'financial resources' are provided.

We argue that we have to 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; Newbert, 2007; Priem and Butler, 2001b), but instead actually measure the VR characteristics of specific resources and capabilities.

4. Measuring and analyzing strategic resources: developing methods contributing to theory

The challenges discussed in the last section can be addressed when suggestions of Newbert (2008) and Rouse and Daellenbach (1999) are merged, as also Armstrong and Shimizu (2007) and Barney *et al.* (2011) implicitly acknowledge. Armstrong and Shimizu (2007) argue that since 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.

When determining which VR resources contribute to competitive advantage an objective method must be developed or adopted that allows one to identify specific resources. Drawing on the previous, a template involving three steps is suggested:

1. Select an industry and collect data on current market opportunities and threats for industry incumbents.
2. Enumerate potentially strategic resources by assigning value scores to resources and capabilities and by determining the measurement of rareness.
3. Analyze the relationship between comparative resource advantages and performance: identify strategic resources that do make a difference.

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 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 (Armstrong and Shimizu, 2007; Eisenhardt, 1989, 1991; Hoskisson *et al.,* 2000; Rouse and Daellenbach, 1999).

Step 1

First, an industry needs to be selected. Rouse and Daellenbach (1999) and Hitt *et al.* (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. 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.

In-depth qualitative research, potentially time-consuming, triangulating between sources of insights, preceding quantitative data collection, allows one to identify and measure opportunities and threats in an industry where they are not evident. When not incorporating insights from industry experts and trade and industry journals on opportunities and threats, resources may be identified which seem strategic (step 2) but in practice are not (see also and Armstrong and Shimizu, 2007; Priem and Butler, 2001b). Too quick an assessment of critical resources, or forgoing the identification of opportunities and threats, implies potentially jumping too quickly to step 3 of the suggested template, potentially sacrificing rigor and robustness.

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, the more a resource contributes to the exploitation of an opportunity or the neutralization of a threat, the more valuable it is. The causal ambiguity argument (Winter and Szulanski, 2001) suggests that the resources that actually make a contribution can be difficult to determine, for researchers as well as for entrepreneurs themselves. A diversity of sources needs to be consulted to determine the range of resources that potentially contribute to firm performance.

We organized multiple focus groups discussions and used Delphi techniques, to reach agreement about a complete and comprehensive list of resources that potentially contribute to smallholder performance (cf. Eisenhardt, 1989, 1991; Eisenhardt and Graebner, 2007; Yin, 2003). A diverse group of experts were involved in this process. Industry sources and reports assisted the researchers in preparing for these sessions. During the discussions the question how smallholders use resources to exploit opportunities or neutralize threats were reiterated until all explanations and alternative explanations have been discussed and general consensus is reached with respect to comparative resource (dis)advantages. In Section 5 we discuss how these discussions provided us a list of potentially strategic resources and how we were able to derive from this list a value score.

Next to a value score we need a conjoint measure for rareness. We propose to use the frequency distribution (skewness) of the value scores as a proxy for rareness.

When statistically testing the extent to which resources contribute to a firm's performance, the skewness of an explanatory variable is of particular interest for the RBT. Data are often assumed to be normally distributed around the median, showing a bell-shaped distribution. In practice, however, valuable deployment of resources among firms is often not following a normal distribution – instead data on resource deployment can be substantially positively skewed as well as negatively skewed (Figure 1). The RBT focuses on the question why some firms outperform others and the deployment of valuable and rare resources is expected to provide an important part of the answer. An empirical study testing resources for their VR characteristics would therefore explicitly account for non-normally distributed resources. Resources that are prevalent, will not allow firms to differentiate themselves from others, not even when valuable, implying that negatively skewed predictor variables are unlikely to relate to the outcome variable significantly. In contrast, positively skewed data may indicate that a resource is not only valuable but also rare, suggesting a relatively high probability that this independent variable will explain performance differentials. If, for example, few respondents from a large population independently score a 5 on a scale of 1-5 (Newbert, 2008), then the resource is rare. We consider this as a conjoint measure as there is no need to measure rareness separately. Similarly, if there is no variance in the value score for a resource among competing firms, no significant contribution from the resource for firm performance can be expected.

Hence, we suggest that empirical tests of models rooted in the RBT logic also report distributional characteristics of the variables of interest that may be indicative of Rareness. To do so we suggest reporting the skewness of the respective variables and testing the hypothesis that the variable is normally distributed.[1] Significance of this test would then indicate that we have to reject the hypothesis that the focal variable is normally distributed and hence relevant in terms for Rareness from the RBT logic.

[1] While we decided to use skewness as the main factor of interest from an RBT logic, there are alternatives to reporting skewness. For example, one may also refer to the kurtosis or apply a joint test utilizing skewness and kurtosis. In addition, the Shaprio-Wilk and Shapiro-Francia tests for normality may be considered useful alternatives. It is also important to note that linear models do not require to make assumptions about the distribution of the independent variables. Although it may be useful to transform a highly skewed independent variable, we suggest to report the skewness of the non-transformed variable.

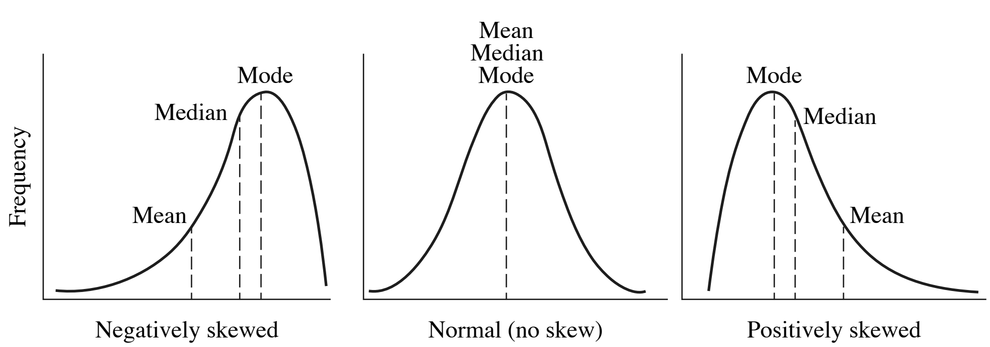

Figure 1. Alternative distributions.

According to the central limit theorem, claiming that skewness declines and normality increases with sample size, looking at the shape of distributions is particularly relevant for small sample sizes. While a visual representation of the skewness of a variable suggests relevance, the explanatory power of a predictor variable may depend on other circumstances as well. Hence, it might be that limited conclusions can be drawn from the distribution alone. A complementary analysis can be quantile regression as it allows greater levels of specificity when studying the effect of predictor variables in the lower and higher tails of the distribution on an outcome variable (Koenker and Hallock, 2001). Given that the RBT is particularly interested in firms performing above average, quantile regression can help determine in greater detail and certainty the type of resources that make some firms outperform others.

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. The survey gathered information about the deployed resources and capabilities and smallholder performance. 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. 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 use 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 to use the data of 367 observations. We excluded eight observations because of missing data.

The measurement of independent variables is explained above (further details are discussed in the next Section). In addition to the predictor variables we included four control variables in the analysis: age of the firm, (il)literacy, village and cooperative membership, i.e. we control for the effect of membership of a cooperative as compared to non-membership.

Concerning the dependent variable we used profit per hectare. We used the 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 farmers had difficulty in reporting the costs. Many farmers did not remember the exact expenses as they do not record costs (42.7% of the respondents are illiterate). 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.

5. Smallholders in a daunting environment: sesame farmers in Humera, Ethiopia

We study empirically if smallholders in exceptionally daunting circumstances are nevertheless able to develop and deploy strategic resources so that they are better able to strengthen their competitive position. We collected data among small-scale sesame seed farmers in Humera, Ethiopia. Collecting data among commodity producers may seem counterintuitive given the nature of commodity production. Commodity production is characterized by similar inputs and outputs (Gereffi *et al.*, 2005; Henderson *et al.*, 2002), 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 (Ali, 2016; Maspaitella *et al.*, 2017). 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 export-market oriented commodity producers. In case of farming this means that any group of farmers only producing crops for home consumption was excluded. For our sample we needed producers who pursue profits. In addition, we selected farmers producing commodities for export, in order to avoid situations in which smallholders from developing countries participate in difficult to study informal and complex local trade channels. Finally, we were looking for small or medium-sized farms in order to be able to have a sufficiently large number of observations. In farming there are still many sole proprietors who differ from one another in terms of inputs used and performance. We collected data from sesame seed farmers in the Northwest of Ethiopia, in a county named Kafta-Humera with thousands of sesame seed farmers. Almost all sesame is being exported. 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.

After 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. We spent most time in Kafta-Humera. The last 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.

Opportunities exist for farmers to increase 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 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. The focus group discussions resulted in the following full list of resources and capabilities.

- Plowing and sowing. Proper plowing and sowing is important for both the 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. Improved seeds are available and recommended rather than traditional seeds. We conclude that for plowing and sowing three items are key: number of times of plowing, time of sowing and the type of seeds used.
- Weeding. Similarly, there is variety in the way farmers weed, affecting agronomical yield and quality. Again three items are key: weeding after flowering, the number of times of weeding and the time of weeding.
- Harvesting. Regarding harvesting the right time, determined by the color of the sesame seeds, is key.

- Storage. Storage is important to prevent theft, damage on the crop resulting from humidity, and lost harvest because of strong winds. The following items were identified in the focus group discussions: floor materials, wall materials, roof materials, house and a plastic shelter on the field.
- Labor quality. Labor is important in order to obtain good quality yields and to avoid theft. Careful weeding is important in order not to damage the crop and to remove as many weeds as possible in order to give the crop the space to grow well. Three items are deemed relevant: provisions to hired laborers (food, water, shelter, *et cetera*), repeated contracts with hired laborers and the number of household members working on the farm.
- Location. Location is important because of local differences in 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. Bordering fields of small-scale farmers can, if paid for, relatively easy be included in the plowing and sowing process of large-scale farmers. Four items are important: one of the 'favored' locations, local soil quality, distance between the respondent's home and field and the distance of the field from a large-scale farmer's farm.
- Time of selling. The time of selling is important since the price tends to be lowest just after harvest time and increases gradually throughout the following year.
- Capital (number of animals). Experts pointed at the importance of farmers' private assets, particularly animals. Animals such as goats, sheep, oxen, donkeys, and camels often function as a savings account for farmers who do not have a bank account. In bad production years, animals can be sold, while in good sesame production years animals will reproduce. Animals can function as collateral for loans and allow farmers to take more risks (in the hope of higher returns) when farming.

All participants of the focus group discussions reached consensus that these 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 composed a composite measure instead for each of the resources/capabilities. Focus group discussants argued that the different items cannot be seen as independent: 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 and make use of 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).

For each of the resources and capabilities we calculated value scores. An example can be found in the supplementary calculation of value score per resource / capability. The Value scores of other resources and capabilities are calculated in similar ways and are available upon request.

Results step 3

We made use of both ordinary least squares (OLS) and quantile regression techniques to analyze our data. Table 1 shows descriptive statistics and correlations for our central variables of interest. We do not observe indications for multicollinearity issues. This is evident from the correlations but also from the VIF scores, which are all close to 1.

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, quality 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.

Resource capability		**Mean**	**St. Dev.**	**n**	**Resource capability**								
					1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1	Profit	3345.26	4960.10	369	1								
2	Plowing sowing	2.5820	0.6670	370	0.099+	1							
3	Weeding	3.4581	0.6525	370	0.024	0.036	1						
4	Harvesting	3.9811	0.5864	370	0.149**	-0.045	0.005	1					
5	Storage	2.6104	1.4012	370	0.278***	0.013	0.068	0.127*	1				
6	Labor	1.8502	0.3030	370	0.265***	0.004	0.096+	0.110*	-0.026	1			
7	Location	3.2162	0.5767	370	0.118*	0.023	-0.024	-0.092+	0.096+	0.018	1		
8	Animals	16.3875	33.6405	369	0.206***	0.133*	0.092+	0.007	0.170**	-0.018	-0.034	1	
9	Time of selling	4.4478	4.6277	369	0.267***	0.014	0.033	0.109*	0.220***	-0.030	0.033	0.060	1

[1] *** significant at P<0.001; ** significant at P<0.01; * significant at P<0.05; + significant at P<0.1.

Table 2. Results from regression analyses and tests for skewness – outcome variable profit per ha in 1000 Ethopian birr.[1]

Resource / capability	OLS	Quantile1 (0.25)	Quantile2 (0.50)	Quantile3 (0.75)	Skewness
Plowing and sowing	0.5778	0.2025	0.4799	0.8129	-0.10
Weeding	-0.2765	-0.2616	-0.2382	0.1409	0.17
Harvesting	0.5298	0.4185	0.5564	0.9473	-3.23***
Storage	0.7666***	0.6070**	0.8221***	0.9409**	0.20
Labor	4.3256***	3.2784***	3.9817***	4.8037**	0.93***
Location	0.6165	0.8331*	1.1176*	0.1154	0.01
Animals	0.0220**	0.0212**	0.0156*	0.0238*	6.63***
Time of selling	0.2361***	0.1511**	0.2771***	0.2173*	1.63***
Farm age	0.0018	-0.0221	-0.0060	-0.0190	
Literacy	0.9023	0.5523	0.3812	1.0560	
Village 2	2.3494**	1.1903	2.4240**	2.5518	
Village 3	0.7697	-0.7807	-0.2017	1.0130	
Village 4	0.4490	0.2128	-0.0869	0.0249	
Village 5	0.2083	-0.1752	-0.6822	-0.2303	
Cooperative membership	-1.1508*	-1.0124*	-0.6463	-0.7074	
(pseudo) R^2	28.35	17.58	18.87	18.90	

[1] OLS = ordinary least squares regression; *** significant at P<0.001; ** is significant at P<0.01; * is significant at P<0.05.

6. Discussion and conclusions

Our aims in the current article were threefold: (1) we are one of the first to apply RBT insights in a BoP context; (2) we developed a novel template for conducting empirical RBT research; and (3) we applied the RBT in an economic sector that is characterized by seemingly homogenous incumbents, yet demonstrates performance variances. By designing a template for empirical RBT research we were able 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 it possible to identify which resources and capabilities contribute to performance and to what extent.

The quantile regression does not provide a better estimation than OLS. Nonetheless we do still consider its results relevant, particularly because the increasing coefficients for most quantiles demonstrate our argument. With larger samples the standard errors will reduce, increasing the relevance of quantile regression. We can also derive from the results that, as expected, the significantly negative skewed variables cannot explain profit. Only normally distributed variables (those variables which are not significantly skewed) and significantly positive skewed variables can explain performance. 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 distribution then the resources will not be significantly related to competitive advantage. Put differently, rareness as measured by skewness of the value score for specific capabilities, helps to understand why specific valuable resources make, or do not make, a difference.

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. Though tested among commodity producers in a BoP context, the template is designed such that it can be used in other contexts as well. Interviews and focus group discussions with industry experts can reveal specific resources and hence open 'the black box'. This is 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 VR.

The results are also of high relevance for scholars conducting research on economic development in BoP contexts, whether from the discipline of (agricultural) economics, small business and entrepreneurship, strategic management, economic geography, or development studies. Approximately one-fifth of the world population, mostly residing in developing countries, are estimated to derive their incomes at least partly from farming (Alston and Pardey, 2014). The results of the current article demonstrate entrepreneurial and strategic potential of these farms from a novel perspective.

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 capabilities which should be given priority in order to improve a firm's competitiveness. The results confirm the importance of strategic resources in creating a competitive advantage even for businesses at the bottom of the pyramid. For the resource constrained entrepreneurial farmers proper investment in quality labor, storage, time of selling and availability of animals to cover financial needs are key. Interestingly, these resources have a stronger effect on profit than the recommended agricultural production techniques regarding plowing, sowing, weeding and harvesting.

6.1 Limitations and further research

There are a number of limitations to the research we conducted. The data is collected in a country with a 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 was well and fully translated. Despite techniques to deal with foreignness, there will always remain a part of foreignness when collecting data.

For further research we suggest to make use of larger samples in order to exploit the benefits that quantile regression brings. In order to explain the different steps of the template clearly, we chose not to use advanced quantitative analyses. More advanced quantitative analyses, such as structural equation modelling, can give more insights in 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 (Teece *et al.,* 1997) and asymmetries (Miller, 2003). Longitudinal resources can also be used to test the relevance of the resource characteristics 'inimitability' and 'non-substitutability' in VRIN.

Supplementary material

Supplementary material can be found online at https://doi.org/10.22434/IFAMR2018.0111.

Example. Calculation of value score per resource/capability.

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