Paper to be presented at the DRUID Academy Conference 2016 in Bordeaux, France on January 13-15, 2016

Industry characteristics as drivers of dynamic capabilities

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Abstract

Industry characteristics as drivers of dynamic capabilities Annelies van Uden PhD Candidate Radboud University Nijmegen April 2013 – April 2017 A.vanuden@fm.ru.nl State-of-the-art and research gap Since the seminal work of Teece & Pisano (1994) the dynamic capabilities (DC) approach has emerged as one of the most important approaches to explain competitive advantages of firms. DC refer to the ability of a firm to 'purposefully create, extend or modify its resource base' (Helfat et al., 2007:4). A vast body of research studies the relationship between the dynamic capabilities of firms and their performance and found a positive relationship. However, if DC have a positive effect on performance, why does not every firm develop the same level of DC? Some scholars argued that this heterogeneity in DC can be explained by internal learning mechanisms, experience and routines. Yet, a factor that has been neglected as a driver of DC, is the role of industry characteristics. The aim of the paper is to fill this gap and enhance our understanding of drivers of DC by analyzing how different industry characteristics relate to the level of DC of firms. We consider the four main industry characteristics as identified in previous studies, which are dynamism, munificence, heterogeneity and competition (Boyd, 1990). Theoretical arguments The first driver is dynamism, which refers to the volatility in the environment that a firm faces. In a dynamic environment, flexibility is key and DC gives a firm flexibility to adjust its resource base in order to deal with the instability. In a more stable environment, DC are probably too expensive to develop and could be even destructive considering the cost involved by building and using them. This indicates that the level of DC of a firm will be higher in a dynamic environment. Second, we expect that higher levels of munificence lead to lower levels of DC of firms. Munificence is the extent to which the environment supports growth of firms. In a highly munificent environment, enough resources will be available to support a firm's growth. Moreover, the resources will be available whenever the firm needs them. Therefore, a firm does not have to undertake a lot of effort in order to use or find these resources and a firm might perform well, without having to adapt its resource base. Third, we expect that a heterogeneous industry elicit an incentive for firms to develop a higher level of DC. Heterogeneity refers to the dissimilarity of inputs and outputs required by an industry. In a more heterogeneous industry there will be more sources that contain information relevant for the firm. This raises complexity and uncertainty, because it is more difficult to obtain all relevant information. In such an industry, it will be more beneficial for a firm to be strategically flexible in order to be able to quickly adapt if new information is available. Furthermore, a more heterogeneous environment consists of more potential resources. DC gives the firm the flexibility to use these resources whenever necessary. The last driver is competition, which refers to the number of firms active within the industry. In a more competitive

industry, it becomes increasingly difficult to identify competitors, to determine how to deal with these competitors and create value for clients. Furthermore, it creates a market in which firms continuously seek for new opportunities in order to stay competitive. The speed and accuracy of the adaptation of firms within such an industry is crucial. This provokes a need to develop dynamic capabilities in order to be flexible and deal with this uncertainty and rivalry and change the resource base accordingly. Data To test the above hypotheses we used data of 492 SMEs in the manufacturing sector in three developing countries, namely Kenya, Tanzania and Uganda. The Innovation Capabilities Survey 2015 (World Bank) measured DC with several items in which the firm indicated their ability to sense and seize opportunities. We used the Enterprise Surveys 2007 and 2013 (conducted by the World Bank) and input-output tables taken from 'Global Trade Analysis Project' to measure our independent variables. Munificence was measured as the growth of sales within an industry. Dynamism was operationalized by the standard error of the regression slope divided by the mean value of sales. Heterogeneity was measured as the Herfindahl index of both the input and output of an industry. Concentration was computed as the share of firms within an industry that indicated that the number of competitors was too many to count. We controlled for firm age, size, foreign ownership, R&D and training. Results The results partly support our expectation. Yet, unexpectedly, the effects of the environmental variables on DC differ amongst countries. The only variable that has the expected sign and is significant in all three countries is competition, which strongly supports our expectation. However, the other industry dimensions have different effects in different countries. For instance, munificence has a negative effect in Uganda, while in Tanzania the effect is positive. Dynamism has positive effect in Kenya, but turns negative in Tanzania. This suggests that dynamism has a discouragement effect in Tanzania. In line with our expectations, heterogeneity has a effect in Tanzania and Uganda, but no significant effect in Kenya. The results indicate that industry characteristics indeed influence the level of DC of firms. However, the results suggest as well that the relationship between industry characteristics and the level of DC of firms, differ across different context. Hence, when considering industry characteristics as drivers of DC, the wider context in which the firm operates should be taken into account. References Boyd, B. (1990). Corporate linkages and organizational environment: A test of the resource dependence model. Strategic Management Journal, 11, 419–430. Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M. A., Singh, H., Teece, D. J., & Winter, S. G. (2007). Dynamic Capabilities Understanding Strategic Change In Organizations (pp. 1–147). Blackwell Publishing Ltd. Teece, D., & Pisano, G. (1994). The Dynamic Capabilities of Firms: an Introduction. Industrial and Corporate Change, 3(3), 537–556. doi:10.1093/icc/3.3.537-a

Jelcodes:O14,M21

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INTRODUCTION

Since the seminal work of Teece and Pisano (1994) the dynamic capabilities approach has emerged as one of the most important approaches to explain competitive advantages of firms (Easterby-Smith, Lyles, & Peteraf, 2009; Stefano, Peteraf, & Verona, 2014). Dynamic capabilities refer to the ability of a firm to 'purposefully create, extend or modify its resource base' (Helfat et al., 2007, p.4). A vast body of research has explored the relationship between dynamic capabilities and firm performance and traditionally, a positive relationship has been assumed (Schilke, 2014a). Yet, the level of dynamic capabilities varies across firms.

The heterogeneity among the level of DCs of firms can be explained by several factors. First of all, it is costly to develop DCs. Building DCs may interrupt ongoing learning activities or certain resources are devoted to dynamic capabilities instead of ongoing organizational activities (Helfat et al., 2007; Schilke, 2014a; Winter, 2003). Thus, a firm has to invest in the development of DCs, which is associated with financial and managerial costs (Ethiraj et al., 2005). Due to the cost involved in developing DC, managers of a firm have to decide if they would like to invest in the development of DCs. If it is worth investing in will depend on the cost associated with building DCs and the benefits that can be derived from DCs. In general, the benefit of having a certain level of DCs is that it gives the firm strategic flexibility, because the firm will be better able to sense opportunities and act upon it by changing its resources base (Teece, 2007). DCs help the firm to identify and select opportunities, to acquire necessary information and to transform and commercialize this information. Managers of a firm need to decide if the benefits associated with DCs are worth the costs of building and using the DCs.

Studies that examine how dynamic capabilities come into being, focused on the internal drivers of dynamic capabilities, such as internal learning mechanisms, experience and routines (Schilke, 2014b; Zahra, Sapienza, & Davidsson, 2006; Zollo & Winter, 2002). Despite the value of these internal drivers, previous studies also suggest that DCs are the result of co-evolution of internal and external forces

(Jacobides & Winter, 2011; Li & Liu, 2014a; D. J. Teece, 2007). However, there is a lack of detailed knowledge about how the external environment exactly drives the development of DCs. The few studies that empirically studied how the external environment leads to the development of DCs only looked at 'environmental dynamism' in relation to DCs (e.g. Schilke, 2014; Teece et al., 1997). Yet, the literature about DCs ignores other industry characteristics (Barreto, 2010), that have been identified to influence strategic decision making, which are munificence, heterogeneity and complexity (Aldrich, 1979; Aragón-Correa & Sharma, 2000; Dess & Beard, 1984). It is important to include these other dimensions, because the environment is not a mono-dimensional construct, which only contains dynamism. If the environment is conceived as dynamism alone, this might reconcile conflicting results. The aim of this paper is to fill this gap and enhance our understanding of drivers of DC by analyzing how different industry characteristics relate to the level of DC of firms.

In this study we focus specifically on the capability of a firm to identify the need and opportunity to change and we call this the DC identification and selection. This DC refers to the ability of a firm to identify and select information, which relates to the sensing and seizing DC as mentioned by Teece (2007). It reflects the extent to which the firm observes and is aware of the environment. An example of activities that a firm could undertake relating to identification are monitoring and scanning of firms, universities and other organizations in the region in which the firm is active. This gives the firm information about locally residing knowledge that could be valuable for the firm (Danneels, 2008). Hence, we expect that the formation of this DC and the level that we observe of this DC amongst firms will depend on industry characteristics.

These issues are examined empirically in three developing countries. Most research about DCs take place in developed countries and some studies have considered transition economies. However, studies about DCs in developing countries are missing. We examine how these different industry characteristics influence the level of DCs of small and medium size manufacturing firms in three developing countries. Previous research suggest that external factors are relatively more salient for firms

in developing countries compared to developed countries, because developing countries are more heterogeneous in their environmental settings (Makino, Isobe, & Chan, 2004). Hence, the variation in environmental characteristics makes developing countries an interesting case to study the relationship between the environment and DCs. We focus specifically on the East African region, studying Kenya, Tanzania and Uganda.

THEORETICAL BACKGROUND

Dynamic capabilities

Dynamic capabilities refer to the ability of a firm to 'purposefully create, extend or modify its resource base' (Helfat et al., 2007, p.4). It has been seen as an extension of the resource-based view. The resource-based view considers the firms existing resources as a components of a competitive advantage (Barney, 2001). The DC approach addresses the importance of changing the resource-base of a firm in order to stay competitive. The idea is that DCs give firms the ability to change and recreate its resource-base, which may give the firm a competitive advantage and greater success compared to its competitors (Teece, Pisano, & Shuen, 1997).

The dynamic capabilities approach originated in the work of Teece & Pisano (1994). In their work they proposed a framework in which a firm's competitive advantage was determined by managerial and organization processes, specific asset positions and paths available to a firm. Subsequently, several alternative approaches towards DCs developed to establish what DCs exactly are and to refine and expand the concept. This has led to two opposing views within the DC literature (Peteraf, Di Stefano, & Verona, 2013). One view, based on the work of (Teece & Pisano, 1994), argues that DCs are especially valuable in dynamic environment in which a firm has to adjust its resource base frequently to stay competitive. The main focus of this research is how firms can stay competitive in a rapidly changing market (Peteraf et al., 2013). The other view is based on the work of Eisenhardt & Martin (2000) arguing that DC 'become difficult to sustain in high-velocity markets' (p.1113), indicating that the 'sustainability of the capabilities

themselves varies with the dynamism of the market' (p.1113). Thus they argue that DCs are especially valuable in less dynamic environments. Our research fits within this debate, by analyzing how different environmental characteristics influence DCs.

Drivers of DCs

Previous studies suggest that the benefits of DCs depend on the environment in which the firm is active (Teece et al., 1997). For instance, Schilke (2014b) shows, using data from 279 firms, that DCs are more strongly associated with a competitive advantage in moderately dynamic environments. Karna et al. (2015) conducted a meta-analysis which indicated that DCs and performance have a stronger relationship in more dynamic environments.

However, the above described studies used DCs as an explanatory factor of performance, but it is still unclear in what kind of environments DCs will be developed (Barreto, 2010). Notwithstanding the moderating effect the environment may have on the relationship between DC and performance, the environment could as well be a driver of DCs. An environment may give an incentive, because the need to have DCs in some environments may be higher than in others. For instance, a volatile environment characterized by change gives a firm that is aware of this changing environment the need to reconfigure its resource base in order to stay competitive. Hence, environments in which strategic flexibility is necessary create a need for firms to develop. Previous studies posited that the environment moderates the relationship between DCs and performance. Notwithstanding the moderating effect of the environment on the relationship between DC and performance (Li & Liu, 2014b; Schilke, 2014a), we theorize and empirically test, that the environment is an antecedent of DCs as well and creates an incentive to develop DCs.

Hypotheses

Industry characteristics

The literature about environmental constructs identified four key dimensions which have been used to describe the environment in which the firm is active (Aldrich, 1979). The key constructs are munificence, dynamism, heterogeneity and competition (Boyd, 1990; Dess & Beard, 1984). The first construct refers to the capacity and support for growth of the environment. It relates to the abundance of resources, which influences the need for a firm to renew its resources base in order to stay competitive. The latter three relate to the uncertainty within the environment, which increases the need for a firm to be strategically flexible.

Munificence

Munificence is the extent to which the environment can support sustained growth (Starbuck, 1976). It refers to the resources within the environment that are available for an organization (Aldrich, 1979, p. 63). We expect that higher levels of munificence lead to lower levels of DCs of firms.

The general argument underpinning this expectation is that the need for strategic flexibility will probably vary with the levels of munificence. In a high munificent environment, enough resources will be available to support a firm's growth. Moreover, the resources will be available whenever the firm needs them (Sirmon, Hitt, & Ireland, 2007). This indicates that a firm does not have to undertake a lot of effort in order to use or find these resources, because it will be easier to identify and select information than in an environment in which resources are scarce and therefore more difficult to find. Furthermore, it creates an environment in which a firm might perform well, without having to adapt its resource base. Thus a firm could survive without having DCs (Helfat et al., 2007, p. 11). This indicates that the need to have DC identification and selection is lower in a munificent environment. Yet, a really munificent environment could give rise to slack resources within a firm, which could be used to build DCs (Sirmon, Hitt, & Ireland, 2007b). Moreover, it could as well be that in a very munificent environment, there are a lot of resources which could be identified en selected by firms, creating an incentive to develop the DC identification and selection to be better able to select these resources. Yet, we expect that in the context of

developing countries, there will not be such considerable a high level of munificence that creates an opportunity for firms to have a lot of slack resources. Thus, the argument that in a munificent environment the DC identification and selection will be lower, prevails.

In environments with lower munificence, it will be more critical to manage and purposefully recreate and efficiently use your resource base (Sirmon, Hitt, & Ireland, 2007) and change your strategy whenever necessary (McArthur & Nystrom, 1991). In such an environment it will be more difficult to survive, due to challenges that a firm faces. Te environment will not be as supportive for growth as a munificence environment. In addition, resources are more difficult to find and the scarcity of resources within the environment may provoke a need for a firm to expand into new markets (Keats & Hitt, 1988), This stimulates firms to develop the DC identification and selection, because it will help them to deal with the lower munificence within the environment. Moreover, in a low munificent environment, environmental selection will intensify. This will encourage firms to develop the DC identification and selection, giving them a higher chance to survive.

Therefore, we expect that the DC identification and selection will be higher in a less munificence environment, resulting in the following hypothesis:

H1: The higher the level of munificence within a firm's industry, the lower the level of DCs of that firm.

Environmental dynamism

Environmental dynamism refers to the volatility in the environment that a firm faces, which is indicated by the deviation from the trend growth in the industry (Dess & Beard, 1984). Dynamism consists of two dimensions, the quantum of change and the rate of change (Miles et al., 1974). The quantum of change refers to the magnitude of change within the environment: the bigger the magnitude of the change, the more uncertainty this generates for the organization (Bakker & Knoben, 2014; Koka et al., 2006). The rate of change refers to how frequent change occurs (Bakker & Knoben, 2014; Koka et al., 2006).

Although the quantum and rate of change are caused by different mechanisms, both aspects result in uncertainty due to the instability in the environment (Bakker & Knoben, 2014; Dess & Beard, 1984). It is this instability that creates an incentive for firms to develop DCs. In an environment characterized by volatility, firms have to respond to this dynamism in order to stay competitive (Aldrich, 1979;Zahra et al., 2006).

We expect that both dimensions of a dynamic environment reduces the potential value of the resource base and the firms competitive position (Drnevich & Kriauciunas, 2011; Li & Liu, 2014b; Wang & Ang, 2004). In such a dynamic environment, flexibility is key (Tallon, 2008) and DCs gives a firm flexibility to adjust its resource base in order to deal with the instability (Chmielewski & Paladino, 2007; Eisenhardt & Martin, 2000; Helfat et al., 2007; Winter, 2003). In an environment characterized by change and instability, firms should closely observe what happens within the environment in order to be able to respond adequately. In this reasoning it is implicitly assumed that a dynamic environment requires firms to respond by reconfiguring its resource base (Drnevich & Kriauciunas, 2011). However, it could be that dynamism does not require a firm to change its resource base, but to use its resource base more efficiently (Miller and Friesen, 1983; Helfat et al., 2007). Yet, if that is the case, DCs are also necessary in order to adjust the resource base to become more efficient. In a more stable environment, it is less useful to develop this DC, because if no changes occur it is easier to understand the environment and less necessary to monitor the environment closely. Moreover, DCs are probably too expensive to develop and could be even destructive considering the cost involved by building and using them (Li & Liu, 2014a; Schreyögg & Kliesch-Eberl, 2007). This indicates that this DC is more necessary in a dynamic environment.

Summarizing, dynamism creates a need for firms to develop DC identification and selection in order to be better able to deal with the instability within the market. Hence, we propose the following hypothesis:

H2: *The higher the level of dynamism within a firm's industry, the higher the level of DCs of that firm.*

Environmental complexity

Environmental complexity consists of two components: heterogeneity and concentration. Heterogeneity refers to the dissimilarity of inputs and outputs required by an industry (Boyd, 1990). Concentration refers to the density of firms within the same industry (Boyd, 1990). We expect that both elements influence the need to have DCs.

Heterogeneity

Heterogeneity results in complexity, because a more heterogeneous environment is characterized by dissimilarity of inputs and outputs used by a firm (Dess and Beard 1984). This dissimilarity of inputs and outputs raises uncertainty, because it is burdensome to obtain all relevant information for the firm. Such an environment creates an incentive for firms to develop the DC identification and selection. This DC will support firms in collecting relevant information, which reduces the uncertainty.

Furthermore, in a more dissimilar environment, there will be more sources that contain information relevant for the firm, due to the dissimilarity of inputs and outputs used by a firm. A heterogeneous environment consists of a more diverse pool of potential resources. This will drive the development of the DC identification and selection. , because in such an environment it makes sense to have such a DC. This will help the firm to identify and select resources valuable for the firm. A more diverse pool of resources creates a lower incentive to stay committed to your own resource base, because there are more resources that a firm could incorporate and use to adjust its resource base. Making it more valuable to develop the DC identification and selection.

Hence, we expect that:

H3: The higher the level of heterogeneity within a firm's industry, the higher the level of DCs of that firm.

Concentration

A second component of complexity is concentration (Dess & Beard, 1984), which refers to the degree in which resources are either evenly distributed or concentrated within the industry (Aldrich, 1979). It has been seen as the competition in the industry (Boyd, 1990).

Several studies indicate that there exists an inverted U-shaped relationship between concentration and uncertainty (Scherer, 1980). At very low levels of concentration (perfect competition) there are an infinite number of firms and all these firms have a small market share. This results in an environment that is easy to understand and where all firms are price takers, which results in less uncertainty (Scherer, 1980). The other end of the range of competition is an environment in which concentration is really high, resulting in an environment characterized as a monopoly in the most extreme case. In such an environment it is easy to understand the environment and know your competitors, which results in low uncertainty. At moderate levels of competition, uncertainty will be high, because there are numerous competitors which makes it more difficult to have all information, which creates uncertainty. However, most environments are not characterized by perfect competition or a monopoly. Therefore, we focus in our argumentation on concentration levels between moderate concentration to highly concentrated markets. Within this range, we expect that the lower the concentration, the higher the uncertainty, which creates a higher need to develop DCs.

The key argument is that lower concentration creates higher uncertainty, because it becomes increasingly difficult to understand the environment. It becomes more difficult to identify competitors and to determine how to deal with these competitors and create value for clients when competition increases (Sirmon et al., 2007). In such an industry, it is more ambiguous what kind of information is needed to maintain or develop a competitive advantage (Sirmon et al., 2007) and change the resource base

accordingly. Therefore it becomes more difficult to monitor the environment and select the information useful for the firm. Furthermore, it creates a market in which firms continuously seek for new opportunities in order to stay competitive, because there is more rivalry (Acs & Audretsch, 1988). The speed and accuracy of the adaptation of firms within such an industry is crucial (Adler et al. 1999). Finally, in a more competitive industry, there is even a higher chance of losing customers (Lusch & Laczniak, 1987; Wilden, Gudergan, Nielsen, & Lings, 2013), which makes it valuable to monitor customers. This provokes a need to develop the DC identification and selection in order to be flexible and deal with this uncertainty and rivalry and change the resource base accordingly (Auh & Menguc, 2005; Sirmon et al., 2010; Wilden et al., 2013).

Hence, we expect that in an environment with a higher level of competition, the DC identification and selection will be higher. This results in the following hypothesis:

H4: The higher the competition within a firm's industry, the higher the level of the DCs of that firm.

METHODOLOGY

To test the relationship between the different industry characteristics and the DC identification and selection, we used data of SMEs in the manufacturing sector in three developing countries, namely Kenya, Tanzania and Uganda. We focus on SMEs, because they are conducive for economic activity and innovation (Mulhern, 1995). Furthermore, especially SMEs are more sensitive to the environment (Barnett, 1997), because they have less resources to control the environment. We chose the manufacturing sector, because in particular in developing countries, manufacturing is an important sector. It has been a sine qua non of structural economic change and development ever since the Industrial revolution, yet in developing countries the manufacturing sector have been shrinking or stagnant (Bigsten & Söderbom, 2006).

Data

The quantitative data that we used to test our theoretical ideas stems from several sources, we used survey data collected by the World Bank and input-output tables taken from 'Global Trade Analysis Project' conducted by the Purdue University.

We used the Enterprise Surveys 2007 and 2013 and the Innovation Capabilities Survey 2015 conducted in Kenya, Tanzania and Uganda. The Enterprise Surveys have been developed by the World Bank to collect harmonized data among developing countries. Since 2002, the World Bank has conducted interviews with top managers and business owners of 130,000 firms in 135 economies. The goal of the survey is to get an overview of a broad range of topics, such as finance, corruption, infrastructure, crime, competition and performance. We used the Enterprise surveys of 2006/7 and 2013 to measure our independent variables, except for heterogeneity. To measure heterogeneity, we used input-output tables constructed by the 'Global Trade Analysis Project' conducted by the Purdue University, stemming from 2007.

We used the Innovation Capabilities Survey of the World Bank to measure our independent variable, the DC identification and selection. The aim of the Innovation Capabilities Survey of 2015 is to get a better understanding of the innovative activities and capabilities of manufacturing firms. The survey gives us unique data about capabilities in these three developing countries.

The World Bank uses stratified random sampling as sampling methodology. The strata for the Enterprise Survey have been based on firm size, business sector (manufacturing and services) and geographic region within a country.[2] The sample for the Innovation Capabilities Survey is a subsample of the Enterprise Survey sample and is drawn from manufacturing firms only. This increases the comparability of firms within our sample. In total 484 firms have been surveyed in our sample, 201 from Kenya, 136 from Tanzania and 147 located in Uganda. There is a two-year interval between the surveys.

[2] For more information about the methodology and sampling see www.enterprisesurveys.org.

Unfortunately, the dependent variable has only been measured in 2015, which makes it impossible to conduct a panel data analysis. The advantage is that our dependent variable has been measured two years after our independent variables. Moreover, we avoid potential problems due to common method bias, because we used separate sources of data for our dependent and independent variables (Podsakoff, MacKenzie, & Lee, 2003). The combination of different surveys and data sources gave us a unique dataset to test our ideas.

Dependent variables

Dynamic capability Identification & Selection We measured the dynamic capability Identification & Selection with responses to statements in which the establishment indicated how much they agreed with the statements. The response was measured with a 7-point-likert-scale, ranging from completely disagree to completely agree. Several different statements were used to measure the DC identification and selection. The items used to measure the DC are taken from previous studies. We used three items from Danneels' (2008) environmental scanning scale. We combined these items with two items related to selection. One item indicates if a firm monitors the needs of clients and costumers and one item about technology monitoring within the firm, based on Radas & Božić (2009). All the items together denotes the firm's ability to identify and select information that is valuable for the firm, because it indicates if a firm is aware of the knowledge/technologies that are relevant for the market and fits within the firm.

The exact statements are:

- This establishment has extensive contact with researchers at universities
- This establishment has an active network of contacts with the scientific and research community
- This establishment regularly reads specialized journals and magazines to keep abreast of market and technical trends
- This establishment regularly conducts a technological audit

- This establishment monitors the needs of its clients and customers

The average of the standardized scores of all these items together indicates the level of the DC identification and selection of a firm. The reliability of the scale is $\alpha = 0{,}71$ which conforms to the accepted level of at least 0.70 (Nunnally, 1978).

Independent variables

Data about the environment of SMEs in our sample were aggregated from the Enterprise Surveys of 2007 and 2013 and input-output tables and linked to the primary survey data about the DC. We aggregated the data to the industry level, related to the industries present in the Innovation Capabilities Survey. Unfortunately, we did not have data about the total industry, therefore we had to rely on the data available within the sample of the surveys and used this to get industry averages by aggregating the data to the industry level. The industries where matched with the industries mentioned in the Innovation Capabilities Survey of 2015.

Munificence Following Boyd (1990) we measured munificence as the coefficient resulting from regressing time against the industry sales divided by the mean value of the industry sales. We estimated the munificence for each industry in each country separately using the Enterprise Survey of 2007 and 2013. In both surveys, firms were asked to indicate their sales for the last fiscal year and three fiscal years ago. We aggregated this information to the industry level and estimated the growth in sales per industry between 2002 and 2013, using the four different points in time.

Dynamism was operationalized by the standard error of the regression slope divided by the mean value of sales (Bradley, Aldrich, Shepherd, & Wiklund, 2011; Dess & Beard, 1984), using the same data as munificence.

Heterogeneity is the extent to which industries require many different inputs and outputs (Dess & Beard, 1984). We used input-output tables constructed by the Global Trade Analysis Project based on 2007 for the three countries and distinguished between different industries, related to the industries as mentioned in the Innovation Capabilities Survey of 2015. Input heterogeneity was calculated by the Herfindahl index of the value of purchases of inputs of other industries by an industry. Output heterogeneity was determined by computing the Herfindahl index of the value of the industry sales to other industries. We calculated the final score of both measures by 1 minus the Herfindahl value. In order to have one measurement for heterogeneity, we took the average of both scores.

Concentration refers to the density of firms within the same environment (Boyd, 1990). We constructed a variable that indicates which amount of firms within an industry indicated that the number of competitors where to many to count. If a firm indicated that the number of competitors was too many to count, we coded it as one. We then computed the share of firms within the total industry that gave this answer and used it as our measurement for concentration.

Control variables In addition to the industry level variables, we controlled for the following firm level factors: firm age, firm size, foreign ownership, R&D and training.

Firm age The age of a firm has been indicated as a factor that influences the development of dynamic capabilities (Helfat & Peteraf, 2003). Moreover, older firms are less flexible (Hansen, 1992) and will therefore react differently on changes within the environment. Firm age was measured as the natural logarithm of the number of years that the firm exists, determined by asking for the establishment year of the company and subtracting this from the year in which the survey was performed.

Firm size may influence the development of DC and the way in which the firm deals with its environment. Larger firms have more resources to develop and change their routine and it may influence the need for external resources available within the environment (Barnett, 1997). We measured size as the natural logarithm of the total number of full time employees within the firm.

Foreign ownership We used a question about the percentage of the company that is owned by private foreign individuals, companies or organizations to construct two control variables. For any company that answered any value greater than 0% to the above question we coded the control variable 'foreign ownership' as '1' and '0' otherwise. We control for foreign ownership because firms in emerging economies often highly benefit from technological knowledge available from their international headquarter and research labs (Isobe et al., 2000), which gives them a better opportunity to develop DCs and deal with the external environment.

R&D gives the firm the capacity to generate and process knowledge and to absorb external knowledge (Cohen & Levinthal, 1989; Rothaermel & Hess, 2007). This influences the ability of a firm to develop DCs and the ability to deal with the environment. Therefore, we included a dummy variable, taken the value of '1' if the firm indicated to spend money on R&D in the last three years.

Training enhances learning and increases the general skills and abilities that employees have, which is pivotal for the development of DCs (Easterby-Smith & Prieto, 2008; Sirmon et al., 2007b; Zollo & Winter, 2002, Felin et al., 2012; Helfat & Winter, 2011) and the ability of the firm to deal with the environment. Therefore, we include a dummy variable based on the question: *"In the last fiscal year did your company offer formal training programs to your full-time permanent employees?"*. Companies that answered with yes were coded with '1' , all other companies with ' 0'.

Data analysis

We estimated OLS regression models with the DC identification & selection as dependent variables. Our independent variables could possibly suffer from correlation of errors within industries. Therefore, we accounted for clustered standard errors, when we ran the regressions. Our sample consists of three East African countries, although previous studies assumed that these countries can be lumped together, we used a Chow-test to see if the countries can be pooled. Surprisingly, the Chow-test indicated that the co-efficient of the considered variables differ significantly between the countries. This indicates that the

countries are not as similar as we expected. Therefore, we decided to show the results of the regressions for each country separately.

RESULTS

Every country has its own section, consisting of descriptive statistics, a correlation matrix and the estimated results of two models. For each country, we first estimated a base model (model 1), including the control variables only. In the second model, we added the direct effects of the industry level characteristics.

Kenya

In table 1 we report the descriptive statistics and correlations between the variables for Kenya. Most correlations are low to moderate. We tested for multicollinearity using VIF estimates after every regression and no high scores were found for Kenya.

Table 4 displays the results for the model with control variables and the full model. Model 1 presents the results of the model with only controls and serves as a baseline model. Model 2 includes all the independent variables and the model has a better fit compared to the baseline model and we will use this model for interpretation. The only significant control variable is R&D, which has a positive coefficient. Indicating that firms which conduct R&D have a higher level of DCs. The relationships that we found between the industry characteristics and the level of DCs of firms do not all support our expected hypotheses.

We expected a negative relationship between munificence and the level of DCs (hypothesis 1), however, the results in Kenya do not support this hypothesis. The coefficient of munificence is positive instead of negative, yet its effect is not significant. This indicates that firm in industries characterized by higher munificence do not have a higher level of DCs.

In hypotheses 2 we proposed a positive relationship between dynamism and DCs. This hypothesis is supported by our analysis for Kenya. Thus, firms in environments with a higher dynamism have a significantly higher level of DCs than firms based in an industry with lower levels of dynamism. The coefficient of 0,48 indicates that an increase of 1 standard deviation in dynamism, increases the level of DCs by 0,48 standard deviation, which is a rather substantial effect, compared to the standardized coefficients of the other variables.

We expected a positive relationship between heterogeneity and the level of DCs (hypothesis 3). However, this hypothesis is not supported by our analysis. The sign of the coefficient has the expected sign, but is insignificant.

According to hypothesis 4, the higher the level of competition within an industry, the higher the level of DCs, which indicates a positive relationship. We found support for this hypothesis, because the coefficient of this variable is positive and significant. Thus firms active in industries with more competition are indeed more inclined to have a higher level of DCs, indicating that a more competitive environment encourage firms to establish DCs.. The coefficient is rather large compared to the other standardized coefficient, indicating a substantial effect.

Tanzania

Table 2 reports the correlation matrix for Tanzania and most correlations are low to moderate. We tested for multicollinearity using VIF estimates and did not find indications of multicollinearity.

The baseline model (Model 1) consists of the control variables only (see table 4). If we include the environmental variables (model 2, see table 4), the fit of the model improves. Considering the control variables, only training and size have a significant effect. Yet training has a negative effect, while we expected a positive sign. Size has the expected positive effect. The hypothesized variables all have a significant effect, but not all coefficients have the expected sign.

Munificence has a positive and significant relationship with the DC identification and selection and the coefficient is rather large. This indicates that the larger the growth of sales is within the previous years within a particular industry, the higher the level of DCs of a firm within that industry. This is the opposite effect of what we proposed in our hypothesis, in which we expected that in a less munificent environment, a firm will tend to develop DCs, because it helps the firm to survive. This opposite result could indicate that munificence incentivizes firms to build DC due to the abundance of resources. In a less munificent environment, where resources are scarce, it could be more difficult to have the resources to build DC. Moreover, a more munificent environment could give the firm a certain faith and confidence about the future which give them the confidence to build DCs.

Surprisingly, dynamism has a significant negative relationship with the level DC of DCs of Tanzanian firms, which is not in line with what we hypothesized in hypothesis 2. We expected that dynamism would have a positive relationship with the DC, but it turns out to be the opposite in Tanzania. This could indicate that a firm is discouraged by dynamism to build DCs. The uncertainty related to dynamism could have a paralyzing effect on firms instead of motivating a firm to develop DCs.

Hypothesis 3 is supported by the results in Tanzania, a higher level of heterogeneity within an industry relates to a higher level of DCs within a firm in that particular industry.

In hypothesis 4 we proposed a positive relationship between competition and DCs and the results for Tanzania support this hypothesis. The coefficient of competition is 0,66, which is the largest standardized coefficient among all variables, indicating that a standard deviation increase in competition has the largest effect on the DC.

Uganda

The correlation matrix of Uganda (table 3) shows a very high correlation between munificence and dynamism and munificence has a VIF score of 10.11, indicating a problem of multicollinearity. In order to solve the problem of multicollinearity, we estimated two separate regressions, one with dynamism and

one with munificence. However, the results do not change, therefore we decided to include the model with both independent variables and discuss the full model in more detail (see table 4).

Model two has a better fit compared to a model with only control variables (model 1). The control variables are all insignificant, except for size, which has the expected positive effect. The coefficients of the environmental variables all have the expected signs and have a significant effect, except for dynamism. Munificence has negative significant effect, while heterogeneity and competition have a positive and significant effect. These results support our hypotheses. Heterogeneity has the largest coefficient, indicating that one standard deviation increase in heterogeneity results in almost one standard deviation increase in the DC identification and selection.

Comparison between countries

The effects of the environmental variables on DC differ amongst countries. The only variable that is consistent and significant in all three countries is competition, which indicates strong support for hypothesis 4. Munificence has the expected effect in Uganda, while in Tanzania it has a significant positive effect and in Kenya we did not find a significant effect.

Dynamism has opposing but significant effects in Kenya and Tanzania. In Kenya a more dynamic market results in a higher level of DCs, while in Tanzania the opposite holds, the more dynamic a market, the lower the level of DCs. In Uganda, we did not include dynamism due to multicollinearity.

In line with our expectations, heterogeneity has a positive and significant effect in Tanzania and Uganda, but no significant effect in Kenya.

The results indicate that the context of the country in which the firm is active influences the results of the industry variables on DCs. The East African region is thus not a homogeneous region which can easily pooled together considering the relationship between industry variables and the level of DCs. An explanation for these differences could be that the range of the independent variables differs between

the countries. A country with a different range could show a different relationship between the independent and dependent variable. The range of munificence and dynamism overlaps between the three countries. So, this does not give us an explanation for the different results between those countries. For heterogeneity, the range for Tanzania is the widest, while for Kenya and Tanzania we found a smaller range. Competition has a different range for every country, but the results are similar across countries. This indicates that for competition the range does not matter, at every part of the range of competition we find a similar result (see table 1,2 and 3).

DISCUSSION

This study establishes the importance of industry characteristics as drivers of DCs of firms in the East African region. More specifically, we proposed that environmental constructs influences the level of DCs of firms. We suggested that certain industry characteristics create a need to be strategically flexible, which drives the level of DCs of firms. We tested these hypotheses empirically and found strong support that industry characteristics indeed drives the level of DCs, but the relationship between industry characteristics and the level of DCs differs between countries.

This study clarifies the debate about drivers of DCs. Previous studies indicated that internal characteristics explain differences in levels of DCs of firms (Schilke, 2014b; Zahra et al., 2006; Zollo & Winter, 2002). Yet, dynamism has been considered as a moderating or driving force of DCs. Li & Lu (2014) already pointed out that dynamism is a driving force for the development of DCs. This studies contributes to the debate about the external driving forces of DCs by indicating that not only dynamism plays a role, but other environmental characteristics pushes DCs as well. Our focus was on the external factors driving DC, but we included internal characteristics as controls. Surprisingly, these were not as important as previous studies indicated. The environmental characteristics explained much more of the variation within the level of DCs than internal characteristics. This indicates that in these East African

countries, the external forces are extremely important as a driving factor for DCs compared to the traditional internal factors considered in previous studies.

Moreover, the results indicate that the way in which industry characteristics influence the level of DCs differs across different contexts. This suggests that within the environment, not only industry characteristics push the level of DC, but other context related factors influence the result. Several possible explanations could account for this interesting result. The history of the countries could account for differences. For instance, Tanzania has more socialistic roots compared to Kenya. This could explain why dynamism has opposing effects in these countries. In the socialistic society, companies could be more risk averse, which could affect the way in which firms perceive dynamism and how they will act upon it. While in Kenya, firms are more used to dynamism and are more prone to deal with this dynamism by building DCs.

Another explanation could point into the directions of policies. Different policies are at play, for instance regarding import and export taxes. This could influence they way in which firms react on their environment.

We look forward to future research that includes other characteristics of the environment, next to the industry characteristics that we accounted for. This could further explains how the context in which a firm is active influence the level of DCs of firms.

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Tabel 1

Descriptive statistics and bivariate correlations Kenya

		Mean	St.Dev	Min	Max	1	2	3	4	5	6	7	8	9	10
1	Zidsel	0,48	0,75	-2,07	2,88	1,00	0,07	0,04	-0,06	0,18	0,19	0,14	0,10	0,02	0,08
2	Lnsize	3,46	1,44	0,00	8,61	0,07	1,00	0,13	-0,35	0,32	0,31	-0,06	0,00	0,12	0,01
3	Lnage	3,21	0,69	1,39	4,69	0,04	0,13	1,00	0,08	0,16	0,14	0,03	0,07	-0,06	-0,09
4	Foreign	0,43	0,50	0,00	1,00	-0,06	-0,35	0,08	1,00	-0,12	-0,17	0,01	0,08	-0,20	-0,21
5	RD	0,40	0,49	0,00	1,00	0,18	0,32	0,16	-0,12	1,00	0,39	0,05	0,01	-0,10	0,00
6	Training	0,49	0,50	0,00	1,00	0,19	0,31	0,14	-0,17	0,39	1,00	-0,01	0,05	-0,08	-0,09
7	Munificence	0,09	0,06	-0,08	0,21	0,14	-0,06	0,03	0,01	0,05	-0,01	1,00	0,49	-0,32	0,05
8	Dynamism	0,52	0,20	0,14	1,14	0,10	0,00	0,07	0,08	0,01	0,05	0,49	1,00	-0,51	-0,59
9	Heterogeneity	0,71	0,07	0,64	0,87	0,02	0,12	-0,06	-0,20	-0,10	-0,08	-0,32	-0,51	1,00	0,60
10	Competition	0,25	0,06	0,15	0,38	0,08	0,01	-0,09	-0,21	0,00	-0,09	0,05	-0,59	0,60	1,00

Tabel 2

Descriptive statistics and bivariate correlations Tanzania

		Mean	St.Dev	Min	Max	1	2	3	4	5	6	7	8	9	10
1	Zidsel	-0,46	0,90	-2,47	2,66	1,00	0,38	0,14	-0,12	0,22	0,02	0,11	-0,13	0,00	0,06
2	Lnsize	2,86	1,51	0,00	8,01	0,38	1,00	0,27	-0,11	0,33	0,23	0,01	-0,21	0,11	-0,11
3	Lnage	2,83	0,55	1,39	4,59	0,14	0,27	1,00	0,00	0,21	0,19	0,12	0,02	-0,11	0,01
4	Foreign	0,43	0,50	0,00	1,00	-0,12	-0,11	0,00	1,00	-0,10	-0,20	0,10	-0,14	-0,17	0,01
5	RD	0,11	0,32	0,00	1,00	0,22	0,33	0,21	-0,10	1,00	0,25	0,04	-0,05	-0,01	0,12
6	Training	0,30	0,46	0,00	1,00	0,02	0,23	0,19	-0,20	0,25	1,00	0,08	0,01	-0,03	0,18
7	Munificence	0,06	0,06	-0,05	0,12	0,11	0,01	0,12	0,10	0,04	0,08	1,00	0,46	-0,76	0,43
8	Dynamism	1,40	0,84	0,34	2,34	-0,13	-0,21	0,02	-0,14	-0,05	0,01	0,46	1,00	-0,45	0,60
9	Heterogeneity	0,61	0,11	0,36	0,74	0,00	0,11	-0,11	-0,17	-0,01	-0,03	-0,76	-0,45	1,00	-0,70
10	Competition	0,46	0,12	0,20	0,64	0,06	-0,11	0,01	0,01	0,12	0,18	0,43	0,60	-0,70	1,00

Tabel 3

Descriptive statistics and bivariate correlations Uganda

		Mean	St.Dev	Min	Max	1	2	3	4	5	6	7	8	9	10
1	Zidsel	-0,12	1,11	-2,71	2,88	1,00	0,32	0,12	-0,10	0,29	0,12	-0,09	-0,08	0,14	-0,08
2	Lnsize	2,63	1,26	0,00	8,29	0,32	1,00	0,21	-0,20	0,26	0,25	-0,21	-0,14	-0,05	-0,01
3	Lnage	2,71	0,59	1,39	4,48	0,12	0,21	1,00	0,03	0,07	0,06	-0,04	-0,01	-0,07	-0,05
4	Foreign	0,20	0,40	0,00	1,00	-0,10	-0,20	0,03	1,00	-0,14	-0,07	-0,05	-0,08	-0,06	-0,06
5	RD	0,26	0,44	0,00	1,00	0,29	0,26	0,07	-0,14	1,00	0,29	0,01	0,01	0,16	-0,01
6	Training	0,31	0,46	0,00	1,00	0,12	0,25	0,06	-0,07	0,29	1,00	-0,11	-0,03	-0,20	0,01
7	Munificence	0,06	0,06	-0,02	0,14	-0,09	-0,21	-0,04	-0,05	0,01	-0,11	1,00	0,91	0,37	0,65
8	Dynamism	0,62	0,57	0,09	1,57	-0,08	-0,14	-0,01	-0,08	0,01	-0,03	0,91	1,00	0,19	0,76
9	Heterogeneity	0,78	0,04	0,68	0,87	0,14	-0,05	-0,07	-0,06	0,16	-0,20	0,37	0,19	1,00	-0,31
10	Competition	0,71	0,10	0,60	0,90	-0,08	-0,01	-0,05	-0,06	-0,01	0,01	0,65	0,76	-0,31	1,00

Tabel 4 Regression results

	Kenya				**Tanzania**				**Uganda**			
	Model 1		*Model 2*		*Model 1*		*Model 2*		*Model 1*		*Model 2*	
Control variables												
Lnsize	-0.016	(0.076)	-0.014	(0.074)	0.274	(0.083)	0.238***	(0.066)	0.315*	(0.137)	0.239*	(0.109)
Lnage	0.003	(0.065)	0.003	(0.067)	0.045	(0.082)	0.080	(0.101)	0.061	(0.064)	0.103	(0.055)
Foreignowned	-0.022	(0.049)	0.005	(0.057)	-0.071	(0.081)	-0.110	(0.085)	-0.033	(0.055)	-0.036	(0.063)
R&D	0.089**	(0.041)	0.089**	(0.041)	0.140	(0.095)	0.065	(0.111)	0.269**	(0.108)	0.206	(0.113)
Training	0.104	(0.063)	0.116	(0.068)	-0.097	(0.068)	-0.171**	(0.054)	-0.008	(0.218)	0.061	(0.211)
Independent variables												
Munificence			0.044	(0.060)			0.335***	(0.076)			-0.367*	(0.179)
Dynamism			0.481**	(0.189)			-0.224***	(0.053)			-0.024	(0.191)
Heterogeneity			0.078	(0.083)			0.313*	(0.139)			0.930**	(0.277)
Competition			0.415*	(0.195)			0.658*	(0.305)			0.605**	(0.238)
N	201		201		136		136		147		147	

a: Robust standard errors in parentheses

* p < .10

** p < .05

*** p < .01