MASTER THESIS

The relation between leadership, organisational structure and absorptive capacity

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Abstract

Recent research suggests that due to the fast-changing market, the absorptive capacity of an organization is constantly provoked. Changes outside an organisation provide new information which should be recognized, assimilated and applicated by an organisation. The absorptive capacity is inter alia linked to competitive advantage, innovation and business performance. Although much research is conducted on the effects of absorptive capacity, research on how to foster and stimulate absorptive capacity is scarce.

This study aims to narrow this scientific gap by examining the role of managerial and organisational antecedents on absorptive capacitu. In this study, transformational leadership, transactional leadership, centralization and formalization are regarded as potential antecedents. Also, the effects of centralization and formalization on the relation between the type of leadership and absorptive capacity is investigated. Based on data from 111 top management members from organisations which were using cloud computing systems, this study analysed how the absorptive capacity is affected. The results reveal that transformational leadership is positively related to the recognition of knowledge and that formalization is positively related to the assimilation of knowledge. Further, formalization negatively moderates the relationship between transactional leadership and assimilation of knowledge. Overall, this study's findings help managers to better understand the concept of absorptive capacity and how to stimulate absorptive capacity in an organisation.

Keywords: Absorptive capacity, transformational leadership, transactional leadership, centralization, formalization.

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1. Introduction

Due to institutional, technological and economic changes, organisations are nowadays constantly challenged to innovate and adapt to the environment. Changes outside the organisation provide new external information (Lavie, 2006) and in order to respond to these changes, organisations must *'' recognize the value of this new information, assimilate it and apply it to commercial ends''* (Cohen & Levinthal, 1990, p. 128). This capability is in the academic literature known as the absorptive capacity of an organisation (Cohen & Levinthal, 1990; Lavie 2006; Lewin, Massini & Peeters, 2010; Zahra & George, 2002). In the past twenty years, a body of research has accumulated on absorptive capacity (Lewin, Massini, & Peeters, 2011) and several studies have shown the positive effects of absorptive capacity on innovation (Tsai, 2001), organizational responsiveness (Liao, Welsch, & Stoica, 2003) and performance (Lane, Salk & Lyles, 2001). It is evident that absorptive capacity contributes to the innovative capabilities of a firm (Cohen & Levinthal, 1990), which in its turn is important to gain and retain competitive advantage (Hitt, 1998). In this light, it is for managers of huge importance to understand the concept of absorptive capacity and to improve this capacity.

Despite the rich literature on absorptive capacity, scholars and researchers largely ignored the managerial and organizational antecedents that could influence and improve the absorptive capacity of an organisation (Volberda, Foss & Lyles, 2010; Flatten et al., 2014). Volberda et al. (2010) suggest in their article that one of the managerial antecedents might be (the type of) leadership. Prior studies already provide evidence that type of leadership is closely linked with organisational learning and knowledge absorption of an organization (Vera & Crossan, 2004). Prior research also provides evidence that leadership is a crucial asset that could stimulate organisational change (Bass, 1985; Bryant, 2003) and dynamic capabilities such as the absorptive capacity of a firm (Teece, 2007; Sun & Anderson, 2011). From this view, the type of leadership might influence the absorptive capacity of the firm. Although some research suggests that there is a relationship between the type of leadership and the absorptive capacity of a firm, clear proof is missing because of limited empirical evidence (Flatten et al., 2014).

Next to the leadership style, leaders can also influence the absorptive capacity with their actions. Leaders can (re)shape the company by (de)centralization and (de)formalization. Prior research shows that a high degree of centralization and formalization may disable knowledge management (Lee & Choi, 2003) and thus may inhibit the absorptive capacity. Further, scholars argue that the effectiveness of leaders is partly affected by contextual influences such as the organisational structure (Walter & Bruch, 2010; Osborn, Hunt, & Jauch, 2002; Porter & McLaughlin, 2006). E.g. organisations with an organic structure perform better with transformational leadership while organisations with a mechanistic structure perform better with a transactional leadership (Kark & Van-Dijk, 2007; Pawar & Eastman, 1997). Thereby, the degree of centralization and formalization should be regarded as potential influencers of the absorptive capacity of a firm. In the literature, the influence of centralization and formalization on absorptive capacity and

on the relationship between the type of leadership and absorptive capacity is neglected (Volberda, Foss & Lyles, 2010; Flatten, Greve & Brettel, 2011).

1.1 Research question and variables

The aim of this study is to contribute to the discussion which antecedents influence the absorptive capacity of a firm. The purpose of this study is to investigate the relation between the type of leadership and the absorptive capacity. Another purpose is to investigate the relationship between centralization and formalization on absorptive capacity. Lastly, the influence of centralization and formalization on the relation between the type of leadership and the absorptive capacity is studied. The research question in this study is:

What is the relation between the type of leadership and the absorptive capacity of a firm and how does centralization and formalization influence this relation?

Burns (1978) and Bass (1985) distinguish two types of leadership; transformational leadership and transactional leadership. The difference between the two types lies in how leaders act and react on developments inside the company. Transformational leadership tends to inspire others through leading by example. Through this, the motivation and the engagement of employees could be increased (Bass, 1990). Transactional leadership is more oriented on the task and outcome. Transactional leaders emphasize the performance of the employees and organisation. A distinctive feature of transactional leadership is that it constantly evaluates the performance and rewards or punishes the employees based on the latter (Burns, 1978; Bass, 1990).

As mentioned before, it is expected that the leaders not only affect the absorptive capacity because of their behaviour but also through their actions. An example of two of such actions is changing the degree of centralization and formalization within the firm (Van den Bosch, Volberda, & Boer, 1999). These variables are added to this research. Centralization refers to the ‘’…*extent to which decision making is concentrated in an organization’’* (Jansen, Van Den Bosch, & Volberda, 2006, p. 1663). According to Argyris and Schon (1978), centralization influences the knowledge stream and knowledge transfer and according to Matusik and Heeley (2005), centralization affects the knowledge creation in a firm. The other organisational mechanism that might affect the absorptive capacity is formalization. In the literature, formalization is defined as the ‘’*degree to which rules, procedures, instructions, and communications are formalized or written down’’* (Jansen, Van Den Bosch, & Volberda, 2006, p. 1663). Jansen et al., (2006) concluded in their research that formalization has an effect on (exploratory and exploitative) innovation. Because it is proven that the absorptive capacity also influences innovation (Tsai, 2001), there might be a link between the degree of formalization and absorptive capacity.

1.2 Theoretical and practical relevance

In the existing literature, the concept of absorptive capacity is seen as a dynamic capability (Zahra & George, 2002; Lewin et al., 2011) that enables organisational change and innovation (Tsai, 2001; Lewin

et al 2011). In the past three decades, scholars have found a positive relationship between absorptive capacity and innovation capabilities (Brettel, Greve & Flatten, 2011), highlighting the importance of this concept for managers and management literature. Despite this importance, there is limited research available on how to foster and stimulate absorptive capacity (Flatten, Greve & Brettel, 2011). By understanding what variables influence the three dimensions of absorptive capacity, organisations can improve their absorptive capacity. The aim of this study is to contribute to existing research on how absorptive capacity is fostered in organisations. By studying the relationship between the type of leadership, centralization and formalization on the absorptive capacity, the purpose of this study is to reveal potential influencers of the absorptive capacity and thus the firm performance (Lane, Salk & Lyles, 2001). In practical sense, this research can provide valuable information for managers that want to improve the absorptive capacity of their firm. Absorptive capacity is a theoretical and abstract concept and is thereby not always easy to understand. Because of the complexity, fostering and stimulating the absorptive capacity of an organisation is also complicated. Therefore, this study aims to contribute on a better understanding of the concept of absorptive capacity for managers.

1.3 Outline

In the next chapter, the theoretical background is discussed and hypotheses are made on the basis of prior research. In chapter three, the method is presented and discussed. In chapter four the data is analysed and in the last chapter, the discussion and limitations are assessed.

2. Theoretical background

In this chapter, the main research variables are briefly explained. Further, prior literature is used to find potential relations between the research variables. Also, hypotheses are made based on prior literature.

2.1 Absorptive capacity

In 1990, Cohen and Levinthal introduced the concept of absorptive capacity. The absorptive capacity is defined as the ability '*to recognize the value of new information, assimilate it and apply it to commercial ends''* (Cohen & Levinthal, 1990, p. 128). Absorptive capacity is a straightforward process, where an organisation focuses on external knowledge and translates this knowledge into valuable data through organisational routines (Zahra & George, 2002; Rezaei-Zadeh & Darwish, 2016). Absorptive capacity is a dynamic capability (Zahra & George, 2002) that is required to develop other organisational capabilities (e.g. innovation) in order to achieve superior performance (Barney 1991; Garcia-Morales et al., 2008). Scholars investigated the role of absorptive capacity in knowledge-related context and found that absorptive capacity has a positive effect on innovation (Tsai, 2001), organisational learning and performance (Lane, Salk & Lyles, 2001) and organisational change and growth (Zott, 2003).

The concept consists of a three-dimensional construct; recognition (or identification) of new external knowledge, assimilation of this knowledge and application (or explication) of knowledge in firm-related context (Cohen & Levinthal, 1990; Lane, Koka & Pathak, 2006; Zahra & George, 2002). Recognition refers to '*'a firm's capability to identify and acquire externally generated knowledge that is critical to its operations''* (Zahra & George, 2002, p.189). Three attributes influence the recognition of knowledge; the intensity, speed and direction (Zahra & George, 2002). The first two attributes determine the quality of the identified and acquired knowledge and thus the quality of the capability (Kim, 1997). The greater the effort to recognize knowledge, the more likely the firm will build requisite knowledge (Zahra & George, 2002, p.189). The direction of the recognized knowledge has an influence on the path the firm will follow. Hence it is crucial to gain knowledge from different areas of expertise to preclude tunnel vision (Rocha, 1997; Zahra & George, 2002). The assimilation of knowledge addresses the firm's ''*routines and processes that allow it to analyse, process, interpret, and understand the information obtained from external sources''* (Zahra & George, 2002, p.189). It is important to understand that assimilation of knowledge needs prior knowledge; it is not possible to assimilate knowledge when it is not recognized before (Cohem & Levinthal, 1990). Further, assimilation is a complex task since external knowledge is often context specific which makes it more difficult to understand or replicate (Szulanski, 1996; Teece, 1981). The last dimension is the application (or exploitation) of external knowledge. Zahra & George (1990, p. 191) describe the application ability as an ''*organizational capability based on the routines that allow firms to refine, extend, and leverage existing competencies or to create new ones by incorporating acquired and transformed knowledge into its operations''*. This last dimension is not dependent on the external environment but on the knowledge transfer inside the organisation and on the structure of communication (Cohen & Levinthal, 1990, p. 133). During this last process, the knowledge

that already exists or is created is used to create new goods, systems, processes, knowledge or new organisational forms (Spender, 1996, Zahra & George, 2002).

2.2 Leadership

Leadership stands for the ability to lead individuals or groups (Bass, 1990). Leaders govern the group and enforce control (Bass, 1990; Halal, 1994) and the '*'leader's main job is to provide orders, delegate tasks, set expectations, provide guidance, set the rules and coordinate daily activities for the followers''* (Chin, 2015, p. 200). Leaders are key players in firms; prior research has shown that leadership behaviour affects organisational outcomes such as profit margins (Lieberson & O'Connor, 1972), organisation performance (Chandler, 1962) and return on equity (Day et al., 1991). Other scholars mention that leadership also has positive effects on innovation and change (García-Morales et al., 2008; Kanter, 1985). Ekvall & Arvonen (1984) found in their research that leadership also affects the organisational climate. The organisational climate is defined as how the employees perceive the organisation, work tasks and workplace and this climate influences among other the productivity and the employee behaviour (Ivancevich et al., 1990). The organisational climate also influences the knowledge management of an organisation (Chen & Huang, 2007). Combining prior research gives the impression that leaders play a key role in knowledge management and thus probably the absorptive capacity through the organisational climate.

2.2.1. Transformational leadership

Burns (1978) and Bass (1985) distinguish two types of leadership: transformational and transactional leadership. Transformational leadership occurs when leaders transform attitudes, values and aspirations of subordinates (Flatten et al., 2014; MacKenzie, Podsakoff & Rich, 2001). Through inspiration and transformation, leaders motivate and stimulate the subordinates to put great effort in the company (Bass & Riggio, 2006; Avolio, Bass & Jung, 1999; Vera & Crossan, 2004). Next to this, transformational leaders '*'help followers' need by empowering them through aligning the objectives and goals of the individual followers, the leader, the group, and the larger organization''* (Bass & Riggio, 2006, p.3). Prior research provides evidence that through transformational leadership subordinates exceed expected performance, are more satisfied about their job and show more commitment to the organisation (Bass, 1985; Bass & Riggio, 2006).

Bass and Avolio (1997) identify four components of transformational leadership that distinguish transformational leaders from transactional leaders. The four components are 'Idealized Influence' (II), 'Inspirational Motivation' (IM), 'Intellectual Stimulation' (IS) and 'Individualized Consideration' (IC). Transformational leaders (II) serve as role models whereby the followers '*admire, respect and trust'* them (Bass & Riggio, 2006, p.6). The idealized influence is *''embodied in both the leader's behaviour and the attributions'' (p.6).* Second, transformational leaders (IM) motivate and inspire people around them by '*'providing meaning and challenge to their followers' work'* (p.6)*'*. Leaders are charismatic (Burns, 1978, Bass 1985), show enthusiasm and optimism and *involve the followers in envisioning*

attractive future states (Bass & Riggio, 2006, p.6). Third, transformational leaders (IS) stimulate others to '*'be innovative and creative by questioning assumptions, reframing problems and approaching old situations in new ways''* (p.7). By creating the right atmosphere, followers are encouraged to think differently and look at problems from many diverse angles. Followers are not criticised for individual mistakes or ideas that differ from the leaders' idea (Bass & Riggio, 2006). Finally, transformational leaders focus on all the followers (IC). By acting as a coach, ''*leaders pay attention to the need for achievement and grow''* (p.7). Leaders accept the individual differences of followers and through personalised interaction, leaders lead followers to '*'successively higher levels of potential''* (p.7).

To achieve a higher level of absorptive capacity, it is crucial for leaders to focus on all three elements of the concept; knowledge recognition, assimilating and application. Transformational leaders succeed in doing so because of their empowering effect (Conger, 1999). By stimulating others to *be innovative and creative by questioning assumptions* (Bass & Riggio, 2006, p. 7), the effort in recognizing knowledge increases. This results in a higher likelihood that a firm collects the requisite knowledge (Zahra & George, 2002). Another characteristic of transformational leadership is *involving followers in envision attractive future states* (p.6). This is also beneficial for the recognition of knowledge because by involving employees, the likelihood of tunnel vision will be decreased (Zahra & Georige, 2002). Based on the information above, the assumption can be made that transformational leadership leads to a higher level of recognition. Second, transformational leaders also stimulate employees to ''*reframe problems and approach old situations in new ways''* (Bass & Riggio, 2006, p. 7), which encourages employees to ''*understand the information obtained from external sources''* (Zahra & George, 2002, p.189) in their own way. Employees that work under a transformational leader are thus not restricted to the traditional assimilation way, but are more free and open in understanding and assimilating new knowledge. Concluding, the expectation is that transformational leadership behaviour results in a higher level of assimilation. Finally, transformational leadership also increases the level of knowledge application by not criticising individuals for mistakes or ideas that differ from the leaders' idea (Bass & Riggio, 2006). Because of this, followers are more free in the way they exploit knowledge. Further, transformational leaders ''*act as a coach''* when needed (p.7). This is necessary when the employees keep failing to apply the knowledge. Based on the arguments above, it is expected that transformational leadership increases the level of all three dimensions of absorptive capacity and thus has a positive relationship with the concept.

Hypothesis H1 (a, b, c): Transformational leadership has a positive effect on the recognition ability (a), assimilation ability (b) and application ability (c) of the firm

2.2.2. Transactional leadership

''Transactional leaders are those who lead through social exchange between leaders and subordinates'' (Bass & Riggio, 2006, p. 3). This type of leadership is based on the ''*formulation of goals and consequences in case of (non-)fulfilment of the goals''* (Flatten et al., 2014, p.16). The consequences are

a reward when a subordinate delivers good work and a punishment when delivering unsatisfactory work (MacKenzie et al., 2001; Avolio et al., 1999). Partly because of the consequences, subordinates are motivated to perform. Transactional leadership also means that subordinates ‘’*agree, accept or comply with the leader in exchange for praise, rewards, and resources or the avoidance of disciplinary action’’* (Bass, Avolio, Jung & Berson, 2003, p. 208). In transactional leadership, standards for compliance are specified. Transactional leadership is also associated with monitoring mistakes and errors and corrective response when mistakes or errors occur (Bass, Avolio, Jung & Berson, 2003).

Three types of transactional leadership are known and that are: contingent reward, active management by exception and passive management by exception (Howell & Avolio, 1993). Contingent reward refers to the degree to ‘’*which the leader sets up constructive transactions or exchanges with followers’’* (Judge & Piccolo, 2004, p. 755). Management by exception refers to how leaders manage undesired situations. Active managers ‘’*monitor follower behaviour, anticipate problems and take corrective actions before the behaviour creates serious difficulties’’* (p.755). Passive managers operate with the mindset that *‘’if it is not broken, don’t fix it’’* (Schruijer & Vansina, 1999, p. 21). This way, passive leaders act after the problem has occurred.

For the first two stages of absorptive capacity, recognition and assimilation of external knowledge, flexibility in procedures is required (Bass & Avolio, 1993). In those two stages, flexibility provides a higher likelihood of collecting diverse knowledge and understanding this knowledge in different ways (Zahra & George, 2002) and thus is very important for proper recognition and assimilation of knowledge. However, transactional leaders are known for the inflexible mindset and procedures, which might inhibit the innovative behaviour of the firm (Rank et al., 2009; Flatten et al., 2014). Transactional leaders want the employees to stick with their original tasks (Bass, 1990) and do not (per se) encourage employees to be innovative and creative (Pieterse et al., 2010). This suggests that transactional leadership inhibits the recognition and assimilation ability. The third stage of absorptive capacity, application of external knowledge, is also crucial for absorptive capacity. Zahra & George (2002) highlight the importance of not criticising mistakes by employees in this stage. But, the focus of transactional leaders lies on the fulfilment of goals (Flatten et al., 2014) and unsatisfactory work (or mistakes) will be punished/criticized (MacKenzie et al., 2001; Avolio et al., 1999). Because of this, transactional leadership is perceived as controlling and demotivating by the employees (Pieterse et al., 2010). This might result in a higher level of employees’ resistance to apply the externally obtained knowledge (Bass & Riggio, 2006) and a higher level of work alienation (Sarros et al., 2002). Combining the concept of transactional leadership and absorptive capacity gives the impression that there is a negative relationship between the two concepts. Hence, the following hypotheses are formulated:

Hypothesis H2 (a, b, c): Transactional leadership has a negative effect on the recognition ability (a), assimilation ability (b) and application ability (c) of the firm.

2.3 Organisational structure

The effectiveness of leadership partly depends on the contextual factors of the firm (Pawar & Eastman, 1997; Katz & Kahn, 1978). Examples of contextual factors are the tasks of employees, the structure of the organisation and the organisational climate (Bass, 1985). Contextual factors influence among other the operating process and thereby the leadership's effectiveness (Fiedler, 1996). The structure of a company is a significant contextual factor since it can predict and determine the behaviour of individuals (Ambrose & Schminke, 2003) in such a way that is *'also determines what type of leadership will be accepted or rejected*' (Kim & Shin, 2017). Two constructs that change the organisational structure are the degree of centralization and formalization.

2.3.1. Centralization

Centralization is in the academic literature defined as *the concentration of decision-making authority and power in the hand of the top levels of management* (Damanpour, 1991; Pfeffer, 1981; Corwin 1975; Linstead et al., 2009). Decentralization refers to the opposite of centralization, where the decision-making authority is dispersed through the whole organisation. The effects of centralization and decentralization have been discussed through the years by many scholars (Child, 1972; Mintzberg, 1979). According to Weber (1947), centralization leads to higher efficiency in the workplace and more specialisation. Baum & Wally (2003) found out that centralization is positively linked with the speed of decision making. Other advantages of centralization are greater overall control and the benefits of economies of scale (Linstead et al., 2009). On the other hand, several scholars have discovered that decentralization is positively related to innovation and knowledge management (Damanpour, 1991; Jansen et al., 2006). Decentralization is also linked to an increase of the motivation, loyalty and creativity of employees (Sims, 1996). Further, decentralization brings a greater organisational responsiveness to environmental change (Mullins, 1985; Linstead et al., 2009). A great organisation responsiveness is crucial, since the better the responsiveness of a firm, the better the absorptive capacity (Liao, Welsch & Stoica, 2003; Daghfous, 2004). Finally, decentralization enables more information flow inside a firm which results in employees sharing more (external) information throughout the firm (Sheremata, 2000).

Considering prior research, it is expected that centralization is negatively linked with absorptive capacity. As mentioned before, absorptive capacity consists of three dimensions; recognition, assimilation and application (Cohen & Levinthal, 1990). Due to a centralised organisation structure, employees are kept away from decision-making and this decreases the commitment of employees. As a result, less knowledge is recognized from outside the organisation (Baum & Wally, 2003). Further, centralization also inhibits the need of sharing new ideas (Sheremata, 2000; Lee & Choi, 2003). A centralized structure also leads to fewer communication channels (Baum & Wally, 2003), which results in distortion and discontinuousness of ideas (Lee & Choi, 2003). This is detrimental to the assimilation and application of external knowledge. These findings result in the following hypotheses:

Hypothesis H3(a, b, c): Centralization has a negative relationship on the recognition ability (a), assimilation ability (b) and application ability (c) of the firm

Centralization combined with transformational leadership

In highly centralised organisations, resources and information are centred at the management, which means that only the management makes important decisions (Child, 1973). Due to centralization, subordinates have less to say and are kept away from important decision making. As a result, subordinates *remain preoccupied with implementing operational directives* (Walter & Bruch, 2010, p.768; Pawar & Eastman, 1997) from the management which decreases the ability of subordinates to articulate and identify with the vision of the leader (Walter & Bruch 2010; Howell, 1997; Pawar & Eastman, 1997). Another effect of centralization is the reduction of the autonomy and discretion which results in increased demotivation, powerlessness and negative attitudes (Sarros et al., 2002, Schminke et al., 2002). Due to this, the commitment of subordinates will decrease and they will be less passionate about their work (Kim & Shin, 2017) causing an inhibiting effect on the awareness of employees (Tannenbaum & Dupuree-Bruno, 1994; Wally & Baum, 1994). Ultimately, the centralised structure of an organisation will make the employees experience a ''*cognitive dissonance*'' (Walter & Burch, 2010) which negatively affects the empowering process. Because of the tempered empowering effect due to centralization, it is expected that transformational leadership is less effective when combined with a high degree of centralization and thus decreases the absorptive capacity. Hence, the following hypotheses:

Hypothesis H3(d, e, f): Centralization has a negative effect on the relationship between transformational leadership and the three dimensions of absorptive capacity, causing a lower recognition ability (d), assimilation ability (e) and application ability (f).

Centralization combined with transactional leadership

Centralization limits the employees' freedom to deviate from the leaders' idea (Baum & Wally, 2003). This is because by centralization, the access to additional resources, important information and key people are limited (Bass & Riggio, 2006). More centralization also leads to work alienation which is counterproductive for the subordinates and thus the effectiveness of the leader (Sarros et al., 2002). Work alienation leads namely to increased organisational rigidity and inefficiency. This way, subordinates experience less job satisfaction and less commitment (Cummings and Manring, 1977; Kakabadse, 1986; Sarros et al., 2002). As stated, a decrease of commitment will cause an inhibiting effect on the awareness of employees (Tannenbaum & Dupuree-Bruno, 1994; Wally & Baum, 1994). This is detrimental for the recognition of new external knowledge. That's why it is expected that centralization will negatively affect the relationship between the transactional leadership and the absorptive capacity. On the other hand, a transactional leader that operates with a high degree of centralization could have a positive effect on absorptive capacity. While transformational leaders emphasise on creating a vision, transactional leaders prioritise on attaining formulated goals (Bass,

1985). Transactional leaders focus on the fulfilment of goals by formulating the role and task requirements of subordinates and providing rewards if subordinates attain the goals (Bass, 1985). By centralising the organisation, subordinates '*remain preoccupied with implementing operational directives'* (Walter & Bruch, 2010, p.768; Pawar & Eastman, 1997). This way, subordinates will further focus solely on their job and attain their goals (Mintzberg, 1979, Pawar & Eastman, 1997). Since both assimilation and application only stresses the existing organisational routines and processes (Zahra & George, 2002), centralization combined with transactional leadership should stimulate these two abilities. In this sense, centralization facilitates the attainment of goals and thus the effectiveness of transactional leadership and thus should increase the assimilation and application of new knowledge. Combining these findings makes the assumption that centralization has a negative effect on the recognition ability but a positive effect on the assimilation and application ability. Hence the following hypotheses:

Hypothesis H3g: Centralization has a negative effect on the relationship between transactional leadership and the recognition ability of a firm, causing a lower recognition ability.

Hypotheses H3(h, i): Centralization has a positive effect on the relationship between transactional leadership and the assimilation ability and application ability causing a higher assimilation ability (h) and a higher application ability (i).

2.3.2. Formalization

Formalization is in the literature referred as "*the degree of the use of rules or procedures of an organisation directing behaviours of employees*" (King & Sabherwal, 1992). An increase of the formalization degree in an organisation results in more predictability and controllability of the behaviour of employees (Jägers & Jansen, 1991). Another advantage of formalization is that it helps to avoid chaos, inconsistency and duplicated efforts (Adler, 1999). But it also results in less flexibility and less creativity since employees are restricted to the rules and procedures of an organisation (Aiken & Hage, 1969; Burton, Obel & DeSanctis, 2011). Flexibility and creativity are required for the creation of new knowledge (Lee & Choi, 2003; Ichijo, Krogh, & Nonaka, 1998). Furthermore, formalization inhibits the openness of employees, which is crucial for the creation of new ideas and behaviours (Pierce & Delbecq, 1977; Damanpour, 1991). Lastly, flexibility decreases the capacity of employees to react fast after environmental changes (Hurley & Hult, 1998).

Regarding prior research, it is likely that formalization has a negative relationship with the recognition ability of a firm. Employees in highly formalized organisations are less likely to deviate from the established behaviour of the company (Weick, 1979). This way, the formalization acts as a frame that inhibits the attention towards the external environment (Jansen, Van den Bosch & Volberda, 2005; Weick, 1979) and because of this, less diverse external knowledge could be recognized. Here the assumption can be made that formalization inhibits the first stage of absorptive capacity. But according

to Lyles & Schwenk, (1992), formalization enables the retrieval of knowledge that is already inside the firm. Other scholars support the finding that formalization might stimulate the assimilation and application of external knowledge (Jansen et al., 2006). Formalization codifies the best practices and makes the assimilation of knowledge easier and the application ability more efficient (Galunic & Rodan, 1998; Lin & Germain, 2003). In other words, based on prior research, the first stage of absorptive capacity is inhibited by formalization and the second and third stage are stimulated. Hence, the following hypotheses;

Hypothesis H4(a, b, c): Formalization has a negative relationship with recognition ability of a firm (a) and a positive relationship with the assimilation (b) and the application ability (c) of the firm.

Formalization combined with transformational leadership

Formalization is a construct that can change the organisational structure (Kim & Shin, 2017). Pawar and Eastman (1997) suggest that formalization tempers the effect of transformational leadership because of the bureaucratic structure. A bureaucratic structure is detrimental to the innovation ability of the company (Damanpour, 1996; Hage & Aiken, 1967; Aiken, Bacharach & French, 1980) because formalization provides subordinates a restricted frame where they in operate. This lowers the flexibility and creativity (Burton, Obel, & DeSanctis, 2011) that is required for knowledge recognition. Hereby, the positive relationship between transformational leadership might be weakened by formalization resulting in a lower level of knowledge recognition (Bass & Riggio, 2006). On the other hand, other scholars argue that formalized structures bring more legitimacy which enhances the receptivity of subordinates (Mumford et al., 2008; Walter & Brunch, 2010). The increased receptivity will result in increased commitment (Walter & Brunch, 2010) and thus in leadership effectiveness (Kim & Shin, 2017). Further, formalization will clarify work procedures and decrease ambiguous work situations (Pawer & Eastman, 1997). Clear work procedures on its turn stimulate the assimilation and application of knowledge (Galunic & Rodan, 1998). Concluding, prior research shows mixed and contradicting theories regarding the effect of formalization on the relation between the type of leadership and absorptive capacity. Combining the contradicting theories, the assumption can be made that transformational leadership combined with a high level of formalization could be perceived as a bureaucratic structure by the employees and therefore be counterproductive (Thompson, 1965) and thus have a negative effect on the recognition ability. On the other hand, a high level of formalization could reduce ambiguity (Organ & Greene, 1981; Kahn et al., 1964), bring more legitimacy (Mumford et al., 2008) and further increase the effectiveness of a transformational leadership resulting in a higher assimilation and application ability.

Hypothesis H4d: Formalization has a negative effect on the relationship between transformational leadership and the recognition ability of a firm, causing a lower recognition ability.

Hypothesis H4(e, f): Formalization has a positive effect on the relationship between transformational leadership and the assimilation ability and application ability of a firm, causing a higher assimilation ability (e) and application ability (f)

Formalization combined with transactional leadership

Transactional leaders behave in such way to foster among other the '*consistency, predictability, stability and efficiency [of individuals]'* (Burns, 1978, p. 295). To foster this, transactional leadership is based on the *formulation of goals and consequences in case of (non-)fulfilment of the goals* (Flatten et al., 2014, p.16). Prior research shows that formalization affects the behaviour of employees. An increase of the level of formalization increases the predictability, controllability (Jägers & Jansen, 1991) and consistency of the behaviour of employees (Adler, 1999). Combining these two findings brings the assumption that transactional leaders pursue a high level of formalization. This, because formalization stimulates in several ways the fulfilment of the goals. On the contrary, formalization enhances transactional leadership (Bass & Riggio, 2006; Howell et al., 1993). By explicitly formulating goals, rules and procedures, ambiguity will be reduced and chaos will be avoided (Adler, 1999). This results in a higher level of efficiency. Because of this, the legitimacy and effectiveness of the transactional leader increases. As argued in the beginning of this chapter, it is expected that transactional leadership has a negative relationship with absorptive capacity. An increase in the effectiveness of transactional leadership means thus a lower absorptive capacity. Based on the arguments above, assumptions are made that formalization strengthens the negative relationship between transactional leadership and the three elements of absorptive capacity, ultimately leading to a lower level of all three aspects of absorptive capacity. Hence, the following hypotheses:

Hypothesis H4 (g, h, i): Formalization strengthens the relationship between transactional leadership and the three dimensions of absorptive capacity, causing a lower recognition ability (g), a lower assimilation ability (h) and a lower application ability (i).

2.4 Conceptual model

In figure 1 the conceptual model is shown. The conceptual model summarises the theoretical background and shows the relations between the research variables.

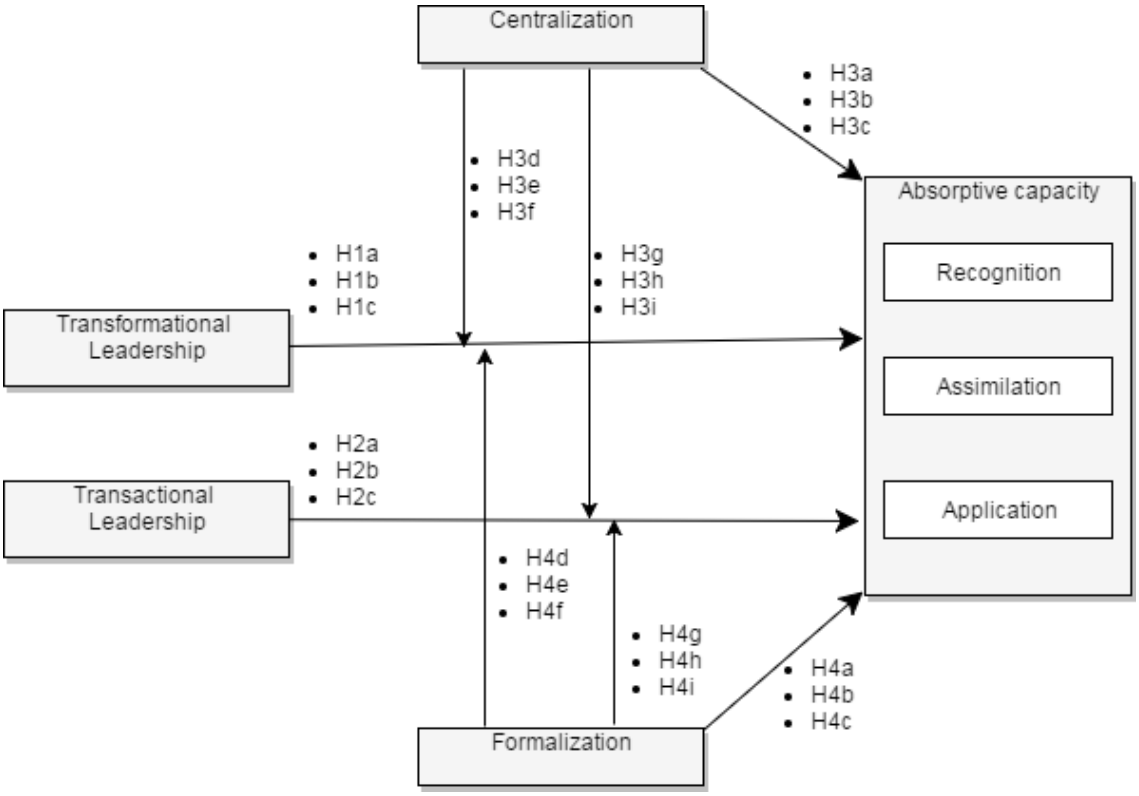

Figure 1

3. Method

3.1 Data acquisition

For this study, members of the top management team (TMT) are targeted as potential participants. The reason for this is that the TMT members are responsible for and are concerned with the strategic direction of the organisation (Thomson, 1967; Jones & Canella, 2011). To make proper decisions, TMT members make sure they are sufficiently knowledgeable. They achieve this by always aiming to be well informed about relevant changes in the environment but also changes in the organisation practices, processes and structures (Hambrick, 2007). Next to the arguments above, targeting TMT members is important because according to the upper echelon theory, organisational outcomes are partially influenced by the leadership style of TMT members (Hambrick & Mason, 1984; Hambrick 2007; Carpenter et al., 2004). Further, TMT has an important role as internal change agents. TMT members are crucial in driving, advocating and pursuing changes in the organisation practices, processes and structures (Birkinshaw, Hamel, & Mol, 2008). Concluding, TMT members are suitable observation objects for this study because of their knowledge level and company role.

The companies that are targeted are all interested in cloud computing and cloud-based solutions. Cloud computing can be defined as '*'a new style of computing in which dynamically scalable and often virtualized resources are provided as services over the Internet''* (Fuhrt & Escalante, 2011, p.3). Users of cloud computing have access to the cloud through a variety of devices, which increases the accessibility and use easiness (Jamsa, 2012). Other great advantages of cloud computing are cost savings, high availability and easy scalability. Because of those advantages, cloud computing is considered as a significant and disruptive technology trend that will reshape the IT-sector (Dikaiaikos et al., 2009; Fuhrt & Escalante, 2011). Cloud computing is thus a technological change that challenges organisations to innovate and adapt. These changes provide new external knowledge (Lavie, 2006) which should be recognized, assimilated and applied by companies (Cohen & Levinthal, 1990). In other words, cloud computing invokes the absorptive capacity of organisations. In the survey, organisations were questioned about their recognition, assimilation and application of external knowledge. Also, the respondents were asked about the centralization and formalization degree of the firm they are currently active in.

3.2 Sample

The data sample for this study already existed and was collected through a filtered search on a Cloud computing group on LinkedIn, the population were gathered to fill in the survey. The filters were the company size, company industry and the level of seniority. In this thesis, the focus lies on small and medium enterprises (SME) companies. Big companies are more unwilling to participate because of the many survey requests they get. Next to that, in small companies, leaders are more likely to have interactions with all employees whereby leaders are more well informed. The companies are divided into three groups, small (1-10 employees), medium (11-50 employees) and large (51-200 employees).

The company industry filter is meant for filtering industries where Cloud Computing solutions are irrelevant. The seniority level filter is meant to be sure that TMT members are contacted. The companies were contacted through a direct message on LinkedIn. If the company did not respond, a reminder was sent after two weeks. In total 1194 survey requests were sent to potential participants of which a total of 201 companies accepted the request. After deleting the incomplete questionnaires because of too many missing values, a total of 111 respondents remained. In other words, the response rate for this measurement sample is 55.2%. The survey provided a well-defined sample. From all the responding companies, 47.7% were from the United States, 13,5% are from the United Kingdom, 9% are from India, 9% from the Netherlands and 20,7% were from other countries. Further, the average company age was 16 years (S.D. = 20.94) and most of the companies are small sized (43,2%), followed by medium sized (28,8%) and large sized (27,9%).

To test for the bias of varying results between early and late respondents, a T-Test was conducted. The dataset was divided into two groups based on the response date and the groups were compared in terms of model variables (Appendix B). The comparisons provided no significant differences ($p > 0.05$). To reduce the risk of common method bias, a pilot test was undertaken by fellow students and Cloud Computing experts. This way, the questions were kept clear and the questionnaire was kept concise with the purpose of ensuring the quality of the survey.

3.3 Research ethics

Following the APA Ethics code, all data was collected and treated with care. The respondents were informed about the purpose of this study and were also ensured that the data was only used for research purposes. In other words, the data will not be shared with other parties and this way respondents were ensured confidentiality. Further, the participation was voluntary and as an exchange, the respondents were offered the results. Overall, this research met the standards of research ethics.

3.4 Measures and validation of constructs

All the items for the dependent and independent variables are (adopted) measures from prior literature. Further, all the items were measured by using a five-point Likert-type scale where 1 stands for 'strongly disagree' and 5 for 'strongly agree'. An exception is made for the control variables. Also, all the constructs consist of three items, which is necessary and recommended (Hancock & Mueller, 2001). In appendix A, the items can be found. In order to create composite indices for all variables, the items are averaged per variable.

3.4.1. Dependent variables

Absorptive capacity

To measure the absorptive capacity, the scale of Schleimer and Pedersen (2013) is adopted and used. Schleimer and Pedersen generated a scale to investigate how absorptive capacity can be fostered. The generated scale is based on prior research from inter alia Cohen & Levinthal (1990), Lane et al. (2006),

Lichtenthaler (2009) and Volberda et al. (2010). The study of Schleimer and Pedersen regards a new marketing strategy as a change, which invokes the absorptive capacity, while in this study the upcoming trend of Cloud Computing is regarded as the change. Because of this, the original scale and questions of Schleimer and Pedersen (2013) are modified with the aim to increase the fit for this study.

Following Cohen & Levinthal (1990) and Schleimer and Pedersen (2013), in this study absorptive capacity is divided into three dimensions which are: recognition, assimilation and application of knowledge. Recognition of knowledge refers in this study to respondents recognized the benefits, importance and the potential of Cloud computing. The assimilation of knowledge refers whether respondents understood the key components of Cloud computing, how Cloud computing should be fitted in their organisations and how the Cloud solutions should be adopted. The application of knowledge refers whether the respondents know how to adjust, monitor and fine-tune the cloud system for a successful operation. All three dimensions are measured with three items (Appendix A).

3.4.2. Moderating and independent variables

Centralization

Centralization is in this study a way to control the structure of an organisation. As mentioned before, centralization is defined as the concentration of decision-making authority and power in the hand of the top levels of management (Damanpour, 1991; Pfeffer, 1981; Corwin 1975; Linstead et al., 2009). For this study, the operationalisation of centralization in the article of Hage & Aiken (1967) and the measure of the article of Jansen et al. (2006) are used. Jansen et al. (2006) investigated inter alia the effect of centralization on exploratory and exploitative innovation. The items are adapted to fit in this study (Appendix A).

Formalization

Another way to exert control over the structure of an organisation is by changing the level of formalization. Formalization stands for "*the degree of the use of rules or procedures of an organization directing behaviours of employees*" (King and Sabherwal, 1992). For the operationalization of the construct formalization, the article of Hall et al. (1967) is used. For the measure of formalization, the article of Jansen et al. (2006) is used. Jansen et al. (2006) also investigated the effect of formalization on exploratory and exploitative innovation. To fit the items of Jansen et al. (2006) in this study, the items are adapted (Appendix A).

Leadership

As Burns (1978) and Bass (1985) distinguish, there are two types of leadership; transformational and transactional. Transformational leadership refers to leaders that transform attitudes, values and aspirations of subordinates (MacKenzie, Podsakoff & Rich, 2001). Transactional leaders refer to *those who lead through social exchange between leaders and subordinates* (Bass & Riggio, 2006, p. 3). To measure the type of leadership, the article of MacKenzie, Podsakoff & Rich (2001) is used. In their

article, the vision of the leader, the supportive behaviour and the intellectual stimulation are considered as indicators for transformational leadership. Contingent reward and contingent punishment behaviour are linked with transactional leadership. For this study, the questions of MacKenzie et al. (2001) are adapted (Appendix A). Both types of leadership are measured with three items.

Control variables

In this study, four other variables are included with the aim to control for potential alternative explanations: the company size, the company age, the purpose of implementing cloud computing and the time of the cloud computing adoption. Prior research shows that size and age may affect knowledge management (Minbaeve et al., 2003; Thornhill, S. 2006). Larger organisations and older companies could be more successful in absorbing capacity because of the greater ability they possess and the bigger manpower (Hagedoorn & Duysters, 2002). On the other side, size and age may negatively affect knowledge management since it could lead to rigidity and inertia (Kelly & Amburgey, 1991; Van de Ven et al., 1999). To control for these potential effects, the control variables company size and age are added. The third control variable is the purpose of the cloud computing; the respondents were asked what the purpose of implementing the cloud computing system was for their company. This is important because the purpose of the cloud computing determines how the cloud computing (and so the technological change) is used and embraced within the company and how important the cloud computing is for the organisation (Marston et al., 2011). Finally, to account for the possible early adopters' advantages, the time of cloud computing adoption is added as a control variable. The diffusion of innovation theory of Rogers (2003) suggests that the point of time of adopting a technological development influences the relative competitive advantage. Innovators, early adopters and the early majority have a relative (competitive) advantage compared to the late majority (Stratopoulos, 2016). To control for this effect, the respondents were asked to estimate the time of cloud computing adoption compared with the competitors.

The validity of all the constructs is assessed by calculating the Cronbach's alpha, average variance extracted (AVE) and composite reliability in Table 1. The measures are shown in the table below. All measures meet the commonly accepted thresholds (Field, 2013). Further, the discriminant validity is checked. The square roots of the AVE of all constructs exceeded the correlation of the construct with other constructs (Table 2). This provides evidence of discriminant validity (Fornell & Larcker, 1981).

Table 1: Construct validity	**Number of items**	**Cronbach's Alpha**	**Composite Reliability**	**Average Variance Extracted (AVE)**
Recognition	3	0.784	0.873	0.698
Assimilation	3	0.908	0.942	0.844
Application	3	0.875	0.922	0.797
Transformational leadership	3	0.794	0.871	0.694
Transactional leadership	3	0.742	0.846	0.655
Centralization	3	0.757	0.850	0.654
Formalization	3	0.849	0.907	0.765

Table 2: Discriminant validity	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1. Recognition	**0.836**						
2. Assimilation	0.565	**0.919**					
3. Application	0.559	0.745	**0.893**				
4. Transformational leadership	0.184	0.188	0.179	**0.833**			
5. Transactional leadership	0.120	0.178	0.211	0.735	**0.809**		
6. Centralization	-0.200	-0.196	-0.101	0.028	0.104	**0.809**	
7. Formalization	0.028	0.202	0.160	0.262	0.241	0.234	**0.875**

4. Analyses

To test the formulated hypotheses, a hierarchical regression analysis was conducted. Below, there are five tables. The first table, Table 3, presents the descriptive statistics of and the correlations between the variables. Table four, five and six present the results of the hierarchical regression analysis with respectively the mean of recognition, assimilation and application ability as dependent variables. Each hierarchical regression analysis contains three models. The first model includes solely the control variables which are cloud purpose, cloud adoption, company size and company age. Except for the company age, all control variables are included as dummy variables. The second model contains next to the control variables, the four main variables which are the two leadership constructs, centralization and formalization. In the third model, the interaction terms are added. Following Aiken and West (1991) interaction terms are calculated by mean-centering the variables and then multiplying the independent variables and the moderating variables. In table 8, an overview of all the tested hypotheses is presented.

To test for the possible multicollinearity, several tests are conducted. First, the correlation matrix on the next pages shows no correlations above 0.70 which eliminate the possibility of problematic multicollinearity (Field, 2013). Further, all tolerance statistics were above 0.1 (Hair et al., 2010) and all models had variance inflation factors (VIF) below 10, which is required (Netter, Wasserman, & Kutner, 1990). Therefore, the conclusion can be made that the possibility of multicollinearity is eliminated. In appendix C, the full regression analyses can be found.

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Cloud purpose: Data Backup	**0.09**	**0.29**																			
2. Cloud purpose: Mobile Working	**0.20**	**0.40**	-0.16																		
3. Cloud purpose: File Storage	**0.05**	**0.23**	-0.08	-0.12																	
4. Cloud purpose: Information Sharing	**0.22**	**0.41**	-0.17	-0.26**	-0.13																
5. Cloud purpose: Other	**0.44**	**0.50**	-0.28**	-0.44**	-0.21*	-0.46**															
6. Cloud adoption: Early	**0.70**	**0.46**	-0.07	-0.02	0.07	-0.09	0.10														
7. Cloud adoption: On time	**0.20**	**0.40**	0.08	-0.02	-0.02	0.07	-0.07	-0.76**													
8. Cloud adoption: Late	**0.10**	**0.30**	0,00	0.06	-0.08	0.04	-0.05	-0.51**	-0.17												
9. Company size: Small	**0.43**	**0.50**	-0.02	-0.07	0.11	0.07	-0.04	0.12	-0.06	-0.10											
10. Company size: Medium	**0.28**	**0.45**	0.08	-0.16	-0.06	-0.03	0.13	-0.07	0.09	-0.01	-0.54**										
11. Company size: Big	**0.29**	**0.46**	-0.06	0.23*	-0.06	-0.04	-0.09	-0.06	-0.02	0.12	-0.56**	-0.40**									
12. Company age	**16.00**	**20.94**	-0.05	0.12	-0.02	0.01	-0.06	-0.07	0.06	0.02	-0.32**	-0.06	0.42**								
13. Recognition	**4.35**	**0.68**	-0.13	-0.09	0.15	-0.22*	0.26**	0.46**	-0.26**	-0.37**	-0.09	0.15	-0.05	0.06	**(0.784)**						
14. Assimilation	**4.30**	**0.72**	-0.01	-0.07	0.05	-0.26**	0.26**	0.30**	-0.06	-0.38**	0.01	0.22*	-0.22*	-0.07	0.56**	**(0.908)**					
15 Application	**4.09**	**0.78**	-0.05	0.03	0.06	-0.38**	0.30**	0.23*	-0.04	-0.30**	-0.15	0.20*	-0.03	0.03	0.53**	0.67**	**(0.875)**				
16. Transformational leadership	**4.15**	**0.53**	-0.09	0.13	-0.02	-0.01	-0.03	0.15	-0.04	-0.17	-0.09	0.16	-0.06	0.05	0.23*	0.16	0.09	**(0.794)**			
17. Transactional leadership	**4.14**	**0.53**	-0.06	0.08	-0.06	-0.06	0.04	0.09	-0.02	-0.12	-0.05	0.25**	-0.20*	0.07	0.10	0.14	0.05	0.54**	**(0.742)**		
18. Centralization	**2.86**	**0.83**	0,00	-0.11	-0.06	0.05	0.07	-0.24*	0.12	0.21*	0,00	-0.19*	0.19*	0.08	-0.14	-0.18	-0.13	-0.26**	-0.13	**(0.757)**	
19. Formalization	**2.97**	**0.92**	-0.07	0.04	0.02	-0.02	0.01	0.05	-0.09	0.06	-0.26**	0.13	0.16	0.16	0.10	0.20*	0.10	0.04	0.08	0.19	**(0.849)**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Cronbach's alpha coefficients on the diagonal (in brackets)

Table 4. Results of Hierarchical Regression Analysis with Recognition as dependent variable[ab]

	Model			Hypothesis
	1	2	3	
Controls				
Cloud purpose: Data Backup	-0.207*	-0.200*	-0.217*	
Cloud purpose: Mobile Working	-0.151	-0.166	-0.180	
Cloud purpose: File Storage	0.062	0.053	0.056	
Cloud purpose: Information Sharing	-0.238**	-0.251**	-0.276**	
Cloud adoption: On time	-0.319***	-0.311***	-0.293***	
Cloud adoption: Late	-0.427***	-0.408***	-0.438***	
Company size: Medium	0.151	0.135	0.121	
Company size: Big	0.030	-0.003	0.003	
Company age	0.100	0.101	0.100	
Transformational leadership		0.197*	0.214*	H1a
Transactional leadership		-0.130	-0.105	H2a
Centralization		0.025	0.033	H3a
Formalization		0.042	0.061	H4a
Transformational leadership x Centralization			-0.117	H3d
Transactional leadership x Centralization			0.008	H3g
Transformational leadership x Formalization			-0.071	H4d
Transactional leadership x Formalization			-0.010	H4g
R^2	0.380	0.408	0.430	
ΔR^2	0.380	0.028	0.022	
F	6.683***	4.977***	3.989***	
N	110	110	110	

[a] Standardized coefficients
[b] * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Looking at the control variables, the data backup ($\beta = -0.207$, $p < 0.05$) and information sharing ($\beta = -0.217$, $p < 0.05$) as cloud purpose have significant negative effect on the recognition of knowledge. Further adopting the cloud computing system on the same time as ($\beta = -0.319$, $p < 0.001$) or later than ($\beta = -0.427$, $p < 0.001$) the competitors has significant negative effect.

Regarding the main variables, only transformational leadership has significant (positive) effect on the recognition of external knowledge ($\beta = 0.197$, $p < 0.05$) and this supports the hypothesized positive relationship of transformational leadership on the recognition of knowledge (Hypothesis 1a). The other main variables: transactional leadership ($\beta = -0.130$, $p = 0.195$), centralization ($\beta = 0.025$, $p = 0.78$) and formalization ($\beta = 0.042$, $p = 0.625$) show no significant relation with the recognition ability of a company. Thereby, hypothesis 2a, hypothesis 3a and hypothesis 4a are rejected. Examining at the moderation variables, no significant relations were found. Thus, hypotheses 3d, 3g, 4d and 4g are rejected.

Table 5. Results of Hierarchical Regression Analysis with Assimilation as dependent variable[ab]

	Model			Hypothesis
	1	2	3	
Controls				
Cloud purpose: Data Backup	-0.104	-0.091	-0.081	
Cloud purpose: Mobile Working	-0.101	-0.128	-0.143	
Cloud purpose: File Storage	-0.042	-0.062	-0.094	
Cloud purpose: Information Sharing	-0.290**	-0.298**	-0.304**	
Cloud adoption: On time	-0.118	-0.076	-0.076	
Cloud adoption: Late	-0.368***	-0.344***	-0.342***	
Company size: Medium	0.141	0.066	0.057	
Company size: Big	-0.127	-0.173	-0.197	
Company age	0.009	-0.008	0.012	
Transformational leadership		0.074	0.143	H1b
Transactional leadership		-0.041	-0.099	H2b
Centralization		-0.081	-0.099	H3b
Formalization		0.238**	0.284**	H4b
Transformational leadership x Centralization			-0.035	H3e
Transactional leadership x Centralization			0.163	H3h
Transformational leadership x Formalization			0.076	H4e
Transactional leadership x Formalization			-0.211*	H4h
R^2	0.293	0.347	0.393	
ΔR^2	0.293	0.054	0.046	
F	4.515***	3.842***	3.423***	
N	107	107	107	

[a] Standardized coefficients
[b] * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Looking at the control variables, two control variables have significant result on the assimilation ability of a company. According to the results, information sharing as cloud purpose ($\beta = -0.290$, $p < 0.01$) as well a late adoption of cloud computing ($\beta = -0.368$, $p < 0.001$) have both a negative effect on assimilation of external knowledge.

Regarding the main variables, only formalization has a significant effect on the assimilation of external knowledge ($\beta = 0.284$, $p < 0.01$) and this is in line with the hypothesized positive relationship of formalization on the assimilation ability (Hypothesis 4b). For the remaining three main variables: transformational leadership ($\beta = 0.074$, $p = 0.479$), transactional leadership ($\beta = -0.041$, $p = 0.697$) and centralization ($\beta = -0.081$, $p = 0.395$) no significant results were found. Thereby, Hypothesis 1b, 2b and 3b are rejected. Examining the moderation variables, one significant relationship was found; formalization has a negative moderating effect on the transactional leadership ($\beta = -0.211$, $p < 0.05$). This means, a higher level of formalization in a company that operates with a transactional leader, will cause a lower assimilation ability. This is in line with hypothesis H4h. On the next page, a plot of this interaction (figure 2) visualizes this relationship. Further hypothesis 3e, 3h and 4e were rejected due to non-significance.

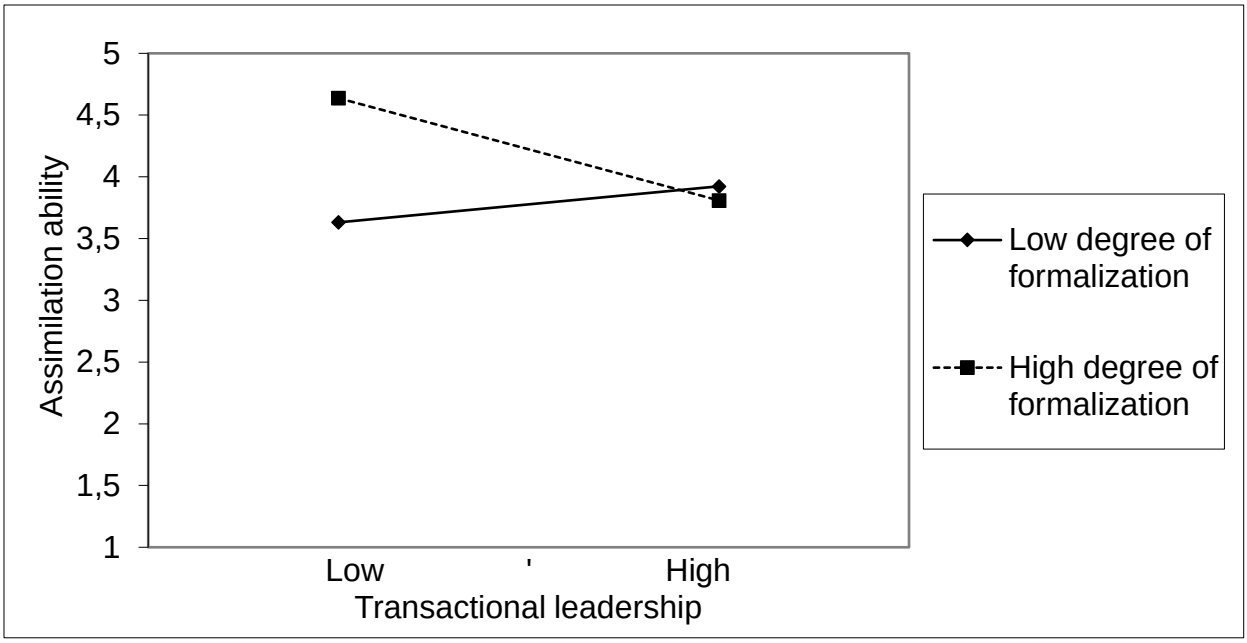

Figure 2

Table 6. Results of Hierarchical Regression Analysis with Application as dependent variable[ab]

	Model			Hypothesis
	1	2	3	
Controls				
Cloud purpose: Data Backup	-0.110	-0.112	-0.118	
Cloud purpose: Mobile Working	-0.069	-0.075	-0.073	
Cloud purpose: File Storage	-0.019	-0.031	-0.049	
Cloud purpose: Information Sharing	-0.404***	-0.411***	-0.422***	
Cloud adoption: On time	-0.078	-0.066	-0.063	
Cloud adoption: Late	-0.268**	-0.263**	-0.260**	
Company size: Medium	0.217*	0.202	0.215*	
Company size: Big	0.055	0.029	0.041	
Company age	0.033	0.039	0.051	
Transformational leadership		0.031	0.039	H1c
Transactional leadership		-0.084	-0.093	H2c
Centralization		-0.045	-0.037	H3c
Formalization		0.068	0.104	H4c
Transformational leadership x Centralization			-0.040	H3f
Transactional leadership x Centralization			0.207	H3i
Transformational leadership x Formalization			-0.060	H4f
Transactional leadership x Formalization			-0.023	H4i
R^2	0.283	0.292	0.326	
ΔR^2	0.283	0.009	0.034	
F	4.291***	2.978**	2.565**	
N	107	107	107	

[a] Standardized coefficients
[b] * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results of table 6 show that two control variables have influence on the application of external knowledge. Similar as the assimilation of external knowledge, information sharing as cloud purpose ($\beta = -0.404$, $p < 0.001$) as well a late adoption of cloud computing ($\beta = -0.268$, $p < 0.001$) have both a negative effect on assimilation of external knowledge. Further, the results show that medium sized organizations achieve higher level of knowledge application ($\beta = 0.217$, $p < 0.05$). Looking at the main variables, the results show that there are no significant relationships between transformational leadership ($\beta = 0.031$, $p = 0.774$), transactional leadership ($\beta = -0.084$, $p = 0.443$), centralization ($\beta = -0.045$, $p = 0.649$) and formalization ($\beta = 0.068$, $p = 0.470$) on the application ability. Thereby, Hypothesis 1c, 2c, 3c and 4c are rejected. Also, no significant relations were found of all four moderators on the application ability. This means that hypotheses 3f, 3i, 4f, 4i are also rejected.

Overall, the results of the three regression analyses show that control variables cloud purpose and adoption time have significant effect on all three aspects of absorptive capacity. Also, the company size has significant result on the application of external knowledge. Regarding the relationships between the main variables, the moderating variables and the dependent variables, only three hypotheses are supported by the results. Transformational leadership is positively related with the recognition ability, formalization is positively related with the assimilation ability and a high degree of formalization negatively moderates the relationship between transactional leadership and assimilation ability. Below an overview of the hypotheses is shown.

Table 8: Overview hypotheses		**Hypothesis supported?**
Hypotheses		
H1(a, b, c)	Transformational leadership has a positive effect on the recognition ability (a), assimilation ability (b) and application ability (c) of the firm.	Only H1a supported
H2 (a, b, c)	Transactional leadership has a negative effect on the recognition ability (a), assimilation ability (b) and application ability (c) of the firm.	Not supported
H3 (a, b, c)	Centralization has a negative effect on the recognition ability (a), assimilation ability (b) and application ability (c) of the firm.	Not supported
H3(d, e, f)	Centralization has a negative effect on the relationship between transformational leadership and the three dimensions of absorptive capacity, causing a lower recognition ability (d), a lower assimilation ability (e) and a lower application ability (f).	Not supported
H3g	Centralization has a negative effect on the relationship between transactional leadership and the recognition ability of a firm, causing a lower recognition ability.	Not supported
H3(h, i)	Centralization has a positive effect on the relationship between transactional leadership and the assimilation ability and application ability	Not supported

	causing a higher assimilation ability (h) and a higher application ability (i).	
H4(a, b, c)	Formalization has a negative effect on recognition ability (a) and a positive relationship with the assimilation (b) and the application ability (c) of the firm.	Only H4b supported
H4d	Formalization has a negative effect on the relationship between transformational leadership and the recognition ability of a firm, causing a lower recognition ability.	Not supported
H4(e, f):	Formalization has a positive effect on the relationship between transformational leadership and the assimilation ability and application ability of a firm, causing a higher assimilation ability (e) and a higher application ability (f)	Not supported
H4 (g, h, i)	Formalization has a positive effect on the relationship between transactional leadership and the three dimensions of absorptive capacity, causing a lower recognition ability (g), a lower assimilation ability (h) and a lower application ability (i).	Only H4h supported

5. Conclusion and discussion

Although the benefits and effects of absorptive capacity have received a lot of attention from researchers and scholars in the past twenty years, research on managerial and organizational antecedents of absorptive capacity are largely ignored (Volberda et al., 2010; Jansen et al., 2005). This empirical study was aimed to contribute on new insights by investigating the relationship between these antecedents and absorptive capacity, more specific the relationship between leadership styles (as transformational and transactional leadership), organizational structure (as the degree of centralization and formalization) and the three dimensions of absorptive capacity. Further, this research focussed on the moderation role of organization structure on the relationship between the type of leadership and absorptive capacity.

First, this research provides evidence that managerial and organizational antecedents do have an influence on the recognition ability and the assimilation ability. The results of this study show that transformational leadership is positively related to the recognition ability of a firm. Transformational leaders show enthusiasm and optimism towards followers and involve employees in envisioning future states. This increases the commitment of employees. Transformational leaders are also able to stimulate others to be more innovate and creative when approaching problems (Bass & Riggio, 2006). These characteristics of a transformational leader contribute to achieving a higher level of knowledge recognition. This finding is in line with prior studies relating transformational leadership to knowledge recognition (Zahra & George, 2002, Flatten et al., 2014). It was expected that transformational leadership was also positively related to assimilation ability and the application ability of the firm. Transformational leaders allow employees to process knowledge in ways that differ from the leader's idea, which encourages employees to understand externally obtained information in their own way. Also, transformational leaders do not criticise employees for mistakes, but rather act as a coach (Bass & Riggio, 2006) which motivates employees to applicate knowledge even after failure. In contrast to prior research (Flatten et al., 2014), this study did not find evidence that there is a direct relationship between transformational leadership and the assimilation ability and application ability of a firm. However, it is possible that transformational has an indirect significant relation with the assimilation ability and the application ability. Zahra & George (2002) state that absorptive capacity is a straightforward process. The first dimension of absorptive capacity is the recognition ability and if knowledge is not recognized, it is not possible to further assimilate and apply the knowledge. In this case, the recognition ability might have a mediating role and this could mean that transformational leadership possibly has an indirect effect on the other two dimensions through the recognition ability. Further research is needed to investigate the relation between the three dimensions of absorptive capacity.

Second, this study examined whether there is a relationship between transactional leadership and absorptive capacity. Prior research suggested that transactional leadership lowers the level of all three dimensions of the absorptive capacity. E.g. Sarross et al., (2002) argue in their article that transactional

leadership caused a higher level of work alienation and according to Lee et al., (2003) transactional leadership reduces the employees' willingness to change. Further transactional leadership is perceived as controlling and demotivating by employees (Pieterse et al., 2010) and this increases the resistance of employees to apply external knowledge (Bass & Riggio, 2006). This study did not find any evidence that there is a direct relation between the transactional leadership and the three dimensions. This contradicts both the general idea that transactional leadership is not linked to absorptive capacity (Vera & Crossan, 2004) as well the suggestion that transactional leadership stimulates absorptive capacity (Flatten et al., 2014). It is possible that the aspects of transactional leadership (such as the formulation of goals and contingent reward/punishment behaviour) solely have contradicting effect on the absorptive capacity, ultimately lifting each other up. To find this out, further research is needed to examine the effect of the distinct aspects of transactional leadership on absorptive capacity.

Third, this study assessed the direct and indirect role of centralization on absorptive capacity. Although prior research suggested that centralization is negatively associated with absorptive capacity, the results show no evidence for this. The results also find no evidence for the centralization moderating the relationship between leadership and absorptive capacity. An explanation for this might be that other factors (such as country and company size) play a role in the relation of centralization and absorptive capacity. In this study, the absorptive capacity of companies from different countries and sizes are measured and investigated together. It is possible that the country and company size partly determine how centralization is perceived by employees and how centralization affects the absorptive capacity. Vaccaro et al., (2012) argue in their article that the organizational size is positively related to management innovation and Hofstede (1994) states that culture and thus country might affect the absorptive capacity. To understand what the exact effect of company size and country on the absorptive capacity of the firm is, further research is needed.

Fourth, the direct effect of formalization on absorptive capacity is investigated in this study. This study provides evidence that formalization is positively related to the assimilation ability of the firm. As prior research state, formalization contributes to codifying the best practices and thus makes assimilation of knowledge easier. Next to this, more formalization provides inter alia clear work procedures which reduces work ambiguity (Galunic & Rodan, 1998). Thereby, formalization increases the assimilation ability of a firm. It was expected that formalization would lower the recognition ability because a high level of formalization acts as a frame that inhibits the attention towards the external environment (Jansen, Van den Bosch & Volberda, 2005). This study did not find a relation between formalization and the recognition ability. It is possible that companies that want to increase the recognition ability, could use formalization to some extent, to reduce work ambiguity and increase the controllability of the employees' behaviour (King & Sabherwal, 1992) but when the formalization level is too high, formalization works counterproductive because it is perceived as bureaucratic by the employees. In other words, formalization might have an inverse U-shape relation with the recognition ability. To confirm

this, further research is needed. In this study, it was also expected that formalization would increase the application ability but the results do not support this. A reason for this could be that formalization does not directly affect the application ability but indirectly through the assimilation ability. As mentioned before, the absorptive capacity is a straight process (Zahra & George, 2002) and in this case, the assimilation ability acts as a mediating variable for the application ability. Future researchers might investigate the mediating role of assimilation ability.

Fifth, the moderating role of formalization on the relationship between leadership and absorptive capacity was investigated. The results show no evidence that formalization has an effect on the relationship between transformational leadership and absorptive capacity. Conger (1999) states that transformational leaders have an empowering effect on the employees, which motivates employees to put more effort in their work. It is possible that because of this empowering effect, formalization has not much effect on the relationship between transformational leadership and absorptive capacity. In this sense, the effectiveness of transformational leaders might not be very sensitive to a lower or higher level of formalization, because employees are already willing to follow the leader. Regarding the moderating role of formalization on the relationship between transactional leadership and absorptive capacity, the results provide evidence that more formalization leads to a lower assimilation ability. Transactional leaders pursue a high level of formalization because this increases the controllability of employees (Jäger & Jansen, 1991) and the effectiveness and legitimacy of their leadership (Adler, 1999; Bass, 1985). But since transactional leadership is negatively associated with absorptive capacity, more formalization ultimately leads to a lower level of assimilation ability when combined with transactional leadership. Formalization does not influence the relationship between transactional leadership and the other two aspects of absorptive capacity.

Finally, the role of control variables was examined. The purpose of implementing a cloud computing system and the adoption time of the cloud computing system clearly have an effect on the absorptive capacity. The purpose determines how employees use and embrace the cloud purpose and thus the technological change. Also, early adoption of the cloud computing systems gives organisations a competitive advantage. This finding is in line with the theory of innovation diffusion of Rogers (2003). These findings make clear that next to managerial and organisational antecedents, other antecedents also influence the absorptive capacity. Future research can address this finding to investigate whether there are more antecedents that influence absorptive capacity.

5.1 Practical implications

Next to the theoretical contribution, this study provides some important practical implications for managers. Several studies have already shown that absorptive capacity has a positive effect on inter alia the innovative capabilities (Tsai, 2001), organizational responsiveness (Liao, Welsch & Stoica, 2003) and the performance of a firm (Lane, Salk & Lyles, 2001), highlighting its importance. Prior research made clear that absorptive capacity is a concept that should be understood and stimulated by managers.

The results of this study provide some implications, showing how absorptive capacity could be stimulated by managers.

First, the results provide evidence that transformational leadership is positively related to the recognition of knowledge. This means that to increase the recognition ability of a firm, leaders should behave as transformational leaders. In other words, leaders should stimulate subordinates to be innovative and creative when approaching problems. Next to that, leaders should motivate and inspire others and involve employees in creating a vision. Also, leaders should act as a coach rather than an 'inspector' by rewarding good work and punishing unsatisfactory work. As a result, employees show more commitment and are more willing to share information that comes from outside the organisation. This leads to a higher knowledge recognition.

Second, the results show that formalization directly leads to a higher assimilation ability. In other words, to achieve a higher level of assimilation, managers should formalize the assimilation process of knowledge. Using procedures and routines will make it easier to analyse, process, interpret and understand external knowledge (Zahra & George, 2002). Formalizing this process is a complicated task since this process is context specific and not always replicable (Szulanski, 1996). Therefore, it is advised to formalize prior successful procedures and routines were external knowledge was assimilated. An example of formalization in this sense is using procedures and routines where employees are asked to document externally obtained knowledge, so this knowledge could be saved and shared easily.

Third, the results show that formalization also has an indirect effect on the assimilation ability of a firm. If a company has a transactional leader, more formalization only leads to a lower assimilation ability. This is because transactional leadership is perceived as controlling and demotivating by the employees (Pieterse et al., 2010) and formalization only strengthens this perception. Therefore, it is advised that leaders should show rather more transformational leadership behaviour towards their followers in order to achieve a higher level of knowledge recognition and assimilation.

5.2 Limitations and future research

Although this research was carefully conducted, there still are limitations that should be addressed by future researchers. In this study, data is collected at the top management team because of their knowledge level and company role. The top management team were asked about their leadership behaviour and the centralization and formalization degree of the firm. Although the top management is well informed about the organisational processes and structures (Hambrick, 2007), there might be differences in how leaders think they behave and how it is actually perceived by line managers and employees. This limitation is known as the single source bias. To prevent this in future research, it is advised to find more respondents per firm or conduct an in-depth interview with the respondent to make sure the answers are more valid and reliable.

Another limitation of this study is that this study solely focuses on the absorptive capacity of firms after a technological change. The results of this study are not just so generalizable to other types of change that provoke the absorptive capacity. Political changes (such as the effects of Brexit) and ecological changes (such as the effects of the climate agree of Paris 2015) might provoke the absorptive capacity of firms differently than technological changes. So, it is possible that the type of change influences the effect of leadership, centralization and formalization on absorptive capacity. To completely understand the effect of leadership, centralization and formalization on absorptive capacity, it is necessary to conduct a similar research in different contexts, such as after a political change or an ecological change.

Finally, in this study the relation between managerial, organizational antecedents and absorptive capacity was investigated. Although this study provides some new insights about potential influencers of absorptive capacity, some other managerial and organizational dimensions are not discussed. For instance, the gender of the leader might have an influence on the absorptive capacity because female leaders possess a different set of leading skills than male leaders (Eagly et al., 2003). Another dimension that is not discussed is the difference in country or culture, which is a potential influencer (Hofstede, 1994). Future research can address these limitations by looking deeper into the factors that potentially influence the absorptive capacity.

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Appendix

Appendix A

Variable	Dimensions	Questions
Absorptive Capacity (Cohen & Levinthal, 1990; Schleimer & Pedersen, 2013)	Recognition	We recognize the benefits of Cloud. We understand the importance of Cloud. We recognize the potential of Cloud to create value for the organization.
	Assimilation	We understand the key components of Cloud solutions. We understand how the components of the Cloud system fitted together to make it work in our market. We recognized what steps we had to take to successfully adopt Cloud solutions.
	Application	We adjust Cloud solutions when necessary We monitor the performance of Cloud solutions and corrected problems as they surfaced. We fine-tune some components of the Cloud system to make it work successfully.
Centralization (Jansen et al., 2006)	Hierarchy of authority (Hage & Aiken, 1967)	There can be little action taken in the organization until senior management approves a decision.
	Participation in decision making (Hage & Aiken, 1967)	A person who wants to make his/her own decisions would be quickly discouraged.
	Participation in decision making (Hage & Aiken, 1967)	Most decisions people make here have to have their supervisor's approval.
Formalization (Jansen et al., 2006)	Authority relations (Hall et al., 1967)	Whatever situation arises, written procedures are available for dealing with it.
	Procedures (Hall et al., 1967)	Rules and procedures occupy a central place in the organization.
	Roles (Hall et al., 1967)	Written job descriptions are formulated for positions at all levels of the company.

Transformational leadership (MacKenzie et al., 2001)	Vision	I am able to get others committed to my vision.
	Supportive leader behaviour	I get people to work together for the same goal.
	Intellectual stimulation	I lead by 'doing' rather than simply by 'telling'.
Transactional leadership (MacKenzie et al., 2001)	Contingent reward behaviour	I provide subordinates with positive feedback when they perform well.
	Contingent reward behaviour	I provide subordinates with special recognition when they produce at a high level.
	Contingent punishment behaviour	I show my disapproval when subordinates performed at a low level.

Appendix B – Bias for early/late respondents

Group Statistics

	Response time	N	Mean	Std. Deviation
Absorptive Capacity	Early	55	4,26	,527
	Late	55	4,22	,708
Recognition	Early	55	4,30	,684
	Late	55	4,39	,673
Assimilation	Early	55	4,41	,563
	Late	55	4,19	,838
Application	Early	55	4,08	,729
	Late	55	4,10	,831
Centralization	Early	54	2,85	,885
	Late	56	2,88	,788
Formalization	Early	53	3,00	1,019
	Late	56	2,93	,827
Transformational Leadership	Early	54	4,16	,552
	Late	56	4,15	,517
Transactional Leadership	Early	54	4,18	,524
	Late	56	4,10	,547

Independent Samples Test

		Levene's Test for Equality of Variances	
		F	Sig.
Absorptive Capacity	Equal variances assumed	7,258	,008
	Equal variances not assumed		
Recognition	Equal variances assumed	,178	,674
	Equal variances not assumed		
Assimilation	Equal variances assumed	7,312	,008
	Equal variances not assumed		
Application	Equal variances assumed	2,401	,124
	Equal variances not assumed		
Centralization	Equal variances assumed	1,530	,219
	Equal variances not assumed		
Formalization	Equal variances assumed	1,902	,171
	Equal variances not assumed		
Transformational Leadership	Equal variances assumed	,295	,588
	Equal variances not assumed		
Transactional Leadership	Equal variances assumed	,003	,955
	Equal variances not assumed		

Appendix C: Results of the hierarchical regression

Results of regression analysis with Recognition Ability as dependent variable: Model 1

Model: 1

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	4,595	,111		41,426	,000		
Cloud purpose: Data Backup	-,507	,205	-,207	-2,471	,015	,900	1,111
Cloud purpose: Mobile Working	-,255	,149	-,151	-1,709	,091	,806	1,241
Cloud purpose: File Storage	,183	,245	,062	,746	,458	,919	1,088
Cloud purpose: Information Sharing	-,387	,142	-,238	-2,722	,008	,830	1,205
Cloud adoption: On time	-,537	,137	-,319	-3,906	,000	,946	1,057
Cloud adoption: Late	-,996	,192	-,427	-5,194	,000	,938	1,067
Company size: Medium	,228	,135	,151	1,693	,094	,794	1,260
Company size: Big	,045	,145	,030	,306	,760	,658	1,521
Company age	,003	,003	,100	1,130	,261	,812	1,231

a. Dependent Variable: M_recog

Results of regression analysis with Recognition Ability as dependent variable: Model 2

Model: 2

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	4,109	,591		6,951	,000		
Cloud purpose: Data Backup	-,489	,206	-,200	-2,374	,020	,890	1,123
Cloud purpose: Mobile Working	-,278	,153	-,166	-1,823	,071	,764	1,310
Cloud purpose: File Storage	,157	,247	,053	,634	,528	,903	1,107
Cloud purpose: Information Sharing	-,409	,143	-,251	-2,869	,005	,823	1,216
Cloud adoption: On time	-,523	,141	-,311	-3,705	,000	,894	1,118
Cloud adoption: Late	-,954	,199	-,408	-4,793	,000	,868	1,152
Company size: Medium	,205	,143	,135	1,433	,155	,706	1,417
Company size: Big	-,005	,151	-,003	-,031	,976	,606	1,649
Company age	,003	,003	,101	1,135	,259	,792	1,263
Transformational leadership	,251	,126	,197	1,996	,049	,646	1,549
Transactional leadership	-,165	,126	-,130	-1,304	,195	,637	1,570
Centralization	,020	,073	,025	,280	,780	,777	1,287
Formalization	,031	,063	,042	,490	,625	,856	1,168

a. Dependent Variable: M_recog

Results of regression analysis with Recognition Ability as dependent variable: Model 3

Model: 3

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	3,831	,624		6,143	,000		
Cloud purpose: Data Backup	-,532	,209	-,217	-2,550	,012	,873	1,145
Cloud purpose: Mobile Working	-,303	,155	-,180	-1,960	,053	,750	1,333
Cloud purpose: File Storage	,166	,251	,056	,659	,511	,878	1,139
Cloud purpose: Information Sharing	-,449	,145	-,276	-3,100	,003	,800	1,250
Cloud adoption: On time	-,492	,143	-,293	-3,451	,001	,882	1,134
Cloud adoption: Late	-1,023	,207	-,438	-4,951	,000	,810	1,235
Company size: Medium	,183	,145	,121	1,265	,209	,691	1,447
Company size: Big	,005	,154	,003	,030	,976	,586	1,707
Company age	,003	,003	,100	1,114	,268	,782	1,279
Transformational leadership	,273	,134	,214	2,039	,044	,573	1,744
Transactional leadership	-,133	,137	-,105	-,973	,333	,545	1,834
Centralization	,027	,074	,033	,358	,721	,760	1,316
Formalization	,045	,065	,061	,685	,495	,805	1,243
Transformational leadership x Centralization	-,184	,177	-,117	-1,038	,302	,495	2,019
Transactional leadership x Centralization	,012	,156	,008	,078	,938	,608	1,644
Transformational leadership x Formalization	-,089	,139	-,071	-,642	,523	,515	1,941
Transactional leadership x Formalization	-,012	,125	-,010	-,097	,923	,634	1,578

a. Dependent Variable: M_recog

Results of regression analysis with Assimilation Ability as dependent variable: Model 1

Model: 1

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	4,603	,126		36,461	,000		
Cloud purpose: Data Backup	-,272	,234	-,104	-1,162	,248	,900	1,111
Cloud purpose: Mobile Working	-,180	,170	-,101	-1,063	,290	,806	1,241
Cloud purpose: File Storage	-,132	,279	-,042	-,474	,637	,919	1,088
Cloud purpose: Information Sharing	-,503	,162	-,290	-3,108	,002	,830	1,205
Cloud adoption: On time	-,212	,156	-,118	-1,354	,179	,946	1,057
Cloud adoption: Late	-,916	,218	-,368	-4,194	,000	,938	1,067
Company size: Medium	,227	,154	,141	1,476	,143	,794	1,260
Company size: Big	-,200	,166	-,127	-1,210	,229	,658	1,521
Company age	,000	,003	,009	,098	,922	,812	1,231

a. Dependent Variable: M_assim

Results of regression analysis with Assimilation Ability as dependent variable: Model 2

Model: 2

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	4,118	,661		6,226	,000		
Cloud purpose: Data Backup	-,238	,231	-,091	-1,030	,306	,890	1,123
Cloud purpose: Mobile Working	-,229	,171	-,128	-1,338	,184	,764	1,310
Cloud purpose: File Storage	-,195	,276	-,062	-,704	,483	,903	1,107
Cloud purpose: Information Sharing	-,517	,160	-,298	-3,239	,002	,823	1,216
Cloud adoption: On time	-,136	,158	-,076	-,862	,391	,894	1,118
Cloud adoption: Late	-,857	,223	-,344	-3,848	,000	,868	1,152
Company size: Medium	,106	,160	,066	,661	,510	,706	1,417
Company size: Big	-,274	,169	-,173	-1,619	,109	,606	1,649
Company age	,000	,003	-,008	-,084	,934	,792	1,263
Transformational leadership	,100	,141	,074	,710	,479	,646	1,549
Transactional leadership	-,055	,141	-,041	-,390	,697	,637	1,570
Centralization	-,070	,082	-,081	-,854	,395	,777	1,287
Formalization	,187	,071	,238	2,648	,010	,856	1,168

a. Dependent Variable: M_assim

Results of regression analysis with Assimilation Ability as dependent variable: Model 3

Model: 3

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	4,026	,686		5,869	,000		
Cloud purpose: Data Backup	-,212	,230	-,081	-,924	,358	,873	1,145
Cloud purpose: Mobile Working	-,256	,170	-,143	-1,507	,135	,750	1,333
Cloud purpose: File Storage	-,295	,276	-,094	-1,069	,288	,878	1,139
Cloud purpose: Information Sharing	-,528	,159	-,304	-3,313	,001	,800	1,250
Cloud adoption: On time	-,137	,157	-,076	-,874	,384	,882	1,134
Cloud adoption: Late	-,851	,227	-,342	-3,745	,000	,810	1,235
Company size: Medium	,091	,159	,057	,575	,567	,691	1,447
Company size: Big	-,312	,170	-,197	-1,840	,069	,586	1,707
Company age	,000	,003	,012	,126	,900	,782	1,279
Transformational leadership	,194	,147	,143	1,318	,191	,573	1,744
Transactional leadership	-,134	,151	-,099	-,888	,377	,545	1,834
Centralization	-,086	,082	-,099	-1,056	,294	,760	1,316
Formalization	,223	,072	,284	3,104	,003	,805	1,243
Transformational leadership x Centralization	-,059	,195	-,035	-,303	,763	,495	2,019
Transactional leadership x Centralization	,266	,172	,163	1,551	,124	,608	1,644
Transformational leadership x Formalization	,101	,153	,076	,665	,508	,515	1,941
Transactional leadership x Formalization	-,280	,137	-,211	-2,041	,044	,634	1,578

a. Dependent Variable: M_assim

Results of regression analysis with Application Ability as dependent variable: Model 1

Model: 1

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	4,271	,136		31,295	,000		
Cloud purpose: Data Backup	-,308	,253	-,110	-1,220	,225	,900	1,111
Cloud purpose: Mobile Working	-,133	,183	-,069	-,724	,471	,806	1,241
Cloud purpose: File Storage	-,063	,302	-,019	-,208	,836	,919	1,088
Cloud purpose: Information Sharing	-,753	,175	-,404	-4,303	,000	,830	1,205
Cloud adoption: On time	-,151	,169	-,078	-,890	,376	,946	1,057
Cloud adoption: Late	-,716	,236	-,268	-3,033	,003	,938	1,067
Company size: Medium	,374	,166	,217	2,255	,026	,794	1,260
Company size: Big	,093	,179	,055	,520	,604	,658	1,521
Company age	,001	,003	,033	,352	,726	,812	1,231

a. Dependent Variable: M_appli

Results of regression analysis with Application Ability as dependent variable: Model 2

Model: 2

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	4,555	,739		6,162	,000		
Cloud purpose: Data Backup	-,313	,258	-,112	-1,214	,228	,890	1,123
Cloud purpose: Mobile Working	-,144	,191	-,075	-,756	,451	,764	1,310
Cloud purpose: File Storage	-,105	,309	-,031	-,342	,733	,903	1,107
Cloud purpose: Information Sharing	-,766	,178	-,411	-4,299	,000	,823	1,216
Cloud adoption: On time	-,128	,176	-,066	-,723	,471	,894	1,118
Cloud adoption: Late	-,702	,249	-,263	-2,819	,006	,868	1,152
Company size: Medium	,350	,179	,202	1,959	,053	,706	1,417
Company size: Big	,049	,189	,029	,259	,796	,606	1,649
Company age	,001	,004	,039	,402	,689	,792	1,263
Transformational leadership	,045	,157	,031	,288	,774	,646	1,549
Transactional leadership	-,122	,158	-,084	-,770	,443	,637	1,570
Centralization	-,042	,092	-,045	-,457	,649	,777	1,287
Formalization	,057	,079	,068	,726	,470	,856	1,168

a. Dependent Variable: M_appli

Results of regression analysis with Application Ability as dependent variable: Model 3

Model: 3

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	4,457	,775		5,750	,000		
Cloud purpose: Data Backup	-,330	,259	-,118	-1,271	,207	,873	1,145
Cloud purpose: Mobile Working	-,141	,192	-,073	-,733	,465	,750	1,333
Cloud purpose: File Storage	-,166	,312	-,049	-,531	,596	,878	1,139
Cloud purpose: Information Sharing	-,786	,180	-,422	-4,363	,000	,800	1,250
Cloud adoption: On time	-,120	,177	-,063	-,679	,499	,882	1,134
Cloud adoption: Late	-,720	,257	-,270	-2,803	,006	,810	1,235
Company size: Medium	,371	,180	,215	2,062	,042	,691	1,447
Company size: Big	,070	,192	,041	,363	,717	,586	1,707
Company age	,002	,004	,051	,523	,602	,782	1,279
Transformational leadership	,056	,166	,039	,339	,736	,573	1,744
Transactional leadership	-,135	,170	-,093	-,791	,431	,545	1,834
Centralization	-,035	,092	-,037	-,375	,708	,760	1,316
Formalization	,087	,081	,104	1,075	,285	,805	1,243
Transformational leadership x Centralization	-,073	,220	-,040	-,329	,743	,495	2,019
Transactional leadership x Centralization	,362	,194	,207	1,865	,065	,608	1,644
Transformational leadership x Formalization	-,086	,173	-,060	-,496	,621	,515	1,941
Transactional leadership x Formalization	-,033	,155	-,023	-,215	,830	,634	1,578

a. Dependent Variable: M_appli