The relationship between formal and informal coordination mechanisms and individual ambidexterity

Final report

Teun Gilissen

Business Management & Organisation Group

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What is the relationship between formal and informal coordination mechanisms and individual ambidexterity?

Teun Gilissen   950823-264-040

MST-80436
Business Management & Organisation Group

Scientific supervisor: dr. M.C. Annosi
Second scientific supervisor: prof. dr. W.A. Dolfsma
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Preface

During almost the whole academic year, I have been working on my thesis. The aim of this study was to investigate the relationship between formal and informal coordination mechanisms and individual ambidexterity. It took me some more time than expected, but I have managed to find some answers. Thanks to this project, I have really gained experience with the research process and improved my knowledge and skills with regard to quantitative analysis (in SPSS).

I would like to thank Maria for the pleasant collaboration during these months. The feedback and discussion sessions were really useful and provided guidance for my work. I would like to thank Dennis for his excellent help with the development and execution of the survey and social network analysis. Last but not least, this study would not have been executed without help from and collaboration with Tiwan and Daniel. *Terima kasih*!

Abstract

Nowadays, many scholars embrace the idea that organisational ambidexterity – the ability to exploit existing resources while exploring new ones – is key to organisational survival. Much research within the ambidexterity paradigm focused on the business unit or (senior) management level. However, conceptual and empirically validated studies on ambidexterity at the individual level are lacking. The main objective of this study was to investigate the influence of formal and informal coordination mechanisms on individual ambidexterity by empirically investigating an Indonesian industrial organisation. A survey was conducted within two business units (N=157). Existing and validated Likert scale items were used to measure individual ambidexterity including measures of two formal coordination mechanisms, decision-making authority and task formalisation. A social network analysis was performed to measure three informal mechanisms; network connectedness, heterogeneity and informality of network ties. Both exploratory and confirmatory factor analysis was used to validate the constructs. The hypothesised relationships were tested based on hierarchical regression analysis. Results showed that two hypotheses could be confirmed. An inverted U-relationship was found between task formalisation and individual ambidexterity. Besides, a significant interaction was found between task formalisation and the heterogeneity of one's informal network. This study not only addresses the issue that ambidexterity is present at the individual level, but provides empirical evidence that it is present at every hierarchical level as well. Organisations should balance the extent of task formalisation while taking heterogeneity into account, as this could contribute to organisational performance.

Management summary

How do organisations create sustainable competitive advantage and achieve long-term success? This is one of the central questions that is prevalent in management theory. Since competition has intensified and changes in the environment continuously gain momentum, more scholars embrace the idea that organisational survival depends on the ability to exploit existing resources while exploring new ones (e.g. Blarr, 2012; Jansen, van den Bosch, & Volberda, 2006; Levinthal & March, 1993; Raisch, Birkinshaw, Probst, & Tushman, 2009). Both exploitation and exploration are crucial for organisational success but compete for the same resources (March, 1991). Organisational ambidexterity refers to a firm's ability to manage the tension between exploitation and exploration (Andriopoulos & Lewis, 2009).

In their literature review paper on organisational ambidexterity, Raisch and Birkinshaw (2008) stress some of the major shortcomings of the current organisational ambidexterity literature. They state the following: *"There is a complete lack of research into ambidexterity at the individual level of analysis* (p. 397). Recently, some scholars responded to the call for more research and started investigating ambidexterity at the individual level (e.g. Bonesso, Gerli, & Scapolan, 2014; Good & Michel, 2013; Jasmand, Blazevic, & De Ruyter, 2012; Mom, Van Den Bosch, & Volberda, 2007, 2009; Rogan & Mors, 2014). However, these studies focus solely on a manager's ambidextrous behaviour. Studies that investigated individual ambidexterity at the employee level remain scarce, despite empirical evidence that individual ambidexterity contributes to task performance in dynamic environments (Good & Michel, 2013) and to ambidexterity at the organisational level (Rogan & Mors, 2014). This study aims to fill this gap within the organisational ambidexterity literature, by investigating whether and how formal and informal coordination mechanisms affect individual ambidexterity.

Formal coordination mechanisms refer to structural organisational elements – departmentalisation, (de)centralisation, formalisation, planning or output and behavioural control – an organisation can use to influence individuals' behaviour, by shaping their relations and interactions with other individuals, groups or organisational units (Martinez & Jarillo, 1989; Mom et al., 2009). Two mechanisms were analysed in this study. These include individual decision-making authority, which is an individual's autonomy to make decisions about operational goals and tasks in order to solve organisational challenges (Atuahene-Gima, 2003). The second mechanism is task formalisation, which is defined as the degree to which an individual's tasks are described, decision-making is directed and to what extent someone has to conform to his task description (Mom et al., 2009).

Three informal coordination mechanisms were analysed, based on social network analysis. The first mechanism reviewed is network connectedness, which refers to the extent to which an individual is networked through other organisation members, across hierarchical levels and organisational units, through direct contacts (Mom et al., 2009). Second, network heterogeneity is the variety of knowledge, know-how and expertise an individual can gather in his network (Rodan & Galunic, 2004). The third mechanism includes the informality of (ties) connections within one's network. Besides, some interactions between several formal and informal coordination mechanisms were defined. The corresponding central research question is the following:

❖ *What is the relationship between formal and informal coordination mechanisms and individual ambidexterity?*

The empirical setting of this study was an Indonesian job shop in the metal sheet industry. An online questionnaire was constructed using Qualtrics to collect both relational and attribute data. Data was collected from two facility locations (business units) within the firm, employing 164 employees in total. The survey was distributed among all employees, including different departments and hierarchical

levels. The survey generated a response rate of 95.73% (157 responses), 105 for business unit A (95.45%) and 52 for business unit B (96.30%). This sample included 3 senior managers, 21 managers, leaders or coordinators and 130 staff members or operators. Existing and validated scales were used to measure the constructs. One name generator item and six name interpreter items were formulated to measure the connections within the network and the strength of these relationships. Besides, several demographic, organisational and psychological control variables were included.

Confirmatory and exploratory factor analysis pointed out that some items of the exploration and exploitation scale did not load on the intended factor properly and were therefore excluded from the analysis. Hierarchical regression analysis was performed to measure the relationships between the constructs. The analysis showed an inverted relationship between task formalisation and individual ambidexterity (β = .29, p < .01). Interestingly, the main effect of individual decision-making authority is significant in the full model, including the interactions (β = .17, p < .05). Task formalisation and network heterogeneity show a positive interaction effect on individual ambidexterity, β = .37, p < .01. All other hypotheses were rejected. Outliers, influential cases and model assumptions were inspected to make sure the model is not biased.

This study contributed empirically to the ongoing debate about ambidexterity in several ways. The results add to the discussion about whether or not ambidexterity could be present at the individual level (Gupta, Smith, & Shalley, 2006). Moreover, this study addressed the issue that individual ambidexterity can be present at every hierarchical level, instead of only focusing on (senior) management. Factor analysis of the key constructs pointed out that exploitation and exploration are two independent latent factors, thereby indicating that exploitation and exploration activities are not mutually exclusive. Hierarchical and K-means clustering shows four distinct clusters related to individual ambidexterity. These include an unfocused, exploitation focused, moderately ambidextrous and ambidextrous cluster.

Several limitations were identified that should be taken into account. These include common method bias, analysis of a single organisation, the use of cross-sectional data and sample size in factor analysis. In this section, the implications of these limitations are described as well as how these are handled. Some of the limitations provide avenues for further research.

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1. Introduction

How do organisations create sustainable competitive advantage and achieve long-term success? This is one of the central questions that is prevalent in management theory. Since competition has intensified and changes in the environment continuously gain momentum, more scholars embrace the idea that organisational survival depends on the ability to exploit existing resources while exploring new ones (e.g. Blarr, 2012; Jansen, Van Den Bosch, & Volberda, 2006; Levinthal & March, 1993; Raisch, Birkinshaw, Probst, & Tushman, 2009).

One of the first scholars that considered the concepts of exploitation and exploration, was March (1991). He defined exploitation as activities that include refinement, choice, production, efficiency, selection, implementation and execution. Exploration includes activities like search, variation, risk-taking, experimentation, play, flexibility, discovery and innovation. March found that exploitation and exploration are related to each other. This relationship is potentially problematic, as both concepts are crucial for organisational success but compete for the same resources (March, 1991). Organisational ambidexterity refers to a firm's ability to manage the tension between exploitation and exploration (Andriopoulos & Lewis, 2009).

A commonly cited article by Levinthal and March (1993) illustrates that a proper balance between exploitation and exploration is essential for firm survival, as focusing too much on either exploitation or exploration enhances risks for a firm. They state that "[a]*n organization that engages exclusively in exploration will ordinarily suffer from the fact that it never gains the returns of its knowledge. An organization that engages exclusively in exploitation will ordinarily suffer from obsolescence.*" (p. 105). When an organisation pursues exploration only, it will run the risk of being in an endless search for innovations, failure and changes that remain unrewarded. Organisations that focus solely on exploitation are likely to obtain stable returns, but run the risk of becoming unsustainable (Raisch & Birkinshaw, 2008). O'Reilly and Tushman (2013) present an extended list of empirical studies that show a positive relation between ambidexterity and firm performance in terms of sales growth, innovation, market valuation, firm survival and subjective performance ratings. The effect of ambidexterity on performance varies among these studies, as it is moderated by the external environment and some firm-specific factors (Raisch & Birkinshaw, 2008). However, it is evident that ambidexterity provides great opportunities for an organisation to increase its performance.

In their literature review paper on organisational ambidexterity, Raisch and Birkinshaw (2008) stress some of the major shortcomings of the current organisational ambidexterity literature. They state the following: *"There is a complete lack of research into ambidexterity at the individual level of analysis. Detailed case studies, as well as broader field studies, could help to further substantiate our understanding"* (p. 397). This is supported by Raisch et al. (2009) and more recently by Mom, Fourné and Jansen (2015), which argue that conceptual and empirically validated studies on individual-level ambidexterity are still lacking.

Recently, some scholars responded to the call for more research and started investigating ambidexterity at the individual level (e.g. Bonesso, Gerli, & Scapolan, 2014; Good & Michel, 2013; Jasmand, Blazevic, & De Ruyter, 2012; Mom, Van Den Bosch, & Volberda, 2007; Mom et al., 2009; Rogan & Mors, 2014). However, these studies focus solely on a manager's ambidextrous behaviour. This manager level focus is due to the fact that organisations were traditionally coordinated based on bureaucratic principles. Bureaucracy is based on rational-legal authority as a legitimate means of command and control, thereby imposing a strong emphasis on the role of managers (Johnson, Wood, Brewster, & Brookes, 2009).

Nowadays, many organisations embrace post-bureaucratic principles. In post-bureaucratic organisations, the role of managers has changed. Their behaviour develops from authoritative leadership aimed at direct control of subordinates, into enhanced horizontal communication and dialogue (Johnson et al., 2009). Decisions are no longer based on the ability to command but on the ability to persuade. Persuasion depends on knowledge, commitment and proven past effectiveness, not on one's official position (Heckscher, 1994). This implies that not only managers, but any person can contribute to decision-making and organisational outcomes in a post-bureaucratic organisation. Therefore, it seems a promising avenue to further investigate ambidexterity at the employee level.

Studies that investigated individual ambidexterity at employee level remain scarce, despite empirical evidence that individual ambidexterity contributes to task performance in dynamic environments (Good & Michel, 2013) and to ambidexterity at the organisational level (Rogan & Mors, 2014). Rogan and Mors (2014) suggest that this is the consequence of an empirical and theoretical challenge. Firstly, it is difficult to make inferences about individual-level processes and capabilities that foster ambidexterity, as most prior studies relied on firm- or business unit-level data. Secondly, prior studies at the individual level define employees as single actors that could only be part of a loosely coupled, ambidextrous unit (Gupta et al., 2006). Incorporating network theory in a study can overcome these challenges; it allows for measuring at the individual level, without using firm- or business unit-level data. Besides, in social network analysis, each individual is conceptualised as an actor within a network of relationships. An individual may use these distinct relationships to balance exploitation and exploration activities and thus become ambidextrous. Rogan and Mors (2014) used social network analysis to investigate the influence of informal coordination mechanisms on individual ambidexterity, yet again at the manager level.

Other research on individual ambidexterity points out that formal and informal coordination mechanisms affect a manager's ability to act ambidextrously. The influence of these coordination mechanisms on individual behaviour varies (Jansen et al., 2006; Mom et al., 2009; Raisch et al., 2009). Moreover, the relationship between coordination mechanisms and individual ambidextrous behaviour has not yet been tested at the employee level. This seems surprising, as formal and informal coordination mechanisms are among the most important organisational elements to influence individual behaviour (Martinez & Jarillo, 1989; Mom et al., 2009). This study aims to fill this gap within the organisational ambidexterity literature, by investigating whether and how formal and informal coordination mechanisms affect individual ambidexterity. To overcome the challenges as stressed by Rogan and Mors (2014), this study uses a social network perspective in accordance. This perspective builds on and extends prior work on informal coordination mechanisms (e.g. Mom et al., 2009) in addition to the more traditional formal coordination mechanisms. Moreover, this study examines the interaction effect of formal and informal coordination mechanisms, as it has proven to influence ambidextrous behaviour (Mom et al., 2009). The central research question corresponding with the knowledge gap described above is the following:

❖ *What is the relationship between formal and informal coordination mechanisms and individual ambidexterity?*

For this study, the following main research objective is formulated:

❖ *To broaden our understanding of the relationship between formal and informal coordination mechanisms and individual ambidexterity by empirically investigating an Indonesian industrial organisation.*

The specific research questions and sub-objectives can be found in Appendix 1 Research Proposal). The remainder of this report is as follows. In the next chapter (Chapter 2), the hypotheses and conceptual

model of this study are presented, based on a review of individual ambidexterity literature. The method chapter (Chapter 3) specifies the empirical setting and study design, data collection and measurement variables. The empirical results and analysis are presented in Chapter 4. The last chapter (Chapter 5) of this report is concerned with the overall conclusions, discussion and recommendations.

2. Coordination mechanisms and individual ambidexterity

In an ambidextrous organisation, organisational behaviour to manage complex and changing job demands is required. Different types of cognitive orientations are involved to meet these demands, as they often conflict (Bonesso et al., 2014). Pursuing exploitation and exploration activities requires different or even contradictory knowledge processes, as it involves diverse administrative routines and behaviour (Lubatkin, Simsek, Ling & Veiga, 2006). The cognitive orientations are either efficiency-oriented (related to exploitation activities) or variability-oriented (related to exploration activities). The conflicting demands of exploitation and exploration make it difficult for an individual to become ambidextrous (Jasmand et al., 2012; March, 1991). Besides, the ambidexterity literature is not explicit about how to solve or minimise the tensions that arise with individual ambidexterity.

In this study, individual ambidexterity is defined as an individual's ability to properly balance exploitation and exploration activities within a certain period of time (Mom et al., 2009). Individual ambidexterity is referred to as ambidextrous behaviour at *employee* level, unless stated otherwise. Individual ambidexterity requires a proper balance and management of exploitation and exploration activities. Prior studies have shown the importance of coordination mechanisms in influencing and guiding individual behaviour (Martinez & Jarillo, 1989; Ven, Delbecq, & Koenig, 1976) such as individual ambidexterity.

A coordination mechanism is defined as an organisational element to coordinate activities of persons within an organisation (Martinez & Jarillo, 1989; Oxford Scholarship Online, n.d.). Coordination mechanisms may be used to establish, decompose and communicate organisational tasks (Vlaar, 2006) and can roughly be classified as formal or informal (Martinez & Jarillo, 1989). These mechanisms can influence (the extent of) exploitative and explorative behaviour and subsequently individual ambidextrous behaviour (Mom et al., 2009). However, much has yet to be clarified about the influence of these types of coordination mechanisms on ambidexterity, particularly at the individual level. The following sections elaborate on different elements of formal and informal coordination mechanisms that may affect individual ambidextrous behaviour.

2.1 Formal coordination mechanisms

Formal coordination mechanisms refer to structural organisational elements – departmentalisation, (de)centralisation, formalisation, planning or output and behavioural control – an organisation can use to influence individuals' behaviour, by shaping their relations and interactions with other individuals, groups or organisational units (Martinez & Jarillo, 1989; Mom et al., 2009). As stated in the introduction, nowadays most companies embrace post-bureaucratic principles (Johnson et al., 2009). Therefore, it seems that individual autonomy has become increasingly more relevant and worth considering. According to Mom et al. (2009), the most important coordination mechanisms regarding individual ambidexterity include (de)centralisation of decision-making authority and formalisation of tasks. Centralisation and task formalisation both relate to individual autonomy, which is a prerequisite to enable a proper balance of exploitation and exploration activities (Gibson & Birkinshaw, 2004). This study explores, among other things, the relationship between these formal coordination mechanisms and individual ambidexterity. The following section provides hypotheses and arguments regarding centralisation of decision-making authority and task formalisation in relation to individual ambidexterity.

2.1.1 Centralisation and individual decision-making authority

One of the fundamental dimensions of organisational design is centralisation (Tsai, 2002). Centralised organisations coordinate activities through vertically imposed bureaucratic processes. In a centralised organisation, employees are limited in their ability to manage (changing) demands in their task

environment due to inadequate response time by management (Jansen, Simsek, & Cao, 2012). Besides, centralisation may cause inefficiency due to errors in knowledge transfer to higher hierarchical levels (Tsai, 2002).

Decentralised organisations allow employees at lower hierarchical levels to make decisions within certain organisational boundaries. Individual decision-making authority can be defined as an individual's autonomy to make decisions about operational goals and tasks in order to solve organisational challenges (Atuahene-Gima, 2003). Delegation of decision-making authority increases the amount and quality of solutions that are provided to solve organisational issues, due to several reasons. Firstly, as lower-level employees are closer to the problem than do their superiors, they are better able to collect qualitative and timely information about the problems. Secondly, decentralisation improves an individual's cognitive ability, which increases the amount and quality of problem-solving ideas. Thirdly, as individuals may feel to have more control over their work, the urge to seek for innovative solutions increases as well (Atuahene-Gima, 2003). Increased self-control and ownership encourages individuals to make autonomous decisions on how they should spend their time (Gibson & Birkinshaw, 2004). This may stimulate an individual to pursue a diverse set of goals and thus become ambidextrous (Mom et al., 2009). Therefore, the following hypothesis is formulated:

H1: individual decision-making authority is positively related to individual ambidexterity.

2.1.2   Task formalisation

Formalisation refers to the extent of written rules, procedures and instructions (Adler & Borys, 1996). Task formalisation can be defined as the degree to which an individual's tasks are described, decision-making is directed and to what extent someone has to conform to his task description (Mom et al., 2009). Formalisation of tasks enables coordination by supporting rational decision-making and by providing individuals the necessary means to handle their responsibilities (Vlaar, 2006, p. 36). Activities and decisions are restricted in an attempt to align individual activities with organisational goals and objectives. Specialised roles, rules and standard operating procedures provide boundaries an individual can work in, which increases the predictability of outcomes (Vlaar, 2006). It is argued that task formalisation leads to efficiency when there is an overlap between individuals' and organisational goals. It could reduce role conflict and ambiguity, which could lead to improved job satisfaction and lower levels of stress (Adler & Borys, 1996). Well-designed rules and procedures could enable individuals to better master their tasks (Adler & Borys, 1996; Jansen et al., 2006), thereby improving ambidextrous behaviour. Jansen et al. (Jansen et al., 2006) found that formalisation is positively related to exploitative innovation, whereas they found no significant negative relationship between formalisation and exploratory innovation.

It seems that formalisation not only contributes to individual ambidexterity but also affects it negatively. This is illustrated by Mintzberg (1994, p. 34, as cited in Vlaar, 2006), who stated that "*formalization is a double-edged sword, easily reaching the point where help becomes hindrance*". Previous studies indicate that formalisation is negatively related to innovation and job satisfaction (see Adler & Borys, 1996). Formalisation negatively affects innovative activity as it constraints creative problem-solving and idea generation (Damanpor, 1996, p. 151). It undermines the high level of autonomy that employees aspire, thereby decreasing commitment and innovation effectiveness. Employees are less motivated to engage in nonroutine, explorative tasks, which could negatively influence ambidextrous behaviour. Task formalisation is associated with singleness of purpose and decreases the likeliness of individuals to pursue different opportunities and goals. This is opposed to ambidextrous behaviour, in which an individual attempts to fulfil a range of different goals (Mom et al., 2009).

To conclude, empirical evidence on the relationship between formalisation and organisational performance is mixed. It seems that too little task formalisation leads to chaos, whereas too much formalisation leads to rigidity and constraints creativity (Vlaar, 2006). Most of the arguments suggest that formalisation negatively affects exploration activities, while positively affecting exploitation activities. However, individual ambidexterity requires high levels of exploitation and exploration activities. It is expected that at a certain point, the negative effects of high task formalisation on exploration activities outweigh the positive effects on exploitation activities. Therefore, the following hypothesis is formulated:

> H2: there is an inverted U-relationship between task formalisation and individual ambidexterity.

2.2 Informal coordination mechanisms

So far, most research within the ambidexterity paradigm has focused on formal coordination mechanisms. However, scholars increasingly address informal coordination mechanisms as a tool to influence individuals' behaviour (Mom et al., 2009). As most activity within an organisation does not follow the hierarchical structure, informal coordination mechanisms seem relevant to coordinate activities (Tsai, 2002). Formally defined interactions and predefined rules cannot fully explain organisational behaviour in complex environments (Lamieri & Mangalagiu, 2009). Therefore, other attempts to explain individual behaviour are based on a different theoretical perspective: the knowledge-based theory of the firm. This theory suggests that knowledge is the most valuable resource of a firm (Grant, 1996) in order to create sustainable competitive advantage (Teece, Pisano, & Shuen, 1997). The perspective suggests that informal interpersonal networks are a major component in transferring knowledge within organisations (Lamieri & Mangalagiu, 2009).

Prior studies have also shown the importance of informal coordination mechanisms in fostering ambidextrous behaviour (e.g. Gibson & Birkinshaw, 2004; Mom et al., 2009). Empirical studies point out that the social network of organisational actors affects their ability to balance exploitation and exploration, as different attributes of one's network may be associated with performing different tasks (Rogan & Mors, 2014). In order to investigate the effects of informal coordination mechanisms on individual ambidextrous behaviour, network theory is considered. According to this perspective, organisations consist of social groups that interact in relatively stable patterns over time. Social network analysis is involved with the structures and patterns of the relationships that exist within organisations (Tichy, Tushman, & Fombrun, 1979). These relationships vary not only in terms of structure – for example the density of one's network – but in terms of content – the heterogeneity of the knowledge that flows through the ties – as well (Rodan & Galunic, 2004; Rogan & Mors, 2014). Moreover, the extent to which an individual actor relies on either formal or informal ties within his network may influence the exploitation and exploration activities performed by that actor (Rogan & Mors, 2014). In order to assess the relationship between informal coordination mechanisms and individual ambidexterity, the following section provides arguments and hypotheses regarding an individual's network connectedness, network heterogeneity and informality of its network ties. The network characteristics in this study are limited to the internal network of the organisation.

2.2.1   Informal social relations and network connectedness

Cardinal (2001) stresses the importance of informal social relations in developing exploitative and explorative innovation. Informal social relations can be defined as personal linkages between employees that comprise a more voluntary mode of coordination than hierarchical structures (Jansen et al., 2006; Tsai, 2002). Prior studies have tested the relationship between the density of a manager's social network – or connectedness – and ambidextrous behaviour (Jansen et al., 2006; Mom et al.,

2009). Connectedness refers to the extent to which an individual is networked through other organisation members, across hierarchical levels and organisational units, through direct contacts (Mom et al., 2009). Both studies hypothesised an inverted U-shaped relationship but found a positive relationship with ambidextrous behaviour (Jansen et al., 2006; Mom et al., 2009).

However, the characteristics and advantages of network connectedness do not apply to managers specifically. Prior studies point out that interfirm or interunit relations affect knowledge transfer and learning behaviour (Jansen et al., 2006). Employees may use their network to acquire for example new competencies and pursue radical innovation, but also to refine existing competencies and pursue incremental innovation (Mom et al., 2009). A densely connected network allows individuals to generate new capabilities, gain new insight and knowledge which allows them to handle complex situations (Lamieri & Mangalagiu, 2009). Regarding network connectedness, the following hypothesis is formulated:

> *H3: network connectedness is positively related to individual ambidexterity.*

2.2.2   Network heterogeneity

Prior studies have mainly focused on the structural dimension of individuals' networks, for example by studying the network density (e.g. Jansen et al., 2006; Mom et al., 2009). However, structural characteristics of a network are not necessarily a good predictor of behaviour and motivation of individuals (Soda, Stea, & Pedersen, 2017). Therefore, a qualitative measure of social interaction should be considered, as the quality of the interactions within the network can affect ambidextrous behaviour as well (Jansen et al., 2006; Rogan & Mors, 2014). Knowledge heterogeneity can be used as an indicator to assess the quality of the network and is defined as the variety of knowledge, know-how and expertise an individual can gather in his network (Rodan & Galunic, 2004). In a social network study, Rodan and Galunic (2004) showed that heterogeneity in the knowledge provided by contacts in a network is as important as the structure of the network itself for gathering novel information and for the implementation of innovation. In a homogeneous network, individuals are closely connected to each other. As a result, these individuals are likely to obtain similar and redundant information and knowledge (Rodan & Galunic, 2004).

In contrast, individuals that are part of a heterogeneous network are likely to obtain not only a larger amount of knowledge but also more diverse information. According to Rodan and Galunic (2004, p. 545), "*exposure to heterogeneous knowledge should improve not only opportunity recognition and thus be associated with the ability to perform routine and ongoing tasks, but should also raise the* [individual's] *creative potential.*" Routine and ongoing tasks are related to exploitation activities, whereas the creative potential can be a source for exploration activities. Knowledge diversity in an individual's network can be useful for the implementation of innovation, especially when it involves complex tasks (Rodan & Galunic, 2004). Cross-functional participation can enable ambidextrous behaviour as it provides individuals with the opportunity to exchange knowledge (Mom et al., 2009). To summarise, it is expected that network heterogeneity contributes to knowledge diversity, which could foster ambidextrous behaviour. Regarding network heterogeneity, the following hypothesis is formulated:

> *H4: network heterogeneity is positively related to individual ambidexterity.*

2.2.3   Network tie informality

Within a network, individuals are connected to each other. These connections, or network ties, can be formal or informal. Formal and informal network ties should not be confused with formal and informal coordination mechanisms. Formal network ties are used to handle standard work procedures and

easily anticipated problems (Krackhardt & Hanson, 1993). Communication via one's formal network ties involves bureaucracy, which is time-consuming and limits flexibility (Aalbers, Koppius, & Dolfsma, 2006). This may constrain individual ambidexterity, as it reduces one's ability to adequately adapt to (environmental) changes.

When organisational challenges become more complex, informal network ties are addressed (Krackhardt & Hanson, 1993). Informal network ties allow for information and knowledge exchange in both vertical and horizontal directions. In contrast to formal network ties, informal ties contribute to flexibility or adaptability, which is an enabling factor for ambidexterity (Gibson & Birkinshaw, 2004). According to Rogan and Mors (2014), informal network ties are more critical than formal ties when passing by existing boundaries (i.e. outside existing tasks or departments). Informal network ties increase the possibility for cross-fertilisation of knowledge, which is essential for ambidexterity. Based on a social network analysis study, Rogan and Mors (2014) found that the degree of informality in the network ties is positively related to ambidextrous behaviour within managers. It is expected that the informality of network ties show the same tendency among all hierarchical levels. Therefore, the following hypothesis is formulated:

> *H5: network tie informality is positively related to individual ambidexterity.*

2.3 Interaction effects

It is argued that combining formal and informal coordination mechanisms would stimulate ambidextrous behaviour (Gibson & Birkinshaw, 2004; Mom et al., 2009). In another study, Chen and Huang (2007) found that social interaction (i.e. informal coordination mechanism) mediates the relationship between organisational structure (i.e. formal coordination mechanisms) and sharing and application of tacit knowledge. These studies suggest that formal and informal coordination mechanisms interact to a certain extent. However, it is not clear whether and how this suggested relationship holds. Therefore, this study assesses whether there are significant interaction effects between distinct elements of formal and informal coordination mechanisms on individual ambidexterity.

2.3.1 Individual decision-making authority and network connectedness

Individuals that have the autonomy to make decisions about operational goals and tasks are likely to perform ambidextrous behaviour (Mom et al., 2009). A densely connected network affects knowledge transfer and learning behaviour between individual actors (Jansen et al., 2006). A connected network may increase an individual's ability to understand the identified needs and opportunities more thoroughly and reduce ambiguity, by "*engaging in frequent, reciprocal and non-routine information processing*" (Mom et al., 2009, p. 817). This implies the following relationship:

> *H6: there is a positive interaction effect between individual decision-making authority and network connectedness on individual ambidexterity.*

2.3.2 Individual decision-making authority and network heterogeneity

As stated in the previous section, the autonomy to make decisions could foster individual ambidexterity. When an individual has access to a wide variety of knowledge, he may be better able to solve diverse organisational challenges. Individuals that possess a heterogeneous network are more likely to obtain new knowledge, know-how and expertise from their network (Rodan & Galunic, 2004). Besides, individuals may recognize a wider variety of opportunities, as they enjoy more diverse possibilities to gather ideas, information and input from other organisational members (Mom et al., 2009). This allows individuals to apply the gathered knowledge to diverse organisational challenges,

thereby increasing perceived self-control and ownership (Gibson & Birkinshaw, 2004) and subsequently, individual ambidexterity. Formally stated:

H7: there is a positive interaction effect between individual decision-making authority and network heterogeneity on individual ambidexterity.

2.3.3 Task formalisation and network heterogeneity

According to Mom et al. (2009), individuals need to cooperate and combine their efforts with other organisational members for being able to pursue different goals. High task formalisation likely leads to isolation of individuals, as they tend to focus more on their core tasks. However, the expected positive effects of a heterogeneous network are likely to reduce the negative effect of high task formalisation on individual ambidexterity. Individuals with a heterogeneous network are likely to be exposed to a larger and more diverse amount of knowledge (Rodan & Galunic, 2004). This may stimulate individuals to broaden their expertise beyond the narrow tasks of their own jobs (Mom et al., 2009) and to develop knowledge underlying exploratory innovation (Jansen et al., 2006). It can be expected that network heterogeneity cancels out the possible negative effects of high task formalisation. Therefore, the following interaction hypothesis is formulated:

H8: there is a positive interaction effect between task formalisation and network connectedness on individual ambidexterity.

2.3.4 Task formalisation and informality of network ties

Section 2.1.2 elaborates on the possible negative effects of high task formalisation. These include reduced innovative activity, commitment and autonomy. Moreover, individuals are more likely to strive for single purposes and to become isolated (Damanpor, 1996; Mom et al., 2009). High task formalisation is negatively associated with ambidextrous behaviour, as it reduces the extent to which individuals build and maintain personal relationships. These possible negative effects of high task formalisation may be reduced by informal network ties. Informal network ties are based on voluntary relationships among individuals. These informal ties are critical when passing existing boundaries (i.e. outside one's existing tasks or department) and it allows cross-fertilisation of knowledge (Rogan & Mors, 2014). Therefore, the following interaction effect is hypothesised:

H9: there is a positive interaction effect between task formalisation and informality of network ties.

2.4 Conceptual framework

Based on the literature review, the conceptual framework is designed as presented in Figure 1. The conceptual framework shows the hypothesised relationships between the formal and informal coordination mechanisms – the independent variables – and individual ambidexterity, the dependent variable. These relationships correspond with hypotheses 1 until 5. The hypothesis regarding task formalisation is depicted with a +/- notation, as the relationship with individual ambidexterity is expected to be curvilinear. The dashed lines show the expected interaction effects between the independent variables on individual ambidexterity, corresponding with hypotheses 6 until 9.
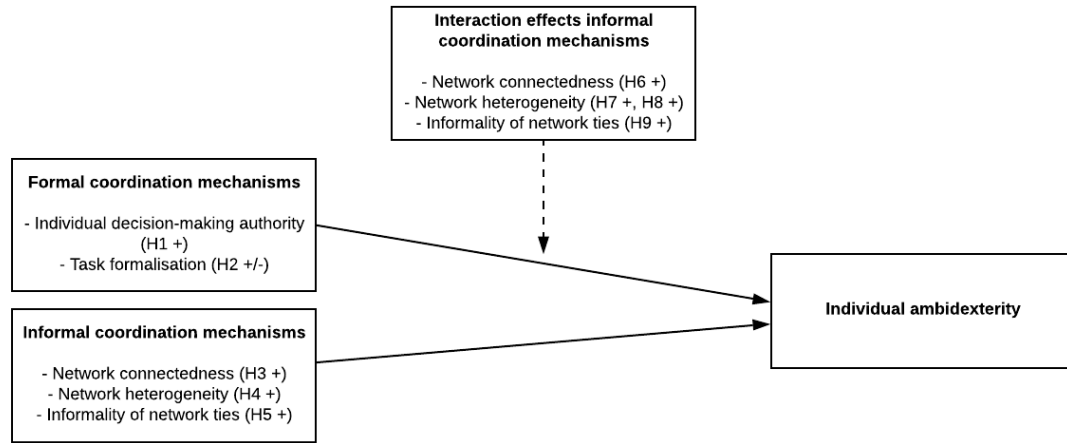
Figure 1: Conceptual framework

3. Methods

The empirical setting of this study was an Indonesian job shop in the metal sheet industry. The organisation has three facility locations, all on the Java island. In total, around 200 people work at the organisation. The organisation can be characterised as a post-bureaucratic organisation, which involves teamwork, decentralised and consensual decision-making and increased individual autonomy (Maravelias, 2003). The organisation applies lean principles, which are targeting at continuous improvement of every process within the organisation. This requires employees to take responsibility for their tasks and feel some sense of ownership (Womack & Jones, 2003). Based on this knowledge, it is assumed that ambidextrous behaviour is present in the organisation. The empirical data was collected from two facility locations (business units) within the firm, employing 164 employees in total. Therefore, external and firm-varying factors that may affect individual ambidexterity are kept constant (Soda et al., 2017).

The survey generated a response rate of 95.73% (157 responses), 105 for business unit A (95.45%) and 52 for business unit B (96.30%). Three responses contained missing values and were therefore (partially) excluded from the analysis. This reduced the final sample size to 154, with a response rate of 93.90%. This sample included 3 senior managers, 21 managers, leaders or coordinators and 130 staff members or operators.

3.1 Study design and data collection

A study design can be classified based on the number of contacts, the reference period and the nature of the investigation (Kumar, 2014). A cross-sectional study design was used for this study. In a cross-sectional study, a phenomenon, situation or problem is investigated based on a single measurement point in time. The reference period can be characterised as prospective, as this study attempts to measure the likely impact of specific events (formal and informal coordination mechanisms) on a certain outcome (individual ambidexterity). The study was non-experimental, as no variables were manipulated (Kumar, 2014).

This study applies a deductive approach. This involves hypotheses development based on existing theory. The study design was developed in such a way that it enables hypotheses testing. In order to test the hypotheses, quantitative data was required. For this study, both primary and secondary data were used. The following sections describe how this data was gathered.

3.1.1 Secondary data

A literature study was executed to find journal articles related to (individual) ambidexterity, its antecedents, individual ambidexterity and performance, environmental factors and other moderators related to individual ambidexterity, innovative behaviour, formal and informal coordination mechanisms and social network analysis.

In order to guide and restrict the literature study, some rules of thumb were used. The Field-Weighted Citation Impact (FWCI) shows the ratio between the actual citations an article received and the average number of citations received by all other similar publications. It shows whether an article is cited above or below average in a certain discipline, up to three calendar years after publication. An FWCI score of 1 indicates that an article performs as expected on global average. An FWCI score of more than 1 indicates that an article is cited more than average. For example, an FWCI score of 1.75 means that an article is cited 75% more than expected. An article that scores for example 0.75 is cited 25% less than expected (Snowball Metrics Steering Group, 2017). Only articles with a FWCI >1 were used for the literature study, in order to filter out literature that has lost impact and relevance.

The majority of the articles considered are published in leading management and business journals. These include Academy of Management Journal, Academy of Management Review, Administrative Science Quarterly (ASQ), Journal of Management, Journal of Management Studies, Organization Science and Strategic Management Journal. The relevance of the journals was assessed and mutually compared based on their Journal Impact Factor 2017 (Clarivate Analytics, 2018). The JIF was used as a guideline to assess the impact of a journal only, as it should not be directly used as an indicator for quality (Seglen, 1997).

3.1.2 Primary data

The empirical part of this study is based on a survey. Choosing between a survey or interview depends on the nature of investigation, geographical distribution and type of study population (Kumar, 2014, p. 181). The type of study population is not in favour of one type of design. For this study, the nature of investigation and geographical distribution are highly relevant. Regarding the nature of investigation, interviews are not suitable for collecting quantitative data. This is required to draw statistically significant conclusions and to use the social network analysis effectively. Besides, in interviews, respondents may feel reluctant to answer questions honestly which may jeopardise the accuracy of data. Surveys can provide greater anonymity. Moreover, as the empirical setting is based on an Indonesian organisation, conducting interviews is expected to be unfeasible. Based on these considerations, a survey design was chosen.

Participants received a questionnaire in order to collect both attribute and relational data. Attribute data "*relate*[s] *to the attitudes, opinions and behaviour of agents, in so far as these are regarded as the properties, qualities of characteristics that belong to them as individuals or groups* (Scott, 2017, p. 4)*. Attribute data is collected while considering the formal coordination mechanisms and individual ambidexterity. Relational data is about "*the contacts, ties and connections, and the group attachments and meeting that relate one agent to another and that cannot be reduced to the properties of the individual agents themselves"* (Scott, 2017, p. 4)*. Relational data is collected with regard to the informal coordination mechanisms.

The survey had been distributed among all employees, which includes different departments and hierarchical levels. For the survey, approval and commitment from management were obtained in order to smoothen the process. An online questionnaire was constructed using Qualtrics and had been distributed among the employees through the management, in an attempt to increase commitment and response rate. As most employees do not master the English language sufficiently, the questionnaire was translated into Indonesian and later translated back to tackle possible translation ambiguities.

3.1.2.1 Implications of survey design

Using a survey design provides several advantages (Kumar, 2014). Compared to interviews, conducting questionnaires saves time and financial resources. Besides, it also benefits some practicalities, as there is no need to be physically present on the empirical site. Another advantage of a survey design is anonymity. In these types of studies, however, confidentiality may be a bottleneck, as employees may be traced from the social network analysis. In order to ensure anonymity and confidentiality, the following steps were taken (Müller-Prothmann, 2005, p. 168):

- All personal data has been anonymised. Each employee is linked to a unique code. Only these codes have been used for analysis. This allowed the researcher to retrieve each employee and link it to other variables of interest, without using sensitive data such as names;
- All data has been stored safely. Only the researcher and supervisors have access to the data;

- Only aggregate results were presented to the management. Aggregate data was used to ensure that employees and their responses cannot be traced back, which further increases anonymity.

Using a survey design has some disadvantages which could influence the quality of data (Kumar, 2014). Questionnaires generally have a very low response rate. The response rate is significantly influenced by the length of the questionnaire (Deutskens, De Ruyter, Wetzels, & Oosterveld, 2004). A low response rate increases the risk of non-response bias, which influences the quality of data. As a consequence, the results may not be representative of the total study population (in this case the organisation). For social network analysis, a response rate of at least 80 per cent is required. Therefore, only 'need-to-know' questions were included in the questionnaire in an attempt to maximise the response rate. Furthermore, respondents that did not complete the questionnaire received a reminder after one week and after two weeks.

The attribute data in this study is based on self-reported measures. Although this may lead to self-reporting bias, a questionnaire remains a valuable and valid measurement strategy to measure employee perception and behaviour (Howard, 1994). The questionnaire was self-administered. Therefore, there was no possibility to clarify any issues if respondents did not understand some questions. Respondents could have interpreted the questions or answers differently, hence influencing the quality of the data. The questions were formulated (and translated) in an easy to follow language, in order to minimise the risk of ambiguity. Moreover, a pilot questionnaire was tested in the field to detect any further issues. The respondents were instructed to give any feedback regarding unclarities, ambiguities or any other remarks. In each part of the survey, an optional text block was added to allow the respondents to give feedback on the items on that particular page. Based on feedback from pilot respondents and the CEO, minor changes were implemented in the survey. These included some examples and clarification of a few questions.

3.1.2.2 Structure of the questionnaire

In order to collect data about individual ambidexterity and formal and informal coordination mechanisms, a questionnaire was constructed. The items in this questionnaire were based on the key concepts in this study, which are operationalised in section 3.2. The questionnaire consisted of five parts. The first part involved demographic background (and) control variables, which was used to analyse the influence of possible extraneous variables (Kumar, 2014). The second part considered the social network analysis part corresponding with the informal coordination mechanisms. Here one name generator items and 6 *qualifier* items were used, as well as an item regarding the informality of network ties. The third part was about individual ambidexterity, based on Likert-scale items. The fourth part involved attitudinal questions regarding formal coordination mechanisms, which were based on Likert-scale items as well. The last part included the self-monitoring control variable, which is elaborated on in Section 3.2. The structure of the questionnaire and its key concepts was as follows:

- Demographic background (control variables):
  - Name;
  - Gender;
  - Education level;
  - Tenure in organisation;
- Social network analysis - Informal coordination mechanisms independent variables:
  - Network connectedness and heterogeneity; 1 name generator item and 6 *qualifier* items for each contact provided in name generator question;
  - Formality of network ties; 1 item for each contact provided in name generator question;

- Individual ambidexterity (dependent variable):
  - Exploitation activities; 7 items;
  - Exploration activities; 7 items;
- Formal coordination mechanisms (independent variables):
  - Individual decision-making authority; 4 items;
  - Task formalisation; 4 items;
- Self-monitoring (control variable); 18 items.

The complete questionnaire is attached in Appendix 2 (English version) and Appendix 3 (Indonesian version).

3.2 Measures

This study used existing scales from literature to ensure validity of the constructs (Kumar, 2014). After data collection, confirmatory and exploratory factor analysis of all attribute data was executed to test for construct validity, see Section 4.1 and Section 4.2. The attribute data includes all items regarding individual ambidexterity (the dependent variable) and all items regarding the formal coordination mechanisms (two independent variables).

3.2.1 Dependent variable

Mom et al. (2007, 2009) created a scale to measure a manager's ambidexterity, based on the exploitation and exploration activities as defined by March (1991). They constructed separate scales for exploitation and exploration activities, thereby assuming that both constructs are independent of each other. They tested the scale using exploratory factor analysis and found seven exploitation (α = .87) and seven exploration items (α = .90) to be reliable to measure individual ambidexterity at manager-level. However, these items cannot only be used to measure a *manager*'s work activities, but to measure work activities in general as well. As this study targeted employees at multiple hierarchical levels, this scale was used. Respondents could select one out of five answers, varying from 1, to a small extent; 3, to a moderate extent; to 5, to a large extent.

Concerning exploitation activities, the following items were used:

- To what extent did you, last year, engage in work-related activities that can be characterised as follows:
  - Activities of which a lot of experience has been accumulated by yourself;
  - Activities which you carry out as if it were routine;
  - Activities which serve internal customers with existing services/products;
  - Activities of which it is clear to you how to conduct them;
  - Activities primarily focused on achieving short-term goals;
  - Activities which you can properly conduct by using your present knowledge;
  - Activities which clearly fit into existing company policy.

With regard to exploration activities, the following items were used:

- To what extent did you, last year, engage in work-related activities that can be characterised as follows:
  - Searching for new possibilities with respect to products/services, processes, or markets;
  - Evaluating diverse options with respect to products/services, processes, or markets;
  - Focusing on strong renewal of products/services or processes;
  - Activities of which the associated yields or costs are currently unclear;
  - Activities requiring quite some adaptability of you;

- o Activities requiring you to learn new skills or knowledge;
- o Activities that are not (yet) clearly existing company policy.

The additudinal score for each item is summed for the exploitation activities and then divided by the number of items (=7). The same procedure is executed for exploration activities. Subsequently, the exploitation and exploration scores are multiplied to calculate the individual ambidexterity score. This procedure is consistent with prior studies (Gibson & Birkinshaw, 2004; He & Wong, 2004; Lubatkin et al., 2006; Mom et al., 2009), and can be illustrated by the following formula:

$$Individual\ ambidexterity =$$

$$(\textstyle\sum Exploitation\ items\ score)/7 * (\textstyle\sum Exploration\ items\ score)/7 \qquad [1]$$

Both exploitation and exploration consist of seven items with a minimum score of 1 and a maximum score of 5. Therefore the value for individual ambidexterity may vary from 1 (=7/7*7/7) to 25 (=25/7*25/7).

3.2.2 Independent variables
In this section, the independent variables are operationalised to enable estimation of the relationship with the dependent variable.

3.2.2.1 Formal coordination mechanisms
To measure the formal coordination mechanisms, two distinct scales were used.

Individual decision-making authority
An existing four-item scale is used to measure individual decision-making authority, based on Dewar, Whetten and Boje (1980) (α = .64). This scale has previously been used in ambidexterity research by Mom et al. (2009). Respondents could select one out of five answers, varying from 1, strongly disagree, 3, undecided, to 5 strongly agree. In this study, the following four items were included:

- ▪ I can undertake little action until my supervisor approves a decision;
- ▪ If I want to make my own decisions, I will be quickly discouraged;
- ▪ I have to ask my supervisor before I do almost everything;
- ▪ Any decision I make has to have my supervisor's approval.

The scores were reversed and the average score on the four items was included in the analysis. Formulated this way, high scores correspond to a high individual decision-making authority, which is consistent with hypothesis H1.

Task formalisation
Consistent with prior studies (Jansen et al., 2006; Mom et al., 2009), a four-item scale was used to measure the extent of task formalisation among employees (α = .68). This scale is adapted from Deshpande and Zaltman (1982), which used a fifteen-item scale to measure the effect of formalisation on the use of market research information. Using the scale Mom and colleagues adapted had some advantages. First, it decreased the length of the survey, thereby reducing the risk of boredom and low response rate. Besides, this scale has previously been tested within the ambidexterity field and has been validated (Mom et al., 2009). Respondents could select one out of five answers, varying from 1, strongly disagree, 3, undecided, to 5, strongly agree. In this study, the following four items were included:

- ▪ Whatever situation arises, I have procedures to follow in dealing with it;
- ▪ I don't have to follow strict operational procedures at any time;

- Rules occupy a central place in my work-related activities;
- There is a written job description for going about my tasks.

The average score on the four items was included in the analysis. High scores correspond to high task formalisation. In contrast with prior studies, this study hypothesised an (curvilinear) inverted U-shaped relationship between task formalisation and individual ambidexterity. Therefore, the coefficient for the squared term was used in the analysis (Mom et al., 2009).

3.2.2.2 Informal coordination mechanisms

The informal coordination mechanisms were studied based on social network variables. This involves a different type of questions compared to the formal coordination mechanisms. The common procedure for collecting network data is to use one or more name generator items and to subsequently obtain additional data via name interpreter items. These name interpreter items could include personal attributes, properties of the network ties or intensities of the ties (Marsden, 1990). In this study, one name generator item and six name interpreter items or *qualifiers* were included.

Network connectedness

To compose the network and its relationships, respondents were exposed to one name generator item. The relationships within the network are necessary to calculate network connectedness, which is the extent to which an individual is networked through other organisation members, across hierarchical levels and organisational units, through direct contacts (Mom et al., 2009). The following name generator item was used (Krackhardt & Hanson, 1993; Rodan & Galunic, 2004):

- Please choose the people with whom you communicated the most regarding work-related topics in the past year;

Respondents could type the first few letters of each contact in the appropriate search bar. The full name then automatically appeared. This item was used to identify the individuals and their contacts in order to build the network. Based on the contacts a respondent identifies, one is able to calculate the network connectedness, based on Formula 2 (Rogan & Mors, 2014):

$$Network\ connectedness = ties\ /\ [size\ x\ (size - 1)/2] \hspace{2cm} [2]$$

Network connectedness describes the fraction of actual connections (ties) relative to the potential connections (size). A potential connection is a possible link between two actors in a network (nodes). Ties refer to the actual connections an individual has. Size refers to the total potential connections in a network. However, one should keep in mind that the actual possible network ties within a network are not the same as the theoretical possible network ties, as individual actors have an upper limit in the number of ties they can manage. The difference between the theoretical and actual possible network ties increases when the size of the network increases (Scott, 2000). As the network under study is relatively large (over one hundred individuals), this should be taken into account. Network connectedness or density is calculated via UCINET software.

Two characteristics of the network data should be considered. The items are *directed*, which means that the direction of a certain relation is relevant. When using undirected data, only the presence or absence of a relationship is considered. Therefore, relations are not reciprocal by definition, but depend on whether two contacts identify one another in the name generator question. Directed data provides a richer explanation of the relationships in a network (Scott, 2000). Besides, *valued* data is used. For each identified contact, respondents were requested to reply to six name interpreter items or qualifiers, to indicate the intensity of the connections. In this study, three knowledge qualifiers, one

frequency qualifiers, an emotional closeness qualifier and a duration qualifier were used, based on the following 5-point Likert scale statements (Reagans & McEvily, 2003):

- To what extent have you provided [name of contact] with work-related knowledge?
- To what extent have you received work-related knowledge from [name of contact]?
- To what extent is the information received from [name of contact] typically well documented in writing (e.g. memos, reports, manuals, e-mails)?
- On average, how often do you talk to [name of contact]?
- How close are you with [name of contact]?
- How long have you been knowing [name of contact]?

Regarding the knowledge qualifiers, respondents could select one out of five answers, varying from 1, very little extent; 3, neither little nor large extent; to 5, very large extent. The frequency qualifier answer options vary from 1, several times a day; 3, weekly; to 5, less than monthly. Regarding emotional closeness, the following answers could be selected: 1, very distant; 3, neither close nor distant; 5, very close. Considering the duration qualifier, respondents could select answers varying from 1, less than six months, 3, one to two years, to 5, more than five years. Based on these qualifiers, the strength of the ties could be calculated to enrich the network connectedness data. This calculation was performed in UCINET software.

Network heterogeneity

Network heterogeneity describes properties of the network ties. In order to assess the network heterogeneity of individual employees, the brokerage position of an individual was determined as a proximation of network heterogeneity. Individuals (brokers) occupy a brokerage position when they "connect individuals who would otherwise remain disconnected" (Soda et al., 2017, p. 3). More recently, scholars acknowledge that a brokerage position is not only a structural characteristic of an individual's position in a network, but may also reflect certain behaviour to mobilise knowledge and pursue structural opportunities provided by their network position (Soda, Tortoriello, & Iorio, 2018). Individuals whose networks bridge structural holes between departments are more likely to detect and process various information across groups (departments) (Burt, 2004).

No additional variable was required to determine the brokerage position of an individual, as this is based on their position in the network. The network was composed based on the name generator items as described above. The brokerage position of an actor illustrates the potential for this actor to connect actors in the network that are not connected directly otherwise. Consider for example the network in Figure 2. Actor C occupies a brokerage position between actor D and actor A, B or E. As there is a direct link between for example actor A and B, actor C does not act as a broker here. Calculation was performed in UCINET software.
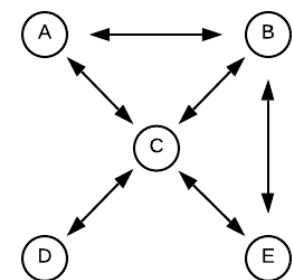
Figure 2: Example network

Network tie informality

In order to determine the extent of informality of the network ties, a 5-point Likert scale item was included. Individuals can build relationships using resources that are *dependent* on their formal role in the organisation, e.g. the firm's knowledge, reputation or delivery capacity. On the other hand, individuals can build relationships using resources that are *independent* of their formal role, e.g. personal knowledge, expertise or friendship. The scale is adapted from Rogan and Mors (2014), who investigated individual ambidexterity from a social network perspective. A five-point Likert scale was used to assess to what extent individuals use formal or informal resources to build and maintain relationships with their contacts (Rogan & Mors, 2014). Respondents could select one out of five

answers: 1, formal; 2, often formal; 3, sometimes formal; 4, rarely formal; 5, independent of formal to describe the informality of their network ties:

- Which combination of resources do you use to build and maintain the relationship with your contacts?

For each contact as defined in the name generator item, the network tie informality was determined. The average network tie informality was calculated for each respondent in order to allow for further analyses. Consistent with Rogan and Mors (2014), a high value corresponds with high tie informality of the respondent's network.

3.2.3 Control variables

Besides the independent variables as described in the previous section, other variables can affect individual ambidexterity as well. Therefore, this study controls for several demographic, organisational and psychological variables. The inclusion of control variables does not only help to determine the influence that is attributable to the independent variables but can – to some extent – be used to test for non-response bias too. A dummy variable is included to control for possible gender effects. Education is associated with increasing cognitive ability to process information and learning (Mom et al., 2009) and is therefore included in the questionnaire. A dummy variable is used to distinguish a bachelor's degree or higher.

Several scholars argue that managers at high hierarchical levels should behave more ambidextrously than personnel at lower hierarchical levels (e.g. Lubatkin et al., 2006; O'Reilly & Tushman, 2004). To control for this possible effect, hierarchical level is included. As three hierarchical levels – CEO or general management, manager, leader or coordinator and staff or operators – are distinguished in the organisation, $N - 1 = 2$ dummy variables were included. Functional area may impact the level of exploitation and exploration activities. For example, it can be assumed that product development is engaged with more exploration activities than finance and accounting. Functional area was included using $(n - 1 =)$ 4 dummy variables. Departments that show some overlap were grouped together to avoid unnecessary additional control variables. The departments were grouped as follows: 1: general management and human resources management; 2: product development and technical group (engineering); 3: ICT and finance and accounting; 4: production and technical support; 5: sales and logistics. Tenure in the organisation was also included in the questionnaire to control for experience. Moreover, tenure may affect an individual's ability to occupy brokerage positions (Mehra, Kilduff, & Brass, 2001). As one of the business units was founded over ten years later than the other, tenure as a fraction of the potential tenure was included to avoid bias.

The variables that correspond to the informal coordination mechanism attempt to map the structure of a network. However, individuals in organisations may outperform their colleagues not only because of differences in the structure of their network but also because of individual psychological differences (Mehra et al., 2001). This study controlled for respondents' differences in psychological traits, by including self-monitoring in the survey. People that score high on self-monitoring are not only more likely to occupy brokering network positions but also better in benefitting from this position (Carnabuci & Diószegi, 2015). The social skills and leadership abilities of those high self-monitors may contribute to significantly better performance, as the modern work environment increasingly requires individuals to cooperate. Self-monitoring seems a stable and validated construct which has been theoretically tested in hundreds of studies (Sasovova, Mehra, Borgatti, & Schipper, 2010). To measure self-monitoring, a (revised) 18-item true-false scale was included (Gangestad & Snyder, 1985). The authors suggest that the revised scale is more reliable and factorially pure than the original 25-item version

(Snyder & Gangestad, 1986). The self-monitoring score was calculated by summing the scores, in which statements in favour of self-monitors scored 1, whereas scores against self-monitoring scored 0.

4. Results

This chapter summarises the data obtained in the survey. First, factor analysis was executed to test whether the constructs in this study are statistically valid. The analysis included both confirmatory and exploratory factor analysis. Reliability analysis was performed to test the reliability of these constructs. The second part of the analysis focused on multiple linear regression. The control variables and independent variables entered the model in multiple steps. Therefore, hierarchical linear regression was used. To test for possible bias in the model, outliers and extreme cases as well as the assumptions of linear regression were examined.

4.1 Confirmatory factor analysis

Confirmatory factor analysis (CFA) was performed in order to test construct validity. This seems especially relevant for the exploration and exploitation construct, as it was originally designed to test a manager's ambidextrous behaviour (Mom et al., 2009). CFA in AMOS with all the constructs of this study, i.e. individual decision-making authority, task formalisation, exploitation and exploration activities provided poor fit of the model (p-value CMIN default model = <0.001 < 0.05; CFI = 0.751 < 0.9; RMSEA = 0.088 > 0.05, see Appendix 4). For both exploitation and exploration activities, one item has a standardised regression weight < 0.3. These include exploitation item 3 (0.287) and exploration item 7 (0.263), which indicates that the data is not suitable for factor analysis.

4.2 Exploratory factor analysis

As the CFA did not provide good fit of the model, exploratory factor analysis (EFA) was conducted in SPSS to assess construct validity of all items regarding exploitation, exploration, individual decision-making authority and task formalisation (see also Appendix 5). The rotated component matrix, performed in initial exploratory factor analysis, pointed out that exploitation item 3 loaded strongly on the fifth factor (.563) while loading little on the intended factor (.169). Exploration item 7 loaded strongly on the fifth factor (.788) while loading little on the intended factor (.140). Consistently, when performing reliability analysis in SPSS, these items had both lowest *corrected item-total correlation*. Besides, *Cronbach's alpha if item deleted* which was higher than the current Cronbach's alpha. Therefore, these items were discarded and excluded from further analysis. A second round of reliability analysis pointed out that Cronbach's alpha for exploration activities would increase from .810 to .841 when if exploration item 4 was deleted. This item was discarded as well.

In order to check whether the (reduced) data is suitable for factor analysis, some preliminary analyses were performed. These included the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) and Bartlett's test of sphericity. The SPSS output for the reduced model can be found in Appendix 6.

4.2.1 Preliminary analyses

The KMO measure represents the ratio of the squared correlation between variables to the squared partial correlation between variables. An acceptable level of the KMO measure is a value greater than .50 (Field, 2013). The upper row of Table 1 shows that the KMO measure in this study is .775, which is above the threshold value.

The variables of interest should be sufficiently correlated in order to be suitable for factor analysis. Bartlett's test of sphericity assesses whether the variables under study do not correlate at all, which means that all correlations are zero and an identity matrix appears. The test is significant when the correlation matrix differs significantly from an identity matrix, and thus the variables are correlated (Field, 2013). The Chi-Square value for Bartlett's test in this study was 1,020.564, with a significance level p < 0.001 (two-tailed), as presented in Table 1. These results imply that the data was suitable for factor analysis.

Table 1: KMO and Bartlett's Test of sphericity

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,775
Bartlett's Test of Sphericity	Approx. Chi-Square	1020,564
	df	171
	Sig.	,000

4.2.2 Factor extraction (principle component analysis)

Principle component analysis was performed in SPSS as extraction method for the factor analysis. The number of factors to be retained can be based on the scree plot, the Kaiser criterion and total variance explained (Field, 2013). Figure 3**Fout! Verwijzingsbron niet gevonden.** presents the scree plot and the point of inflexion. The point of inflexion is where the slope of the line changes drastically, which is at the fifth factor in this case. One retains factors that are to the left of the point of inflexion. Therefore, based on the scree plot, four factors need to be retained.
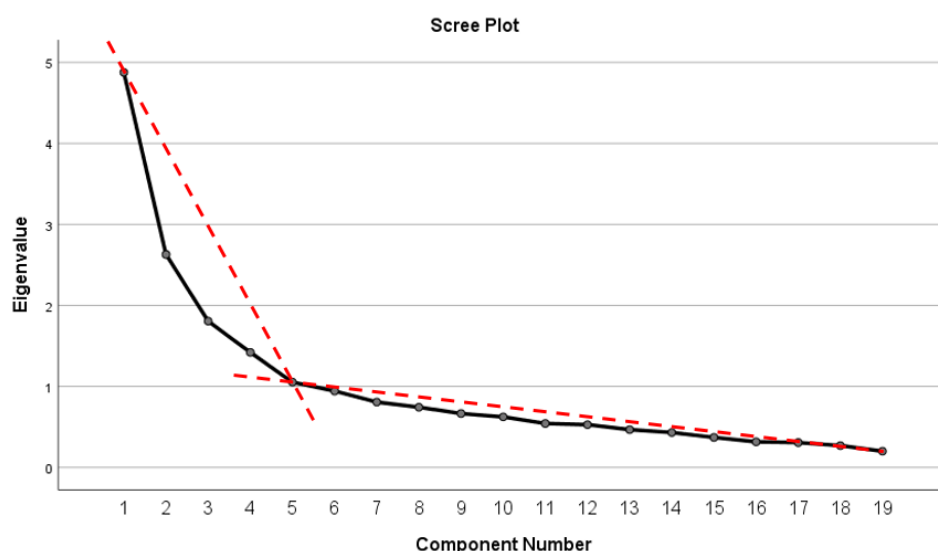
Figure 3: Scree plot

To assess the Kaiser criterion, one should consider the eigenvalues of each factor. The left part of Table 2 shows all the 19 factors in the model, which is equal to the number of variables included (6 for exploitation activities, 5 for exploration activities, 4 four individual decision-making authority and 4 for task formalisation). According to the Kaiser criterion, all factors with an eigenvalue greater than 1 should be included. The second column in Table 2 shows that five factors have eigenvalues ≥ 1.

A third way to determine the number of factors is to assess the total variance explained. The total variance that is explained by the factors should be at least 50% (Trujillo Barrera, 2018). Table 2 shows that the first four factors explained 56.49% of the total variance.

According to the Kaiser criterion, five factors should be extracted. This is inconsistent with the total variance explained and scree plot criteria, which indicate a four-factor solution. However, the eigenvalue of the fifth extracted factor is only slightly larger than the threshold value (1.052 > 1). Therefore, it is reasonable to use a four-factor solution.

Table 2: Factor extraction

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,877	25,668	25,668	4,877	25,668	25,668	3,183	16,753	16,753
2	2,629	13,837	39,505	2,629	13,837	39,505	2,768	14,570	31,323
3	1,806	9,504	49,009	1,806	9,504	49,009	2,533	13,334	44,657
4	1,420	7,476	56,485	1,420	7,476	56,485	2,247	11,828	56,485
5	1,052	5,539	62,024						
6	,943	4,963	66,987						
7	,807	4,247	71,234						
8	,743	3,912	75,146						
9	,665	3,501	78,648						
10	,624	3,285	81,933						
11	,543	2,856	84,789						
12	,528	2,777	87,566						
13	,466	2,454	90,020						
14	,431	2,269	92,289						
15	,371	1,951	94,240						
16	,317	1,666	95,906						
17	,307	1,618	97,524						
18	,270	1,421	98,944						
19	,201	1,056	100,000						

Extraction Method: Principal Component Analysis.

4.2.3 Rotation

The interpretability of the extracted factors can be improved through rotation (Field, 2013). Consistent with other researchers, orthogonal rotation was used (Mom et al., 2009). This type of rotation prohibits factors to correlate with each other. In this study, varimax rotation with Kaiser normalisation was used. Table 3 presents the factor loadings for each variable after rotation. Factor loadings illustrate the correlation between factors and variables. The Rotated Component Matrix clearly shows the following four factors:

- Factor 1: Exploration activities
- Factor 2: Exploitation activities
- Factor 3: Task formalisation
- Factor 4: Individual decision-making authority

Table 3: Rotated component matrix

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Activities of which a lot of experience is accumulated by yourself	,336	,604	,176	,214
Activities which you carry out as if it were routine	,099	,747	,133	-,108
Activities of which it is clear to you how to conduct them	,207	,622	,437	,153
Activities primarily focused on achieving short-term goals	,182	,679	,011	-,107
Activities which you can properly conduct by using your present knowledge	,180	,740	,108	,017
Activities which clearly fit in the current strategy, plans and guidelines	,099	,317	,539	,045
Searching for new products/services, processes or customers	,781	,103	,045	,087
Evaluating potential new products/services, processes or customers	,801	,255	,000	,166
Focusing on strong renewal of products/services or processes	,793	,064	,187	,183
Activities of which you need to change work routines, work procedures or work behaviour	,701	,195	-,017	-,252
Activities requiring you to learn new skills or knowledge	,686	,350	,054	-,070
I can undertake little action until my supervisor approves a decision	-,065	,046	-,061	,602
If I want to make my own decisions, I will be quickly discouraged	,141	-,004	,241	,703
I have to ask my supervisor before I do almost anything	,075	,072	-,134	,775
Any decision I make has to have my supervisor's approval	,047	-,201	-,227	,583

Whatever situation arises, I have procedures to follow in dealing with it	,184	,090	,671	-,158
I have to follow strict operational procedures at any time	,121	-,145	,639	-,436
Rules occupy a central place in my work-related activities	,034	,109	,745	-,029
There is a written job description for going about my tasks	-,131	,146	,637	,036

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

The matrix indicates that all variables loaded on the intended factors, except for exploitation item 7 (activities which clearly fit in the current strategy, plans and guidelines). This variable loaded high on the third factor (.539) while loading only .317 on the intended factor. Two variables showed relatively high cross-loadings, i.e. exploitation item 4 on factor 3 (third variable, loading = .437) and task formalisation item 2 on factor 4 (.436). In order to test whether these loadings are statistically significant, one can calculate critical values that are derived from the standard error for correlation coefficients. Formula 3 presents the formula to calculate the standard error.

$$Standard\ error\ correlation\ coefficient = 1\ /\ \sqrt{N-1} \qquad [3]$$

As a factor loading is simply the correlation coefficient between a factor and a variable, one can rewrite this formula. However, this formula can seriously underestimate the actual amount of error in factor loadings, especially in small sample sizes. Therefore, one should double the standard error to create a critical value for factor loadings to be significant (Stevens, 2009). This is presented in Formula 4.

$$Critical\ value\ factor\ loading =\ 1/\sqrt{(N-1)} * 2 \qquad [4]$$

The critical value for a correlation coefficient (based on N = 140, α = .01, two-tailed) is .434 (Stevens, 2009). This implies that the cross-loadings (.437 and .436) are both significant. Exploitation item 7 (.536) is highly significant. The reliability of this item was tested in reliability analysis, which is discussed in the following session.

4.2.4 Reliability analysis

The quality of a scale depends on its reliability. A scale is reliable when the individual items produce results that are consistent with the overarching construct (Field, 2013). Reliability analysis was executed based on Cronbach's alpha α for each construct separately. Table 4 presents Cronbach's alpha for all constructs. Cronbach's alpha for exploitation and exploration activities are after deletion of the three items (exploitation item 3 and exploration items 4 and 7). Cronbach's alpha before deletion of items is shown in parenthesis. Although exploitation item 7 loaded significantly on another factor, deletion of this item would not improve Cronbach's alpha. Cronbach's alpha for the exploitation and exploration constructs are higher than for the formal coordination mechanism constructs, thereby indicating the former two to be more reliable. However, this may partly be due to the number of items

included in the construct, as α increases when the number of items increase (Field, 2013). The SPSS output of the reliability analyses is presented in Appendix 7.

Table 4: Cronbach's alpha

Construct	Exploitation activities	Exploration activities	Individual decision-making authority	Task formalisation
Cronbach's alpha α	.783 (.746)	.841 (.799*) (.810**)	.642	.683
N of items	6	5	4	4

* full construct
**after deletion of item 7

4.3 Descriptive statistics and correlations

Table 5 shows the descriptive statistics and correlations for the variables and constructs that were used in this study. The mean, standard deviation, minimum and maximum value are included in the table as well. Correlations > .16 are significant at $p < .05$; correlations > .20 are significant at $p < .01$. The table shows the following significant correlations between individual ambidexterity and some independent variables, but across independent variables as well:

- Individual ambidexterity and task formalisation, $r = .31$, $p < .01$;
- Individual ambidexterity and network connectedness, $r = -.27$, $p < .01$;
- Individual decision-making authority and task formalisation, $r = -.26$, $p < .01$.

Moreover, the table shows that two control variables correlate significantly to individual ambidexterity. These include:

- Individual ambidexterity and dummy variable ICT and Finance & Accounting, $r = -.25$, $p < .01$;
- Individual ambidexterity and self-monitoring score, $r = .27$, $p < .01$.

4.4 Hierarchical regression analysis

In hierarchical regression analysis, the variables enter the model in blocks. The hierarchical regression analysis is presented in Table 6. In Model 1, only the control variables are included (using forced entry or enter in SPSS). This indicates that all control variables entered the model simultaneously. The independent variables entered in Model 2, corresponding to Hypothesis 1–5. In Model 3, the full model, the control variables, independent variables and interaction variables were all included. The interaction variables refer to hypotheses 6–9.

To assess multicollinearity, the Variance Inflation Factor (VIF) and Tolerance were inspected. The VIF should not exceed a value of 10, whereas the tolerance should be at least .2. In all three models, no VIF or tolerance values exceeded the threshold. Therefore, multicollinearity seems no issue.

Model 1 shows that one of the dummy variables for department (ICT or Finance & Accounting) is negatively related to individual ambidexterity, $\beta = -.28$ at $p < .01$. Self-monitoring score is positively related to individual ambidexterity, $\beta = .21$ at $p < .01$. These variables are the only two control variables that are significant. ICT of Finance & Accounting is significant in all three models. Self-monitoring score is significant in the first two models.

Table 5: Means, standard deviation, minimum and maximum values, and correlations

	Mean	St. dev.	Min.	Max.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Individual ambidexterity	13.96	4.39	2.20	25.00															
2 Individual decision-making authority	2.90	0.72	1.00	4.50	0.07														
3 Task formalisation	3.79	0.62	2.00	5.00	0.31**	-0.26**													
4 Network connectedness	29.49	21.28	0.00	100.00	-0.27**	0.13	-0.10												
5 Network heterogeneity	50.91	132.19	1.00	965.50	-0.06	-0.03	-0.10	-0.07											
6 Informality of network ties	2.88	1.02	1.00	5.00	0.01	0.09	-0.10	-0.11	0.04										
7 Dummy gender	0.22	0.42	0.00	1.00	0.02	-0.03	0.03	0.10	0.03	0.07									
8 Dummy education level	0.24	0.43	0.00	1.00	0.05	-0.01	0.00	0.18*	0.18*	-0.09	-0.46**								
9 Dummy manager, leader or coordinator	0.15	0.36	0.00	1.00	0.12	0.25**	0.11	-0.08	0.30**	0.07	0.09	0.12							
10 Dummy CEO or senior manager	0.02	0.14	0.00	1.00	0.01	0.12	-0.22**	0.10	-0.01	0.07	0.13	0.25**	-0.06						
11 General Management or Human Resources Management	0.04	0.19	0.00	1.00	0.12	0.06	-0.01	0.07	-0.03	0.02	-0.01	0.20**	0.01	0.46**					
12 Product Development and Technical Group (Engineering)	0.18	0.38	0.00	1.00	0.02	0.13	-0.01	0.00	0.01	0.06	-0.01	0.05	0.15	-0.09	-0.09				
13 ICT and Finance & Accounting	0.10	0.30	0.00	1.00	-0.25**	-0.02	0.03	0.23**	0.10	-0.09	0.24**	0.28**	0.18*	-0.07	-0.07	-0.15			
14 Marketing & Sales and Logistics	0.27	0.45	0.00	1.00	0.05	-0.03	-0.10	-0.04	0.10	0.04	0.22**	0.16*	0.04	-0.05	-0.12	-0.29**	-0.20**		
15 Relative tenure in organisation	0.69	0.32	0.02	1.00	0.12	0.24**	-0.08	-0.39**	-0.19	0.18*	-0.23**	-0.12	0.07	0.12	0.01	0.15	-0.11	-0.07	
16 Self-monitoring score	7.84	3.31	1.00	16.00	0.27**	0.00	0.17	-0.05	0.01	0.04	-0.08	0.10	0.02	0.16*	0.09	-0.08	-0.16*	0.00	0.17*

Notes: N = 154. All interactions above .20 (marked **) are significant at p <.01; all interactions above .16 (marked *) are significant at p <.05 (two-tailed)

4.4.1 Test of main effects

The order in which the independent variables are brought into the model is crucial when the independent variables are correlated (Field, 2013). Consistent with the control variables, the independent variables entered the regression simultaneously, using forced entry or enter in SPSS. Model 2 in Table 6 shows the main effects of the independent variables. The formal coordination mechanisms refer to the first two hypotheses. The model shows that individual decision-making authority relates to individual ambidexterity, but not significantly (β = .15; p = .08). The result indicates no support for Hypothesis 1. Task formalisation is positively related to individual ambidexterity. As Hypothesis 2 predicted an inverted U-relationship, a quadratic term for task formalisation is used. The coefficient for the squared term is .29 with p < .01. Therefore, Hypothesis 2 is supported.

Hypotheses 3-5 refer to the informal coordination mechanisms. As presented in Table 6, Model 2 shows that network connectedness is negatively related to individual ambidexterity. Although the coefficient is significant (β = -.22, p = .01), this provides no support for Hypothesis 3 as the relationship is negative. Network heterogeneity does not relate significantly to individual ambidexterity (β = -.07, p = .41). Therefore, Hypothesis 4 is rejected. The last informal coordination mechanism, network tie informality, does not relate to individual ambidexterity, as the coefficient is -.02 with p = .76. Therefore, no support is provided for Hypothesis 5.

4.4.2 Test of interaction effects

Model 3 in Table 6 shows the full model with the control variables, independent variables and interactions. Interestingly, the main effect of individual decision-making authority is significant in the full model (β = .17, p < .05). The interaction between individual decision-making authority and network connectedness is not significant (β = .08, p = .27), thereby not supporting Hypothesis 5. The interaction involving individual decision-making authority and network heterogeneity has a coefficient of .12 with p = .18. This indicates no support for hypothesis 6. Task formalisation and network heterogeneity show a positive interaction effect on individual ambidexterity, β = .37, p < .01.

Table 6: Results of hierarchical regression analysis

	Model 1			Model 2			Model 3		
	b	s.e.	β	b	s.e.	β	b	s.e.	β
Intercept	10.85	1.21		12.05	1.19		12.40	1.19	
Main effects									
Individual decision-making authority				0.90	0.50	0.15	1.06	0.52	0.17 *
Task formalisation (squared term)				0.27	0.08	0.29 **	0.28	0.08	0.30 **
Network connectedness				-0.05	0.02	-0.22 **	-0.05	0.02	-0.22 **
Network heterogeneity				-0.01	0.00	-0.07	0.01	0.01	0.25
Informality of network ties				-0.10	0.33	-0.02	-0.17	0.33	-0.04
Interaction effects									
Dec. making authority * connectedness							0.03	0.03	0.08
Dec. making authority * heterogeneity							0.01	0.01	0.12
Task formalisation * heterogeneity							0.01	0.00	0.37 **
Task formalisation * informality of ties							-0.02	0.08	-0.02
Control variables									
Gender	0.73	0.96	0.07	0.37	0.92	0.04	0.07	0.92	0.01
Education: bachelor's degree or higher	0.86	0.99	0.08	1.04	0.95	0.10	1.39	0.95	0.14
Manager, leader or coordinator	1.69	1.01	0.14	0.81	1.06	0.07	0.29	1.09	0.02
CEO or senior manager	-3.46	2.85	-0.11	-0.57	2.79	-0.02	-1.01	2.78	-0.03
General Management or HRM	2.02	2.07	0.09	1.73	1.97	0.08	1.44	1.94	0.06
Product Development and Technical Group	-0.58	1.02	-0.05	-0.17	0.98	-0.02	-0.73	0.99	-0.06
ICT or Finance & Accounting	-4.09	1.40	-0.28 **	-3.13	1.37	-0.21 *	-3.70	1.37	-0.25 **
Marketing & Sales or Logistics	-0.31	0.91	-0.03	0.19	0.87	0.02	0.03	0.88	0.00
Tenure in organisation	1.25	1.13	0.09	-0.04	1.22	0.00	0.24	1.23	0.02
Self-monitoring score	0.28	0.11	0.21 **	0.22	0.10	0.17 *	0.20	0.10	0.15
R-squared		0.16			0.28			0.32	
Adjusted R-squared		0.11			0.20			0.23	
F improvement of fit		2.82**			4.39**			2.19	

Note: centered data. Unstandardised coefficients are reported together with the standard error, as well as standardised coefficients. N = 156; *$p < .05$; **$p < .01$

Hypothesis 7 is thus supported. The interaction between task formalisation and informality of network ties is not significant and therefore, Hypothesis 8 is not supported (β = .02, p = .83).

The interaction effect between task formalisation and network heterogeneity on individual ambidexterity is illustrated in **Fout! Verwijzingsbron niet gevonden.**Figure 4. For both network heterogeneity and task formalisation, a low, mean and high value are depicted. For the low and high value, + 1 and - 1 standard deviation was used. The figure shows that the individual ambidexterity scores increase while task formalisation increases. However, individual ambidexterity increases even more for higher levels of network heterogeneity. One can see that high task formalisation is associated with the highest individual ambidexterity scores for mean and high level of heterogeneity, whereas low task formalisation is associated with the highest individual ambidexterity score for the lowest heterogeneity level. The figure clearly shows an interaction effect as all three lines cross each other.
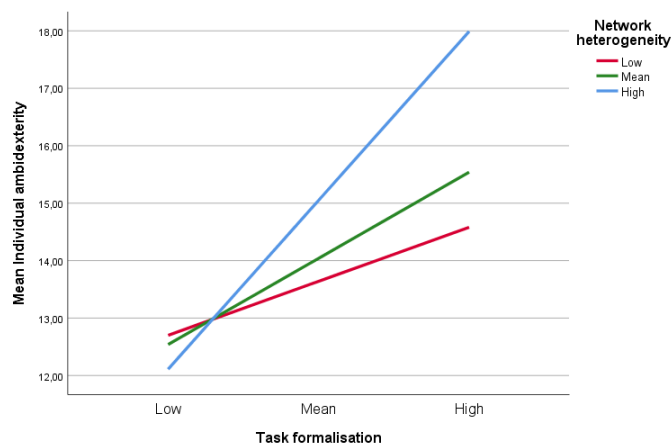

Figure 4: Interaction effect between task formalisation and network heterogeneity

4.5 Spotting bias in the model

Two types of bias can influence the regression model. These include 1), outliers and influential cases and 2), violations of the model assumptions. Section 4.5.1 deals with outliers and influential cases, whereas the model assumptions are tested in section 4.5.2.

4.5.1 Outliers and influential cases

Outliers and extreme scores can cause bias of the regression model. To detect any possible outlier bias, the standardised residuals are inspected. In a normal distribution, one would expect that 95% of all cases have a standardised residual of ±2 standard deviations. With a sample size of 156, this is around seven or eight cases (156 * .05 = 7.8). Table 7 shows all cases that have a standardised residual of ±2. In the sample, there are six cases that exceed this threshold value, which is 3.85%. This is within the 5% of what would be expected and therefore gives no cause for concern (Field, 2013).

Table 7: Casewise diagnostics

Casewise Diagnostics[a,b]

Case Number	Std. Residual	Individual ambidexterity	Predicted Value	Residual
5	-2,473	6,300	15,8290	-9,52896
18	-3,304	3,267	15,9987	-12,73200
109	-2,403	3,733	12,9920	-9,25868
116	-2,024	3,000	10,8002	-7,80023
124	2,242	21,467	12,8290	8,63769
128	-2,435	2,200	11,5824	-9,38241

a. Dependent Variable: Individual ambidexterity

b. When values are missing, the substituted mean has been used in the statistical computation.

In order to make sure that the regression model is stable across the sample, influential cases need to be inspected. In order to measure the effect of a single case on the regression model, two diagnostic statistics were examined. These include the Mahalanobis distances and Cook's distance (Field, 2013). Cook's distance with a value greater than 1 may be cause concern. The Mahalanobis distance detects outliers on the predictors. The critical value of the distance is based on the chi-square distribution with number of predictors as the degrees of freedom. For this study, the Mahalanobis distances with DF (= number of variables included in the regression) 19 and α = .05 is 30.14. Within the sample, 22 cases appeared to be an outlier of the predictors and have a Mahalanobis distance greater than 30.14.

The cases with a Mahalanobis distance above the threshold value were inspected on Cook's distance (Stevens, 2009). One case appeared to have a Cook's distance greater than 1 (case 147, Cook's distance = 1.16). This implies that this case is an influential point and may influence the regression significantly. Therefore, this case was removed from the regression analysis. The complete list of casewise diagnostics can be found in Appendix 8.

4.5.2 Assumptions of regression analysis

Violation of the model assumptions can cause bias in the regression model as well. The following section considers the normality, linearity and homoscedasticity assumptions.

Normality

The normality assumption implies that "*the residuals in the model are random, normally distributed variables with a mean of 0*" (Field, 2013, p. 311). In other words, this means that the differences between the observed data and the model are most frequently (around) zero while greater differences only occur occasionally. In order to test the normal distribution of errors, a Q-Q plot of the residuals was examined. The plot should look like a straight line. The Q-Q plot is presented in Figure 5a, which shows that almost all lines fall on the diagonal line, indicating normal distribution. The dots slightly sag above or below the line, which indicates some extent of kurtosis.

The distribution of individual ambidexterity is presented in a histogram in Figure 5b. The black line represents a normal distribution. Consistent with the Q-Q plot, the distribution shows some extent of positive kurtosis, which is characterised by a pointy distribution around the mean (Field, 2013). However, both graphs approximate a normal distribution. This is confirmed by the Kolmogorov-Smirnov and Shapiro-Wilk test of normality, as both are not significant.

a)   b)
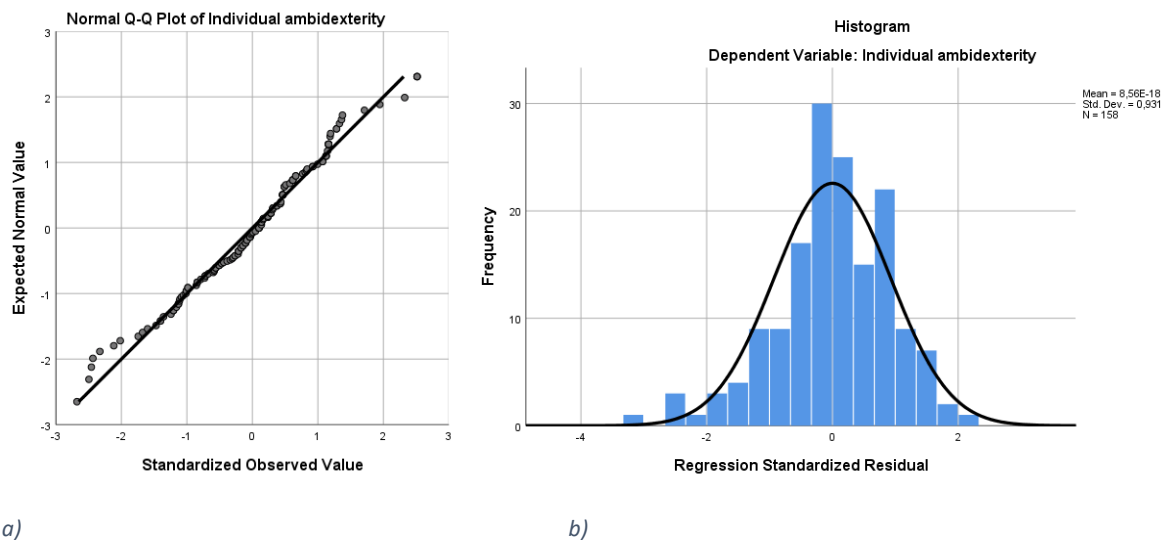
Figure 5: Q-Q Plot and histogram for the normality assumption

Linearity

The linearity assumption means that the dependent variable is linearly related to its predictors and their combined effect is best described by adding their effects together (Field, 2013). To assess whether the linearity assumption holds, one should plot the standardised residuals against the standardised predicted value of the dependent variable. Linearity is assumed if the residuals are evenly spread around zero and show no curve (Field, 2013). Figure 6 shows the scatterplot for individual ambidexterity. The figure looks like a random array of dots, without curving at any point. This suggests that the linearity assumption is met.
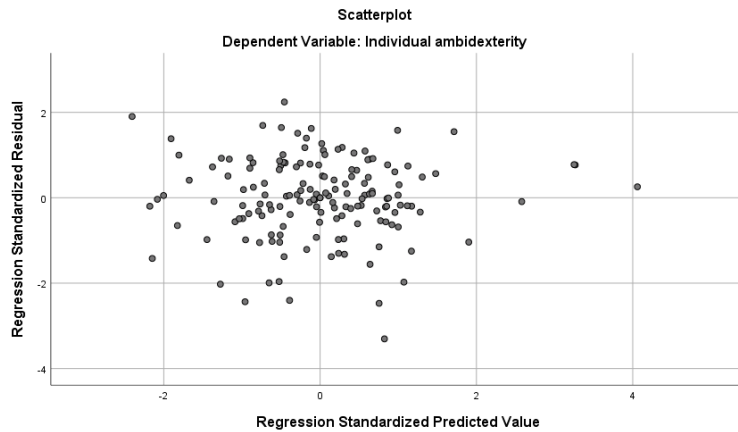
Figure 6: Scatterplot for testing model assumptions

Homoscedasticity

The homoscedasticity assumption suggests that the variance of the residuals should be constant. Like linearity, homoscedasticity can be tested by plotting the standardised residuals against the standardised predicted value of the dependent variable. If the variance looks like a cloud of points without a structure, there is constant variance. The scatterplot in Figure 6 shows no signs of funnelling, which indicates that the homoscedasticity assumptions is met.

Independence

The independence assumption implies that respondents filled the survey independent from each other (Stevens, 2009). For each response, the exact date, time, IP-address and location is traced. This allows the researcher to ascertain whether respondents filled the survey at the same time and location. The data provides no indication for violation of the independence assumption.

5. Discussion and conclusion

This study aims to shed light on the relationship between formal and informal coordination mechanisms and individual ambidexterity. In order to find a clear and structured solution to this objective, nine specific research questions were formulated, which can be grouped based on the theoretical, empirical and analytical part of this study. This study adopted a multimethod approach in which elements of the formal coordination mechanisms were combined with characteristics of the informal network within an organisation. Existing, validated scales and theories have been used to find answers to the theoretical research questions.

The empirical setting that was used to collect the data consisted of two business units of an Indonesian job shop in the metal sheet industry, employing 164 employees in total. The organisation can be characterised as post-bureaucratic, applying lean principles which are targeting at continuous improvement of business processes. The survey generated a response rate of 95.73%, equivalent to 157 responses. 105 responses were collected for business unit A (95.45%) and 52 for business unit B (96.30%). The empirical results provide a mixed picture. Two hypotheses have been confirmed, of which only one involves main effects. The first confirmed hypothesis relates to task formalisation, which indicates that there is a significant relationship between task formalisation and individual ambidexterity. A squared term for task formalisation was used to account for the inverted U-relationship. Surprisingly, a positive linear relationship between task formalisation and individual ambidexterity was significant as well. This is in line with prior studies that investigated the relationship between ambidexterity and task formalisation (e.g. Jansen et al., 2006; Mom et al., 2009). However, the t-value for the squared term was larger than for the regular term (*squared term* t = 3,50 for model 2, t = 3,70 for model 3; *regular term* t = 3,25 for model 2, t = 3,46 for model 3). Furthermore, the squared term provided a better overall model fit in terms of R^2, $R^2_{adjusted}$, and F-value. Therefore, the squared term was preferred and used in the analysis.

The interaction hypothesis between task formalisation and network heterogeneity is confirmed too. The squared term for task formalisation was used here as well. As illustrated in Figure 4, there is a positive interaction effect between task formalisation and network heterogeneity. The figure points out that network heterogeneity cancels out the negative effects of (high) task formalisation. Although task formalisation is related to individual ambidexterity, high levels of network heterogeneity strengthen this relationship even more. This relationship is somewhat related to the interaction that Mom et al. (2009) found between participation in cross-functional interfaces and task formalisation. One of the characteristics of cross-functional interfaces is the opportunity to exchange and acquire knowledge, which holds for network heterogeneity as well.

Except for the two hypotheses discussed above, all other hypotheses have been rejected. With regard to hypothesis 1, the results point out that individual decision-making authority is related to individual ambidexterity, but not significantly. In model 3 – the full model – the coefficient is significant. These results imply that the two constructs are somehow related. Follow-up studies with a larger sample size could provide more insight into the strength of the relationship. Preferably, the sample should consist of multiple organisations, thereby varying extensively in the (perceived) extent of dependent and independent variables.

Network connectedness is negatively related to individual ambidexterity. Although this relation is significant, hypothesis 3 cannot be confirmed as the relationship is the opposite of the hypothesis formulated. This result is in contrast with other studies that tested this relationship (e.g. Mom et al., 2009). This study, however, did not only consider managers but employees at every hierarchical level. One explanation could be that employees that have a considerable amount of connections, (feel the)

need to consult their network before proceeding to action. Alternatively, it might be the case that the presumption of knowledge transfer and learning behaviour is not present in this sample.

Some caveats should be made here. The data involving informal coordination mechanisms differed considerably among the two business units. Independent samples t-test pointed out that the mean for both network connectedness and network heterogeneity differed significantly among the business units (p < .01). On average, employees in business unit 1 have a network size of 3.65, compared to 14.7 in business unit 2. The relatively small network size in business unit 1 may have impacted the network characteristics variables and therefore the corresponding relationships.

No significant relationship was found between network heterogeneity and individual ambidexterity. Brokerage score was used as a proximation for network heterogeneity, as brokers strive to access a wide variety of knowledge and try to integrate these diverse sources of knowledge (Soda et al., 2018). However, it might be the case that brokerage score is not a valid predictor for network heterogeneity, as it is only a proximation. Other network variables such as betweenness centrality may be a better approximation of network heterogeneity, although both are an indication of how central or powerful an actor is within its network (Hanneman & Riddle, 2005). Besides, as for network connectedness, the average network heterogeneity varies significantly among the two business units, which could have influenced the results.

Informality of network ties is not significantly related to individual ambidexterity. It might be the case that the assumptions of informal network ties do only hold for managers, as opposed to employees in general. In contrast, Rogan and Mors (2014) found that informal network ties are important to predict ambidextrous behaviour like for example the mobilisation of resources and human capital. As these activities are not relevant for all employees, this could explain the insignificance of the relationship.

With regard to the interaction hypotheses, only hypothesis 8 was confirmed. As the main effect of network connectedness is negative rather than positive, the interaction effect is not significant and negative as well. The same applies to the other two interaction hypotheses that were not found significant. As the main effect hypotheses did not hold, the interactions are not likely to be significant.

5.1 Theoretical contribution

Studies that investigated individual ambidexterity at employee level remain scarce, despite empirical evidence that individual ambidexterity contributes to task performance in dynamic environments (Good & Michel, 2013) and to ambidexterity at the organisational level (Rogan & Mors, 2014). This study contributed empirically to the ongoing debate about ambidexterity in several ways. The results add to the discussion about whether or not ambidexterity could be present at the individual level (Gupta et al., 2006). Moreover, this study addressed the issue that individual ambidexterity can be present at every hierarchical level, instead of only focusing on (senior) management. Factor analysis of the key constructs pointed out that exploitation and exploration are two independent latent factors, thereby indicating that exploitation and exploration activities are not mutually exclusive. Hierarchical and K-means clustering shows four distinct clusters related to individual ambidexterity. These include an unfocused, exploitation focused, moderately ambidextrous and ambidextrous cluster (see Appendix 9). These clusters are presented in Figure 7. The blue points illustrate the unfocused cluster, whereas the red points indicate exploitation focus. The green points can be characterised as moderately ambidextrous, which is around the centre of the figure. The ambidextrous cluster is illustrated in yellow in the upper right part of the figure. If ambidexterity could not be achieved at the individual level, exploitation and exploration activities would be two mutually exclusive ends of a
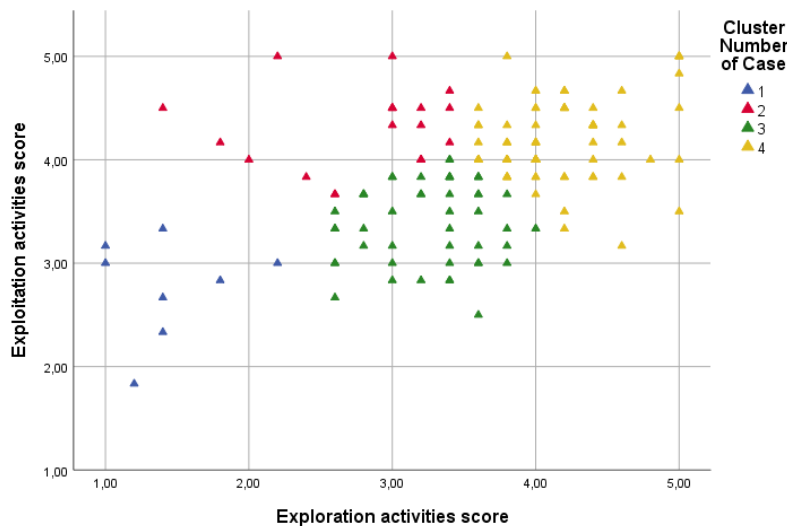
Figure 7: Clusters based on exploitation and exploration activities

continuum. In a figure, this would be illustrated by a negative relationship. When the exploitation activities score is high (e.g. 5), one would expect the exploration activities score to be low (e.g. 1) and vice versa. Figure 7 illustrates rather the opposite.

The clusters and the corresponding cluster centres (average) for both exploitation and exploration activities are displayed in Table 8. ANOVA pointed out that the cluster centres for both exploitation and exploration activities differ significantly (F = 70.31, p < .01 for exploitation and F = 145.98, p < .01 for exploration). Post-hoc analysis based on Hochberg's GT2 and Games-Howell is performed to test the differences between all clusters. As the sample size of each cluster is rather different, Hochberg's GT2 test is included. Furthermore, as Levene's test for homogeneity of variances was almost significant for exploitation activities, Games-Howell is used as well (Field, 2013). Post-hoc analysis pointed out that all cluster centres are significantly different from each other at α = .05, except for Hochberg's test regarding exploitation activities between cluster 2 and 4. The output of the ANOVA and post-hoc analysis can be found in Appendix 10.

Table 8: Clustering analysis

	Cluster	Cluster centre exploitation activities	Cluster centre exploration activities
1	Unfocused	2.77	1.43
2	Exploitation focused	4.31	2.79
3	Moderately ambidextrous	3.40	3.28
4	Ambidextrous	4.17	4.14

5.2 Limitations and future research

This study has some limitations that should be taken into account. The following section discusses the most important ones. Some of the limitations provide avenues for further research.

Common method bias

First of all, a major limitation of this study is that the attribute data is based on self-reported measures. As stated in section 3.1.2.1, this may lead to common method bias. The validity of the survey and its corresponding results therefore strongly depend on the accuracy of the respondents' perception. Despite careful development of the survey, the following types of common method bias may have occurred in this study (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003):

- *Common rater effects* and *measurement context effects:* as respondents provided data for both dependent and independent variables – at one single point in time – this could cause any artificial covariance independent of the content of the constructs;
- *Item characteristics effects:* despite launching the pilot survey, respondents may have been influenced by the interpretation of items due to any ambiguity in the items. Besides, all items – except for the network analysis part – consisted of Likert-scale items, which may cause artificial covariance;

However, it is argued that survey research remains a valuable and valid measurement strategy to measure employee perception and behaviour (Howard, 1994). In order to test common method bias, Harman's single-factor test was performed. In this test, factor analysis is executed in which a single factor is extracted. If this factor accounts for the majority of the variance, common method bias would be problematic (Podsakoff et al., 2003). The total variance explained by this factor is 25.67% (see Appendix 11). Therefore, common method bias is assumed to be not an issue.

Single organisation

As this study investigated a single firm, external and firm-varying factors that may affect individual ambidexterity are kept constant (Soda et al., 2017). Whereas this is advantageous on the one hand, it may be detrimental too as results may lack variation of scores. As the organisation employs around 150 employees, it can be characterised as a small and medium-sized enterprise (SME). Due to this size, analyses may lack statistical power. Moreover, results may not be representative and generalisable to other organisations or industries.

Cross-sectional data

This study used cross-sectional data to approach social networks. However, there is growing recognition that networks are dynamic rather than static (Sasovova et al., 2010). Therefore, using longitudinal data would have been more suitable as this allows for multiple measurement points in time. Due to time limitations, cross-sectional data was preferred. Future research could address this issue by conducting one or multiple follow-up studies. This allows a more comprehensive understanding of the dynamics of social networks.

Sample size in factor analysis

It is argued that sample size in factor analysis should be at least 300 (see Field, 2013 for an overview). The sample size in this study contained only 155 cases, which is almost half of the preferred size. Therefore, one can expect the factor solution to be unreliable. However, not only the sample size determines the reliability of factor analysis. Factor loadings and communalities should be considered as well. Based on a Monte Carlo study, Guadagnoli and Velicer (as cited in Stevens, 2009) came up with some empirical evidence for this issue. They suggested the following recommendations:

- Factors with four or more loadings above .60 in absolute value are reliable, regardless of the sample size;
- Factors with 10 or more low loadings (.40) are reliable as long as the sample size is greater than about 150;
- Factors with only a few low loadings should not be interpreted unless the sample size is at least 300.

Table 9 presents the factor loadings for all four factors. The table shows the loadings for each variable on the factor it was intended to land. Three factors meet the first requirement as stated by Guadagnoli and Velicer. Factor 1, factor 2 and factor 3 all have at least four factor loadings > .60 and are therefore reliable (Stevens, 2009). Factor 4 has one loading < .60 (item 4, .583). However, when the average of the four largest loadings is >.60, a factor is reliable as well. Although factor 4 does not meet the first

requirement as suggested by Guadagnoli and Velicer, the factor is still reliable as the average factor loading is .67 (Stevens, 2009).

Future studies may strengthen the results found in this study by addressing larger samples. This could contribute to a more stable and reliable view. In order to make results more generalisable, the sample should preferably be selected among multiple organisations and industries. Such an approach enables researchers to filter out possible extraneous variables.

Table 9: Factor loadings

	Factor 1: Exploration activities	Factor 2: Exploitation activities	Factor 3: Task formalisation	Factor 4: Individual decision-making authority
Factor loading (after rotation)	.781	.604	.671	.602
	.801	.747	.639	.703
	.793	.622	.745	.775
	.701	.679	.637	.583
	.686	.740		
		.317		

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Appendix

The relationship between formal and informal coordination mechanisms and individual ambidexterity

Research Proposal

Teun Gilissen

Business Management & Organisation Group

Date: 15-11-2018

The relationship between formal and informal coordination mechanisms and individual ambidexterity

What is the relationship between formal and informal coordination mechanisms and individual ambidexterity?

Teun Gilissen   950823-264-040

MST-80436
Business Management & Organisation Group

Scientific supervisor: dr. M.C. Annosi
Second scientific supervisor: dr. D. Stea
Credits: 36 ECTS

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1. Introduction

How do organisations create sustainable competitive advantage and achieve long-term success? This is one of the central questions that is prevalent in management theory. Since competition has intensified and changes in the environment continuously gain momentum, more scholars embrace the idea that organisational survival depends on the ability to exploit existing resources while exploring new ones (e.g. Blarr, 2012; Jansen, Van Den Bosch, & Volberda, 2006; Levinthal & March, 1993; Raisch, Birkinshaw, Probst, & Tushman, 2009).

One of the first scholars that considered the concepts of exploitation and exploration, was March (1991). He defined exploitation as activities that include refinement, choice, production, efficiency, selection, implementation and execution. Exploration includes activities like search, variation, risk taking, experimentation, play, flexibility, discovery and innovation. March found that exploitation and exploration are related to each other. This relationship is potentially problematic, as both concepts are crucial for organisational success but compete for the same resources (March, 1991). Pursuing exploitation and exploration activities requires different or even contradictory knowledge processes, as it involves diverse administrative routines and behaviour (Lubatkin, Simsek, Ling, & Veiga, 2006). Organisational ambidexterity refers to a firm's ability to manage the tension between exploitation and exploration (Andriopoulos & Lewis, 2009).

A commonly cited article by Levinthal and March (1993) illustrates that a proper balance between exploitation and exploration is essential for firm survival, as focusing too much on either exploitation or exploration enhances risks for a firm. They state that "[a]*n organization that engages exclusively in exploration will ordinarily suffer from the fact that it never gains the returns of its knowledge. An organization that engages exclusively in exploitation will ordinarily suffer from obsolescence.*" (p. 105). When an organisation pursues exploration only, it will run the risk of an endless search for innovations, failure and changes that remain unrewarded. Organisations that focus solely on exploitation are likely to obtain stable returns, but run the risk of being unsustainable (Raisch & Birkinshaw, 2008). O'Reilly and Tushman (2013) present an extended list of empirical studies that show a positive relation between ambidexterity and firm performance in terms of sales growth, innovation, market valuation, firm survival and subjective performance ratings. The effect of ambidexterity on performance varies among studies, as it is moderated by the external environment and some firm specific factors (Raisch & Birkinshaw, 2008). However, it is evident that ambidexterity provides great opportunities for an organisation to increase its performance.

Three types of antecedents that foster organisational ambidexterity can be distinguished. These include 1) structural antecedents, 2) contextual antecedents and 3) leadership-based antecedents (Raisch & Birkinshaw, 2008). According to Gibson and Birkinshaw (2004, p. 211), structural ambidexterity is about *"developing structural mechanisms to cope with the competing demands faced by the organization for alignment and adaptability"*. Alignment (exploitation) involves cooperation to achieve common goals, whereas adaptability (exploration) is defined as the capacity to change business activities in order to remain competitive and meet changing customer demands.

The structural antecedents relate to two basic underlying concepts, which are spatial separation and parallel structures (Raisch & Birkinshaw, 2008). In spatial separation or partitioning, separate business units are built to pursue either exploitation or exploration. These business units have different processes, structures and cultures (Adler, Goldoftas, & Levine, 1999; O'Reilly & Tushman, 2004). Parallel structures or switching are an alternative form of structural ambidexterity. Here, a business unit uses various structures, depending on the task. For example, routine and efficiency task can be executed using a business unit's formal structure, whereas cross-functional teams and networks can

be used for innovative and non-routine tasks (Raisch & Birkinshaw, 2008). Spatial separation and parallel structures are derived from formal coordination mechanisms. These mechanisms are among the most important tools to coordinate activities within organisations (Damanpour, 1991; Jansen et al., 2006).

Contextual ambidexterity is defined as *"the behavioural capacity to simultaneously demonstrate alignment and adaptability across an entire business unit"* (Gibson & Birkinshaw, 2004, p. 209). In contrast with structural mechanisms, contextual ambidexterity is achieved through sets of processes and systems, which enables individuals to assess to what extent they should invest time in exploitation or exploration activities (Gibson & Birkinshaw, 2004). Besides, contextual ambidexterity focuses on the individual rather than business unit level (O'Reilly & Tushman, 2013). Organisation can create a context that attributes to ambidextrous behaviour by individuals, by facilitating interactions and relations with other organisational actors (e.g. Gibson & Birkinshaw, 2004; Jansen et al., 2006).

So far, most research has focused on formal coordination mechanisms. However, scholars increasingly address informal coordination mechanisms as a tool to influence individuals' behaviour (Mom, Van Den Bosch, & Volberda, 2009). As most activity within an organisation does not follow the hierarchical structure, informal coordination mechanisms seem relevant to coordinate activities (Tsai, 2002). However, much has yet to be clarified about the influence of these types of coordination mechanisms on ambidexterity, particularly at the individual level. Therefore, leadership-based antecedents are not taken into account in this study.

In that sense, in their literature review paper on organisational ambidexterity Raisch and Birkinshaw (2008) stress some of the major shortcomings of the current organisational ambidexterity literature. They state the following: *"There is a complete lack of research into ambidexterity at the individual level of analysis. Detailed case studies, as well as broader field studies, could help to further substantiate our understanding"* (p. 397). This is supported by Raisch et al. (2009) and more recently by Mom, Fourné and Jansen (2015), which argue that conceptual and empirically validated studies on individual-level ambidexterity are still lacking.

In this study, individual ambidexterity is defined as an individual's ability to properly balance exploitation and exploration activities within a certain period of time (Mom et al., 2009). The conflicting demands of exploitation and exploration make it difficult for an individual to become ambidextrous (Jasmand, Blazevic, & De Ruyter, 2012; March, 1991). However, the ambidexterity literature is not explicit about how to solve or minimise the tensions that arise with individual ambidexterity.

Recently, some scholars responded to the call for more research and started investigating ambidexterity at the individual level (e.g. Bonesso, Gerli, & Scapolan, 2014; Good & Michel, 2013; Jasmand, Blazevic, & De Ruyter, 2012; Mom, Van Den Bosch, & Volberda, 2007; Mom et al., 2009; Rogan & Mors, 2014). However, these studies focus solely on a manager's ambidextrous behaviour. For example, Bonesso et al. (2014) proposed inter-functional, inter-firm and/or inter-industry work experience and a combination of emotional and social competences to predict ambidextrous behaviour of managers. Mom et al. (2009) argue that decision-making authority, participation in cross-functional interfaces and network connectedness are positively related to a manager's ambidextrous behaviour. They also found interaction effects between these formal and informal coordination mechanisms. However, these studies all focus on the manager level.

This manager level focus is not out of the blue. Traditionally, organisations were coordinated based on bureaucratic principles. Bureaucracy is based on rational-legal authority as a legitimate means of

command and control, thereby imposing a strong emphasis on the role of managers (Johnson, Wood, Brewster, & Brookes, 2009). In contrast, nowadays many organisations embrace post-bureaucratic principles. In post-bureaucratic organisations, the role of managers has changed. Their behaviour should develop away from authoritative leadership aimed at direct control of subordinates, to enhance horizontal communication and dialogue (Johnson et al., 2009). Decisions are no longer based on the ability to command but on the ability to persuade. Persuasion depends on knowledge, commitment and proven past effectiveness, not on one's official position (Heckscher, 1994). This implies that not only managers, but any person can contribute to decision-making and organisational outcomes in a post-bureaucratic organisation. Therefore, it seems a promising avenue to further investigate ambidexterity at the employee-level.

Studies that investigated individual ambidexterity at employee-level remain scarce, despite empirical evidence that individual ambidexterity contributes to task performance in dynamic environments (Good & Michel, 2013) and to ambidexterity at the organisational level (Rogan & Mors, 2014). The latter suggest that this is the consequence of an empirical and theoretical challenge. First, it is difficult to make inferences about individual-level processes and capabilities that foster ambidexterity, as most prior studies relied on firm- or business unit-level data. Second, prior studies at the individual level conceptualised employees as single actors that could only be part of a loosely coupled, ambidextrous unit (Gupta, Smith, & Shalley, 2006, p. 697). A social network analysis can overcome these challenges; it allows for measuring at the individual level, without using firm- or business unit-level data. Besides, in social network analysis each individual is an actor within a network of relationships. An individual may use these distinct relationships to perform different types of tasks (i.e. exploitation and exploration activities) and thus become ambidextrous. Rogan and Mors (2014) used a social network analysis to investigate the influence of informal coordination mechanisms on individual ambidexterity, yet again at the manager level.

Other research on individual ambidexterity point out that formal and informal coordination mechanisms affect a manager's ability to act ambidextrously. The influence of these coordination mechanisms on individual behaviour varies (Jansen et al., 2006; Mom et al., 2009; Raisch et al., 2009). However, the relationship between coordination mechanisms and individual ambidextrous behaviour has not yet been tested at the employee level. This seems surprising, as formal and informal coordination mechanisms are among the most important organisational elements to influence individual behaviour (Martinez & Jarillo, 1989; Mom et al., 2009). This study aims to fill this gap within the organisational ambidexterity literature, by investigating whether and how formal and informal coordination mechanisms affect individual ambidexterity. To overcome the challenges as stressed by Rogan and Mors (2014), this study will use a social network perspective in accordance. This perspective builds on and extends prior work on informal coordination mechanisms (e.g. Mom et al., 2009) in addition to the more traditional formal coordination mechanisms. Moreover, this study will examine the interaction effect of formal and informal coordination mechanisms, as it has proven to influence ambidextrous behaviour (Mom et al., 2009).

The remainder of this proposal is as follows. In next section, the hypotheses and conceptual model of this study are presented, based on a review of individual ambidexterity literature. The central research question, specific research questions and objectives are presented in this section as well. The method section specifies the empirical setting and study design, data collection and measurement of the dependent and independent variables.

2. Coordination mechanisms and individual ambidexterity

In an ambidextrous organisation, organisational behaviour to manage complex and changing job demands is required. This involves different types of cognitive orientations in order to meet these conflicting demands (Bonesso et al., 2014). These orientations focus on either exploitation or exploration activities. Exploitation activities include refinement, choice, production, efficiency, selection, implementation and execution. Exploration activities involve search, variation, risk taking, experimentation, play, flexibility, discovery and innovation (March, 1991, p. 71). In this study, individual ambidexterity is defined as an individual's ability to properly balance exploitation and exploration activities within a certain period of time (Mom et al., 2009). Individual ambidexterity is referred to as ambidextrous behaviour at *employee* level, unless stated otherwise. Individual ambidexterity requires a proper balance and management of exploitation and exploration activities. Within an organisation, coordination mechanisms can be used to guide individual behaviour.

A coordination mechanism is defined as an organisational element to coordinate activities of persons within an organisation (Martinez & Jarillo, 1989; Oxford Scholarship Online, n.d.). Coordination mechanisms may be used to establish, decompose and communicate organisational tasks (Vlaar, 2006) and can roughly be classified as formal or informal (Martinez & Jarillo, 1989). These mechanisms can be used to foster individual ambidextrous behaviour (Mom et al., 2009). The following sections elaborate on different elements of formal and informal coordination mechanisms that may affect individual ambidextrous behaviour.

2.1 Formal coordination mechanisms

Formal coordination mechanisms refer to structural organisational elements – departmentalisation, (de)centralisation, formalisation, planning or output and behavioural control – an organisation can use to influence individuals' behaviour by shaping their relations and interactions with other individuals, groups or organisational units (Martinez & Jarillo, 1989; Mom et al., 2009). According to Mom et al. (2009), the most important coordination mechanisms regarding individual ambidexterity include (de)centralisation of decision-making authority and formalisation of tasks. Centralisation and task formalisation both relate to individual autonomy, which is a prerequisite to enable a proper balance of exploitation and exploration activities (Gibson & Birkinshaw, 2004). As stated in the introduction, individual autonomy seems relevant since most companies embrace post-bureaucratic principles nowadays (Johnson et al., 2009). This study will, among other things, explore the relationship between these formal coordination mechanisms and individual ambidexterity. Therefore, the next section provides hypotheses and arguments regarding centralisation of decision-making authority and task formalisation in relation to individual ambidexterity.

2.1.1 Centralisation and individual decision-making authority

One of the fundamental dimensions of organisational design is centralisation (Tsai, 2002). Centralised organisations coordinate activities through vertically imposed bureaucratic processes. In a centralised organisation, employees are limited in their ability to manage (changing) demands in their task environment due to inadequate response time by management (Jansen, Simsek, & Cao, 2012). Besides, centralisation may cause inefficiency due to errors in knowledge transfer to higher hierarchical levels (Tsai, 2002).

Decentralised organisations allow employees at lower hierarchical levels to make decisions within certain organisational boundaries. Individual decision-making authority can be defined as an individual's autonomy to make decisions about operational goals and tasks in order to solve organisational challenges (Atuahene-Gima, 2003). Delegation of decision-making authority increases the amount and quality of solutions that are provided to solve organisational issues, due to several

reasons. Firstly, as lower-level employees are closer to the problem than do their superiors, they are better able to collect qualitative and timely information about the problems. Secondly, decentralisation improves an individual's cognitive ability, which increases the amount and quality of problem-solving ideas. Thirdly, as individuals may feel to have more control over their work, the urge to seek for innovative solutions increases as well (Atuahene-Gima, 2003). Increased self-control and ownership encourages individuals to make autonomous decisions on how they should spend their time (Gibson & Birkinshaw, 2004). This may stimulate an individual to pursue a diverse set of goals and thus become ambidextrous (Mom et al., 2009). Therefore, the following hypothesis is formulated:

H1: individual decision-making authority is positively related to individual ambidexterity.

2.1.2 Task formalisation

Formalisation can be defined as the extent of written rules, procedures and instructions (Adler & Borys, 1996). Task formalisation refers to the degree to which an individual's tasks are described, decision-making is directed and to what extent someone has to conform to his task description (Mom et al., 2009). Formalisation of tasks enables coordination by supporting rational decision-making and by providing individuals the necessary means to handle their responsibilities (Vlaar, 2006, p. 36). Activities and decisions are restricted in an attempt to align individual activities with organisational goals and objectives. Specialised roles, rules and standard operating procedures provide boundaries an individual can work in, which increases the predictability of outcomes (Vlaar, 2006). It is argued that task formalisation leads to efficiency when there is an overlap between individuals' and organisational goals. It could reduce role conflict and ambiguity, thereby improving job satisfaction and lowering stress (Adler & Borys, 1996). Well-designed rules and procedures could enable individuals to better master their tasks (Adler & Borys, 1996; Jansen et al., 2006), thereby improving ambidextrous behaviour. Jansen et al. (2006) found that formalisation is positively related to exploitative innovation, whereas they found no significant negative relationship between formalisation and exploratory innovation.

On the other hand, it seems that formalisation not only contributes to individual ambidexterity but also affects it negatively. This is illustrated by Mintzberg (1994, p. 34, as cited in Vlaar, 2006), who stated that "*formalization is a double-edged sword, easily reaching the point where help becomes hindrance*". Previous studies indicate that formalisation is negatively related to innovation and job satisfaction (see Adler & Borys, 1996). Formalisation negatively affects innovative activity as it constrains creative problem-solving and idea generation (Damanpor, 1996, p. 151). It undermines the high level of autonomy that employees aspire, thereby decreasing commitment and innovation effectiveness. Employees are less motivated to engage in nonroutine, explorative tasks, which could negatively influence ambidextrous behaviour. Task formalisation is associated with singleness of purpose and decreases the likeliness of individuals to pursue different opportunities and goals. This is opposed to ambidextrous behaviour, in which an individual attempts to fulfil a range of different type of goals (Mom et al., 2009).

To conclude, empirical evidence on the relationship between formalisation and organisational performance is mixed. It seems that too little task formalisation leads to chaos, whereas too much formalisation leads to rigidity and constrains creativity (Vlaar, 2006). Most of the arguments suggest that formalisation negatively affects exploration activities, while positively affecting exploitation activities. However, individual ambidexterity requires high levels of exploitation and exploration activities. It is expected that at a certain point, the negative effects of high task formalisation on exploration activities outweigh the positive effects on exploitation activities. Therefore, the following hypothesis is formulated:

2.2 Informal coordination mechanisms

Most studies have focused on formal coordination mechanisms to explain individual behaviour. However, formally defined interactions and predefined rules cannot fully explain organisational behaviour (Lamieri & Mangalagiu, 2009). Therefore, other attempts to explain individual behaviour are based on a different theoretical perspective: the knowledge-based theory of the firm. This theory suggests that knowledge is the most valuable resource of a firm (Grant, 1996) in order to create sustainable competitive advantage (Teece, Pisano, & Shuen, 1997). The perspective suggests that informal interpersonal networks are a major component in transferring knowledge within organisations (Lamieri & Mangalagiu, 2009). Organisations that develop internal and external networks can deal with knowledge more effectively (Müller-Prothmann, 2005)

Prior studies have also shown the importance of informal coordination mechanisms in fostering ambidextrous behaviour (e.g. Gibson & Birkinshaw, 2004; Mom et al., 2009). Empirical studies point out that the social network of organisational actors affect their ability to balance exploitation and exploration (Rogan & Mors, 2014). A social network analysis will be used to study the informal coordination mechanisms. The social network analysis is discussed in the following section.

2.2.1 Social network analysis

In order to investigate the effects of informal coordination mechanisms on individual ambidextrous behaviour, a social network analysis will be used. According to the social network perspective, organisations consist of social groups that interact in relatively stable patterns over time. Social network analysis is involved with the structures and patterns of the relationships that exists within organisations. This perspective allows for analysis at different organisational levels, thereby linking micro and macro approaches to organisational behaviour (Tichy, Tushman, & Fombrun, 1979). The social network analysis can be used to describe the influence of social interaction on certain behaviour, which in this study regards individual ambidextrous behaviour.

As social sciences is about meanings, motives, definitions and typifications, interpretation of data is always involved (Scott, 2017). Two principle types of data can be distinguished: relational and attribute data. The social network analysis is concerned with relational data, which is defined as "*the contacts, ties and connections, and the group attachments and meeting that relate one agent to another and that cannot be reduced to the properties of the individual agents themselves*" (Scott, 2017, p. 4). This type of data differs from attribute data, which "*relate*[s] *to the attitudes, opinions and behaviour of agents, in so far as these are regarded as the properties, qualities of characteristics that belong to them as individuals or groups* (Scott, 2017, p. 4)*. For the informal coordination mechanisms, relational data will be collected. Attribute data will be collected with regard to the formal coordination mechanisms and individual ambidexterity. In this study, a questionnaire will be used to collect the required data. Although the types of data and questions differ for relational and attribute data, the process of survey construction and analysis are identical (Scott, 2017). Therefore, a single questionnaire will be sufficient to collect both types of data. The rationale for using a survey design and the construction of the questionnaire are elaborated in Chapter 3 Methods.

In order to assess the relationship between informal coordination mechanisms and individual ambidexterity, the following section provides arguments and hypotheses regarding an individual's network connectedness, network heterogeneity and informality of its network ties. With regard to feasibility, the network characteristics in this study are limited to the internal network of the organisation.

2.2.2 Informal social relations and network connectedness

Cardinal (2001) stresses the importance of informal social relations in developing exploitative and explorative innovation. Informal social relations can be defined as personal linkages between employees that comprise a more voluntary mode of coordination than hierarchical structures (Jansen et al., 2006; Tsai, 2002). Prior studies have tested the relationship between the density of a manager's social network – or connectedness – and ambidextrous behaviour (Jansen et al., 2006; Mom et al., 2009). Connectedness refers to the extent to which an individual is networked through other organisation members, across hierarchical levels and organisational units, through direct contacts (Mom et al., 2009). Both studies hypothesised an inverted U-shaped relationship, but found a positive relationship with ambidextrous behaviour.

However, the characteristics and advantages of network connectedness do not apply to managers specifically. Prior studies point out that interfirm or interunit relations affect knowledge transfer and learning behaviour (Jansen et al., 2006). Employees may use their network to acquire for example new competencies and pursue radical innovation, but also to refine existing competencies and pursue incremental innovation (Mom et al., 2009). A densely connected network allows individuals to generate new capabilities, gain new insight and knowledge which allows them to handle complex situations (Lamieri & Mangalagiu, 2009). Regarding network connectedness, the following hypothesis is formulated:

H3: network connectedness is positively related to individual ambidexterity.

2.2.3 Network content and knowledge heterogeneity

Prior studies have mainly focused on the structural dimension of individuals' networks, for example by studying the network density. However, structural characteristics of a network are not necessarily a good predictor of behaviour and motivation of individuals (Soda, Stea, & Pedersen, 2017). Therefore it would be wise to include a qualitative measurement of social interaction, as the quality of the interactions within the network can affect ambidextrous behaviour as well (Jansen et al., 2006; Rogan & Mors, 2014). Network heterogeneity can be used as an indicator to assess the quality of the network and is defined as the variety of knowledge, know-how and expertise an individual has access to in his network (Rodan & Galunic, 2004). In a social network study, the authors show that heterogeneity in the knowledge provided by contacts in a network is as important as the structure of the network itself for gathering novel information and for the implementation of innovation.

In a homogeneous network, individuals are closely connected to each other. As a result, these individuals are likely to obtain similar and redundant information and knowledge. In contrast, individuals that are part of a heterogeneous network are likely to obtain not only a larger amount of knowledge, but also more diverse information. According to Rodan and Galunic (2004, p. 545), "*exposure to heterogeneous knowledge should improve not only opportunity recognition and thus be associated with the ability to perform routine and ongoing tasks, but should also raise the* [individual's] *creative potential.*" Routine and ongoing tasks are related to exploitation activities, whereas the creative potential can be a source for exploration activities. Knowledge diversity in an individual's network can be useful for implementation of innovation, especially when it involves complex tasks (Rodan & Galunic, 2004). Cross-functional participation can enable ambidextrous behaviour as it provides individuals the opportunity to exchange knowledge (Mom et al., 2009). To summarise, it is expected that knowledge heterogeneity within a network contributes to knowledge diversity, which could foster ambidextrous behaviour. Regarding network heterogeneity, the following hypothesis is formulated:

H4: network heterogeneity is positively related to individual ambidexterity.

2.2.4   Network tie informality

Within a network, individuals are connected to each other. These connections, or network ties, can be formal or informal. Formal and informal network ties should not be confused with formal and informal coordination mechanisms. The communication structure of formal network ties is derived from the organisational structure. Formal network ties are used to handle standard work procedures and easily anticipated problems (Krackhardt & Hanson, 1993). Communication via one's formal network ties involves bureaucracy, which is time-consuming and limits flexibility (Aalbers, Koppius, & Dolfsma, 2006). This may constrain individual ambidexterity, as it reduces one's ability to adequately adapt to (environmental) changes.

When organisational challenges become more complex, informal network ties are addressed (Krackhardt & Hanson, 1993). Informal network ties allow for information and knowledge exchange in both vertical and horizontal directions. In contrast to formal network ties, informal ties contribute to flexibility or adaptability, which is an enabling factor for ambidexterity (Gibson & Birkinshaw, 2004). According to Rogan and Mors (2014), informal network ties are more critical than formal ties when passing by existing boundaries (i.e. outside existing tasks or departments). Informal network ties increase the possibility for cross-fertilisation of knowledge, which is essential for ambidexterity. Based on a social network analysis study, Rogan and Mors (2014) found that the degree of informality in the network ties is positively related to ambidextrous behaviour within managers. It is expected that the informality of network ties among individual employees show the same tendency. Therefore, the following hypothesis is formulated:

> *H5: network tie informality is positively related to individual ambidexterity.*

2.3 Interaction effects

It is argued that combining formal and informal coordination mechanisms would stimulate ambidextrous behaviour (Gibson & Birkinshaw, 2004; Mom et al., 2009). In another study, Chen and Huang (2007) found that social interaction (i.e. informal coordination mechanism) mediates the relationship between organisational structure (i.e. formal coordination mechanisms) and sharing and application of tacit knowledge. These studies suggests that formal and informal coordination mechanisms interact to a certain extent. However, it is not clear whether and how this suggested relationship holds. Therefore, this study will assess whether there are significant interaction effects between distinct elements of formal and informal coordination mechanisms on individual ambidexterity.

2.3.1   Individual decision-making authority and network connectedness

Individuals that have the autonomy to make decisions about operational goals and tasks are likely to perform ambidextrous behaviour (Mom et al., 2009). A densely connected network affects knowledge transfer and learning behaviour between individual actors (Jansen et al., 2006). A connected network may increase an individual's ability to understand the identified needs and opportunities more thoroughly and reduce ambiguity, by "*engaging in frequent, reciprocal and non-routine information processing*" (Mom et al., 2009, p. 817). This implies the following relationship:

> *H6: there is a positive interaction effect between individual decision-making authority and network connectedness on individual ambidexterity.*

2.3.2   Individual decision-making authority and network heterogeneity

As stated in previous section, the autonomy to make decisions could foster individual ambidexterity. When an individual has access to a wide variety of knowledge, he may be better able to solve diverse organisational challenges. Individuals that possess heterogeneous networks are more likely to obtain

new knowledge, know-how and expertise from their network (Rodan & Galunic, 2004). Besides, individuals may recognize a wider variety of opportunities, as they enjoy more diverse possibilities to gather ideas, information and input from other organisational members (Mom et al., 2009). This allows individuals to apply the gathered knowledge to diverse organisational challenges, thereby increasing perceived self-control and ownership (Gibson & Birkinshaw, 2004) and subsequently, individual ambidexterity. Formally stated:

> *H7: there is a positive interaction effect between individual decision-making authority and network heterogeneity on individual ambidexterity.*

2.3.3 Task formalisation and network heterogeneity

According to Mom et al. (2009), individuals need to cooperate and combine their efforts with other organisational members for being able to pursue different goals. High task formalisation likely leads to isolation of individuals, as they tend to focus more on their core tasks. However, the expected positive effects of heterogeneous knowledge are likely to reduce the negative effect of high task formalisation on individual ambidexterity. Individuals with a heterogeneous network will be exposed to a larger and more diverse amount of knowledge (Rodan & Galunic, 2004). This may stimulate individuals to broaden their expertise beyond the narrow tasks of their own jobs (Mom et al., 2009) and to develop knowledge underlying exploratory innovation (Jansen et al., 2006). It can be expected that network heterogeneity cancels out the possible negative effects of high task formalisation. Therefore, the following interaction hypothesis is formulated:

> *H8: there is a positive interaction effect between task formalisation and network heterogeneity on individual ambidexterity.*

2.3.4 Task formalisation and informality of network ties

Section 2.1.2 elaborates the possible negative effects of high task formalisation. These include reduced innovative activity, commitment and autonomy. Moreover, individuals are more likely to strive for single purposes and to become isolated (Damanpor, 1996; Mom et al., 2009). High task formalisation is negatively associated with ambidextrous behaviour, as it reduces the extent to which individuals build and maintain personal relationships. These possible negative effects of high task formalisation can be cancelled out by informal network ties. Informal network ties are based on voluntary relationships among individuals. These informal ties are critical when passing existing boundaries (i.e. outside one's existing tasks or department) and it allows cross-fertilisation of knowledge (Rogan & Mors, 2014). Therefore, the following interaction effect is hypothesised:

> *H9: there is a positive interaction effect between task formalisation and informality of network ties.*

2.4 Conceptual framework

Based on the literature review, the conceptual framework is designed as presented in Figure 1. The conceptual framework shows the hypothesised relationships between the formal and informal coordination mechanisms – the independent variables – and individual ambidexterity, the dependent variable. These relationships correspond with hypotheses 1 until 5. The hypothesis regarding task formalisation is depicted with a +/- notation, as the relationship with individual ambidexterity is expected to be curvilinear. The dashed lines show the expected interaction effects between the independent variables on individual ambidexterity, corresponding with H6 until H9.
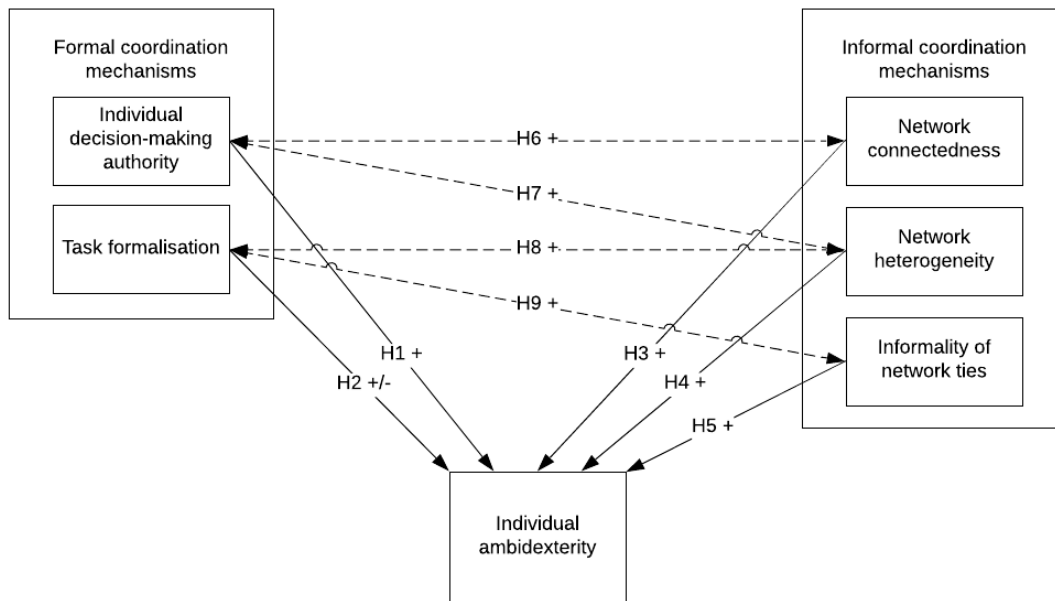
Figure 8: Conceptual Framework

2.5 Research question and objectives

In this section, the main research question, the specific research questions and the research objectives are presented.

2.5.1 Central research question and specific research questions

The central research question for this study is the following:

❖ *What is the relationship between formal and informal coordination mechanisms and individual ambidexterity?*

In order to answer the central research question stated above, nine specific research questions are formulated. These specific research questions are divided in a theoretical, empirical and analytical part.

Theoretical part

➢ *What is individual ambidexterity and how can it be measured?*
➢ *What formal coordination mechanisms can be identified that may be related to individual ambidexterity and how can they be measured?*
➢ *What informal coordination mechanisms can be identified that may be related to individual ambidexterity and how can they be measured?*

Empirical part

➢ *What is the level of individual ambidexterity in an Indonesian industrial organisation?*
➢ *What is the level of formal coordination mechanisms in an Indonesian industrial organisation?*
➢ *What is the level of informal coordination mechanisms in an Indonesian industrial organisation?*

Analytical part

➢ *What is the relationship between formal coordination mechanisms and individual ambidexterity?*
➢ *What is the relationship between informal coordination mechanisms and individual ambidexterity?*

> *What interaction effects influence the relationship between formal and informal coordination mechanisms and individual ambidexterity?*

2.5.2 Main objective and subobjectives

For this study, the following main research objective is formulated:

❖ *To broaden our understanding of the influence of formal and informal coordination mechanisms on individual ambidexterity by empirically investigating an Indonesian industrial organisation.*

This research has different types of objectives, which include descriptive, correlational and exploratory objectives. To achieve the main objective, nine subobjectives are formulated. For each of these objectives, the type of objective is stated in parentheses. Descriptive is referred to as *d*, correlational as *c* and exploratory as *e*. The subobjectives of this study are:

> *To identify individual ambidexterity and tools to measure it (d);*
> *To identify formal coordination mechanisms that may influence individual ambidexterity and tools to measure them (d);*
> *To identify informal coordination mechanisms that may influence individual ambidexterity and tools to measure them (d);*
> *To measure the level of individual ambidexterity in an Indonesian industrial organisation (d/e);*
> *To measure the level of formal coordination mechanisms in an Indonesian industrial organisation (d/e);*
> *To measure the level of informal coordination mechanisms in an Indonesian industrial organisation (d/e);*
> *To determine the influence of formal coordination mechanisms on individual ambidexterity (c);*
> *To determine the influence of informal coordination mechanisms on individual ambidexterity (c);*
> *To determine the influence of interaction between formal coordination mechanisms on individual ambidexterity (c).*

3. Methods

The empirical setting of this study is an Indonesian job shop in the metal sheet industry. The organisation has three facility locations, all on the Java island. In total, around 200 people work at the organisation. The organisation can be characterised as a post-bureaucratic organisation, which involves teamwork, decentralised and consensual decision-making and increased individual autonomy (Maravelias, 2003). The organisation applies lean principles, which target at continuous improvement of every process within the organisation. This requires employees to take responsibility for their tasks and feel some sense of ownership (Womack & Jones, 2003). Based on this knowledge, it can be assumed that ambidextrous behaviour is present in the organisation. The empirical data is collected from a single firm. Therefore, external and firm-varying factors that may affect individual ambidexterity are kept constant (Soda et al., 2017).

3.1 Study design and data collection

A study design can be classified based on the number of contacts, the reference period and the nature of the investigation (Kumar, 2014). A cross-sectional study design is used for this study. In a cross-sectional study, a phenomenon, situation or problem is investigated based on a single measurement point in time. The reference period can be characterised as prospective, as this study attempts to measure the likely impact of specific events (formal and informal coordination mechanisms) on a certain outcome (individual ambidexterity). The study is non-experimental, as no variables are manipulated (Kumar, 2014).

This study applies a deductive approach. This involves hypotheses development based on existing theories. The study design is developed in order to enable hypotheses testing. In order to test the hypotheses, quantitative data is required. For this study, both primary and secondary data will be used. The following sections describes how this data is gathered.

3.1.1 Secondary data

A literature study will be executed to find journal articles related to (individual) ambidexterity, its antecedents, individual ambidexterity and performance, environmental factors and other moderators related to individual ambidexterity, innovative behaviour, formal and informal coordination mechanisms and social network analysis.

In order to guide and restrict the literature study, some rules of thumb will be used. The Field-Weighted Citation Impact (FWCI) shows the ratio between the actual citations an article received and the average number of citations received by all other similar publications. It shows whether an article is cited above or below average in a certain discipline, up to three calendar years after publication. An FWCI score of 1 indicates that an article performs as expected on global average. An FWCI score of more than 1 indicates that an article is cited more than average. For example, an FWCI score of 1.75 means that an article is cited 75% more than expected. An article that scores for example 0.75 is cited 25% less than expected (Snowball Metrics Steering Group, 2017). Only articles with a FWCI >1 are used for the literature study, in order to filter out literature that has lost impact and relevance.

The majority of the articles that will be used are published in leading management and business journals. These include Academy of Management Journal, Academy of Management Review, Administrative Science Quarterly (ASQ), Journal of Management, Journal of Management Studies, Organization Science and Strategic Management Journal. The relevance of the journals is assessed based on their Journal Impact Factor 2017 (Clarivate Analytics, 2018). The JIF is used as guideline to assess the impact of a journal only, as it should not be directly used as an indicator for quality (Seglen, 1997).

3.1.2 Primary data

The empirical part of this study is based on a survey. Participants will receive a questionnaire in order to collect both relational and attribute data. The survey will be distributed among all employees, which includes different departments and hierarchical levels. For the survey, approval and commitment from management is obtained in order to smoothen the process. An online questionnaire is constructed using SurveyGizmo and will be distributed among the employees through the management in an attempt to increase commitment and response rate. As most employees do not master the English language sufficiently, the questionnaire is translated into Indonesian and later translated back to tackle possible translation ambiguities.

Choosing between a survey or interview depends on the nature of investigation, geographical distribution and type of study population (Kumar, 2014, p. 181). The type of study population is not in favour of one type of design. For this study, the nature of investigation and geographical distribution are highly relevant. Regarding the nature of investigation, interviews are not suitable for collecting quantitative data. This is required to draw statistically significant conclusions and to use the social network analysis effectively. Besides, in an interview respondents may feel reluctant to answer questions honestly which may jeopardise the accuracy of data. Surveys can provide greater anonymity. Moreover, as the empirical setting is based on an Indonesian organisation, conducting interviews is expected to be unfeasible. Based on these considerations, a survey design is chosen.

3.1.2.1 Implications of survey design

Using a survey design provides several advantages (Kumar, 2014). Compared to interviews, conducting questionnaires saves time and financial resources. Besides, it also benefits some practicalities, as there is no need to be physically present on the empirical site. Another advantage of a survey design is anonymity. In this study however, confidentiality may be a bottleneck, as employees may be traced from the social network analysis. In order to ensure anonymity and confidentiality, the following steps will be taken (Müller-Prothmann, 2005, p. 168):

- All personal data will be anonymised. Each employee will be linked to a unique code. Only these codes will be used for analysis. This allows the researcher to retrieve each employee and link it to other variables of interest, without using sensitive data such as names;
- All data will be stored safely. Only the researcher and supervisors will have access to the data;
- Only aggregate results will be presented to the management. Aggregate data will be used to ensure that employees and their responses cannot be traced back, which further increases anonymity.

Using a survey design has some disadvantages which could influence the quality of data (Kumar, 2014). Questionnaires generally have a very low response rate. The response rate is significantly influenced by the length of the questionnaire (Deutskens, De Ruyter, Wetzels, & Oosterveld, 2004). A low response rate increases the risk of non-response bias, which influences the quality of data. As a consequence, the results may not be representative of the total study population (in this case the organisation). Therefore, only 'need-to-know' questions are included in the questionnaire in an attempt to maximise response rate. Furthermore, respondents that did not complete the questionnaire will receive a reminder after one week and after two weeks.

The attribute data in this study is based on self-reported measures. Although this may lead to self-reporting bias, a questionnaire remains a valuable and valid measurement strategy to measure employee perception and behaviour (Howard, 1994). The questionnaire is self-administered. Therefore, there is no possibility to clarify any issues if respondents do not understand some questions. Respondents could interpret the questions or answers differently, hence influencing data. The

questions are formulated (and translated) in an easy to follow language, in order to minimise the risk of ambiguity. Moreover, a pilot questionnaire will be tested in the field to detect any further issues.

3.1.2.2 Structure of the questionnaire

In order to collect data about individual ambidexterity and the formal and informal coordination mechanisms, a questionnaire is constructed. The items in this questionnaire are based on the key concepts in this study, which are operationalised in section 3.2. The questionnaire consists of four parts. The first part involves demographic background (and) control variables, which is used to analyse the influence of possible extraneous variables (Kumar, 2014). The second part is about individual ambidexterity, based on Likert-scale items. The third part involves attitudinal questions regarding formal coordination mechanisms, which are based on Likert-scale items as well. The fourth part focuses on informal coordination mechanisms, based on the social network perspective. The structure of the questionnaire and its key concepts are as follows:

- Demographic background (control variables):
  - Name;
  - Gender;
  - Age;
  - Education level;
  - Hierarchical level;
  - Department;
  - Tenure in current function;
- Individual ambidexterity (dependent variable):
  - Exploitation activities; 7 items;
  - Exploration activities; 7 items;
- Formal coordination mechanisms (independent variables):
  - Individual decision-making authority; 4 items;
  - Formalisation; 4 items;
- Informal coordination mechanisms (independent variables):
  - Network connectedness and heterogeneity; 1 name generator item and 4 *qualifier* items for each contact provided in name generator question;
  - Formality of ties; 1 item for each contact provided in name generator question.

The complete questionnaire is attached in Appendix 2.

3.2 Measures

This study uses existing scales from literature to ensure validity of the constructs (Kumar, 2014). After data collection, confirmatory factor analysis of all attribute data will be executed to test for construct validity. The attribute data includes all items regarding individual ambidexterity (the dependent variable) and all items regarding the formal coordination mechanisms (two independent variables).

3.2.1 Dependent variable

Mom et al. (2007, 2009) created a scale to measure a manager's ambidexterity, based on the exploitation and exploration activities as defined by March (1991). They constructed separate scales for exploitation and exporation activities, thereby assuming that both constructs are independent of each other. They tested the scale using exploratory factor analysis and found seven exploitation (α = .87) and seven exploration items (α = .90) to be reliable to measure individual ambidexterity at manager-level. These items are not specifically designed to measure a manager's work activities and will therefore be used in this study. However, this scale is targetet at educated people. Within the study population, not all respondents are highly educated. Therefore, some of the items are slightly

adapted in order to make it easier to understand and therefore more suitable for the target population. This will reduce the risk of ambiguity and quality implications as described in section 3.1.2.1. Respondents can select one out of seven answers, varying from 1, to a very small extent to 7, to a very large extent.

Concerning exploitation activities, the following items will be used (original items in parentheses):

- To what extent did you, last year, engage in work related activities that can be characterised as follows:
    - Activities of which a lot of experience has been accumulated by yourself;
    - Activities which you carry out as if it were routine;
    - Activities which serve existing (internal) customers with existing services/products;
    - Activities of which it is clear to you how to conduct them;
    - Activities primarily focused on achieving short-term goals;
    - Activities which you can properly conduct by using your present knowledge;
    - Activities which clearly fit in the current strategy, plans and guidelines (activities which clearly fit into existing company policy).

With regard to exploration activities, the following items will be used:

- To what extent did you, last year, engage in work related activities that can be characterised as follows:
    - Searching for new products/services, processes or customers (searching for new possibilities with respect to products/services, processes, or markets);
    - Evaluating potential new products/services, processes or customers (evaluating diverse options with respect to products/services, processes, or markets);
    - Focusing on strong renewal of products/services or processes;
    - Activities of which the associated yields or costs are currently unclear;
    - Activities of which you need to change work routines, work procedures or work behaviour (activities requiring quite some adaptability of you);
    - Activities requiring you to learn new skills or knowledge;
    - Activities that are not (yet) in the current strategy, plans and guidelines (activities that are not (yet) clearly existing company policy).

The additudinal score for each item is summed for the exploitation activities and then divided by the number of items (=7). The same procedure will be executed to the exploration activities. Subsequently, the exploitation and exploration scores are multiplied to calculate the individual ambidexterity score. This procedure is consistent with prior studies (Gibson & Birkinshaw, 2004; He & Wong, 2004; Lubatkin et al., 2006; Mom et al., 2009), and can be illustrated by the following formula:

$$Individual\ ambidexterity = (\sum Exploitation\ items\ score)/7 * (\sum Exploration\ items\ score)/7 \qquad [1]$$

Both exploitation and exploration consist of seven items with a minimum score of 1 and a maximum score of 7. Therefore the value for individual ambidexterity may vary from 1 (=7/7*7/7) to 49 (=49/7*49/7).

3.2.2 Independent variables

In this section the independent variables are operationalised to enable estimation of the relationship with the dependent variable.

3.2.2.1 Formal coordination mechanisms

To measure the formal coordination mechanisms, two distinct scales are used.

Individual decision-making authority

In order to measure individual decision-making authority, an existing four-item scale is used based on Dewar, Whetten and Boje (1980). This scale has previously been used in ambidexterity research by Mom et al. (2009). Respondents can select one out of seven answers, varying from: 1, definitely true; 4, neither true nor false; to 7, definitely false. In this study, the following four items are included:

- I can undertake little action until my supervisor approves a decision;
- If I want to make my own decisions, I will never be discouraged;
- I never have to ask my supervisor before I do anything;
- Any decision I make has to have my supervisor's approval.

Formulated this way, high scores correspond to high individual decision-making authority, which is consistent with hypothesis H1.

Task formalisation

Consistent with prior studies (Jansen et al., 2006; Mom et al., 2009), a four-item scale is used to measure the extent of task formalisation among employees. This scale is adapted from Deshpande and Zaltman (1982), which used a fifteen item scale to measure the effect of formalisation on the use of market research information. Using the scale Mom and colleagues adapted has some advantages. First, it reduces the length of the survey, thereby reducing the risk of boredom and low response rate. Besides, this scale has previously been tested within the ambidexterity field and has been validated (Mom et al., 2009). Respondents can select one out of seven answers, varying from 1, definitely true; 4, neither true nor false; to 7, definitely false. In this study, the following four items are included:

- Whatever situation arises, I have procedures to follow in dealing with it;
- I don't have to follow strict operational procedures at any time;
- Rules occupy a central place in my work-related activities;
- There is a written job description for going about my tasks.

High scores correspond to high task formalisation. In contrast with prior studies, this study hypothesises an (curvilinear) inverted U-shaped relationship between task formalisation and individual ambidexterity. Therefore, the coefficient for the squared term will be used in the analysis (Mom et al., 2009).

3.2.2.2 Informal coordination mechanisms

The informal coordination mechanisms will be studied based on social network variables. This involves a different type of questions, compared to the formal coordination mechanisms. The common procedure for collecting network data is to use one or more name generator items and to subsequently obtain additional data via name interpreter items. These name interpreter items could include personal attributes, properties of the network ties or intensities of the ties (Marsden, 1990). This study uses one name generator item and four name interpreter items or *qualifiers*.

Network connectedness

To compose the network and its relationships, respondents are exposed to one name generator item and four qualifiers. The relationships within the network are necessary to calculate network connectedness, which is the extent to which an individual is networked through other organisation members, across hierarchical levels and organisational units, through direct contacts (Mom et al.,

2009). The following name generator item will be used (Krackhardt & Hanson, 1993; Rodan & Galunic, 2004):

- Please choose the people with whom you communicated the most regarding work-related topics in the past year;

Respondents can type the first few letters of each contact in the appropriate search bar. The full name will then automatically appear. This item will be used to identify the individuals and their contacts in order to build the network. Based on the contacts a respondent identifies, one is able to calculate the network connectedness, based on Formula 2 (Rogan & Mors, 2014):

$$Network\ connectedness = ties\ /\ [size\ x\ (size - 1)/2] \qquad\qquad [2]$$

Network connectedness describes the fraction of actual connections relative to the potential connections. A potential connection is a possible link between two actors in a network (nodes). Ties refer to the actual connections an individual has. Size refers to the total potential connections in a network. However, one should keep in mind that the actual possible network ties within a network are not the same as the theoretical possible network ties, as individual actors have an upper limit in the number of ties they can manage. The difference between the theoretical and actual possible network ties increases when the size of the network increases (Scott, 2000). As the network under study is relatively large (over one hundred individuals), this should be taken into account. Network connectedness or density will be calculated via UCINET software.

Two characteristics of the network data should be considered. The items are *directed*, which means that the direction of a certain relation is relevant. When using undirected data, only the presence or absence of a relationship is considered. Therefore, relations are not reciprocal by definition, but depend on whether two contacts identify one another in the name generator question. Directed data provides a richer explanation of the relationships in a network (Scott, 2000). Besides, *valued* data will be used. For each identified contact, respondents are requested to reply to four name interpreter items or qualifiers, to indicate the intensity of the connections. In this study, two knowledge qualifiers, one frequency qualifiers and one emotional closeness qualifier will be used, based on the following 7-point Likert scale statements (Reagans & McEvily, 2003):

- To what extent have you received work-related knowledge from this co-worker?
- To what extent have you provided this co-worker with work-related knowledge?
- How often do you communicate with this co-worker?
- How close is your relationship with this co-worker?

Regarding the knowledge qualifiers, respondents can select one out of seven answers, varying from 1, none or very little extent; 4, moderate extent; to 7, very large extent. The frequency qualifier answer options vary from 1, very rarely; 4, sometimes; to 7, almost every day. Regarding emotional closeness, the following answers can be selected: 1, not very close; 4, somewhat close; 7, very close. Based on the qualifiers, the strength of the ties can be calculated to enrich the network connectedness data. This calculation will be performed in UCINET software.

Network heterogeneity
Network heterogeneity describes properties of the network ties. In order to assess the network heterogeneity of individual employees, the brokerage position of an individual is determined. Individuals (brokers) occupy a brokerage position when they "connect individuals who would otherwise remain disconnected" (Soda et al., 2017, p. 3). More recently, scholars acknowledge that a brokerage position is not only a structural characteristic of an individual's position in a network, but

may also reflect certain behaviour to mobilise knowledge and pursue structural opportunities provided by their network position (Soda, Tortoriello, & Iorio, 2018). Individuals whose networks bridge structural holes between departments are more likely to detect and process various information across groups (departments) (Burt, 2004).

No additional variable is required to determine the brokerage position of an individual, as this can be based on their position in the network. The network is composed based on the name generator items as described above. Brokerage is measured using the effective size of one's (ego) network. The effective size for an ego network measures the amount of nonredundancy in one's network, by subtracting the size of the network with the redundancy in the network. The calculation for effective size is given in Formula 3 (Soda et al., 2018, p. 903):

$$Effective\ size\ for\ ego\ network = \sum_j [1 - \sum_q p_{iq} m_{jq}] \qquad [3]$$

For each contact j that actor $\underline{i}$ has, the redundancy is calculated. p_{iq} refers to the proportion of actor i's relations that is spent with third person q. m_{jq} refers to the marginal strength of contact j's relation with common contact q, which is calculated by dividing j's interaction with q by j's strongest interaction with any other q. Consider for example the network in Figure 2. Here the proportional strength of actor C to third person A is 1 / 4 = .25, whereas the proportion of A to C is 1 / 2 = .50. The marginal strength of e.g. B's relation with A can be calculated by dividing the strength of the interaction between B and A (2) by B's strongest interaction with any other third person q (in this example E, strength 3). The marginal strength is thus 2 / 3 = 0.67. The product $p_{iq}(m_{jq})$ measures "the portion of i's relation with j that is redundant to i's relation with other direct connections" (Soda et al., 2018, p. 903). A high effective size corresponds with a highly heterogeneous network. The effective size and brokerage will be calculated with UCINET software.
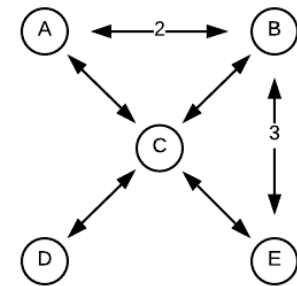
Figure 2: Example network

Network tie informality

Informality of network ties is another name interpreter item. In order to determine the extent of informality of the network ties, a 5-point Likert scale item is included. Individuals can build relationships using resources that are *dependent* on their formal role in the organisation, e.g. the firm's knowledge, reputation, delivery capacity. On the other hand, individuals can build relationships using resources that are *independent* of their formal role, e.g. personal knowledge, expertise, friendship. The scale is adapted from Rogan and Mors (2014), who investigated individual ambidexterity from a social network perspective. A five-point Likert scale is used to assess to what extent individuals use formal or informal resources to build and maintain relationships with their contacts (Rogan & Mors, 2014). Respondents can select one out of five answers: 1, formal; 2, often formal; 3, sometimes formal; 4, rarely formal; 5, independent of formal to describe the informality of their network ties:

- Which combination of resources do you use to build and maintain the relationship with your contacts?

For each contact as defined in the network connectedness variables, the network tie informality is determined. The average network tie informality is calculated for each respondent in order to allow for further analyses. Consistent with Rogan and Mors (2014), a high value corresponds with high tie informality of the respondent's network.

3.2.3 Control variables

Besides the independent variables as described in the previous section, other variables can affect individual ambidexterity as well. Therefore, several control variables are included. The inclusion of control variables does not only help determining the influence that is attributable to the independent variables, but can – to some extent – be used to test for non-response bias too.

A dummy variable is included to control for possible gender effects. Education is associated with increasing cognitive ability to process information and learning (Mom et al., 2009) and is therefore included in the questionnaire grouping the education level as follows: 1: primary or middle school; 2: high school or associate degree; 3: bachelor's degree; 4: master's degree or higher. In accordance, three dummy variables are required. Several scholars argue that managers at high hierarchical levels should behave more ambidextrously than personnel at lower hierarchical levels (e.g. Lubatkin et al., 2006; O'Reilly & Tushman, 2004). To control for this possible effect, hierarchical level is included using two dummy variables. Functional area may impact the level of exploitation and exploration activities. For example, it can be assumed that product development is engaged with more exploration activities than finance and accounting. Functional area is included using (n − 1 =) 4 dummy variables. Departments that show some overlap are grouped together to avoid unnecessary additional control variables. The departments are grouped as follows: 1: general management and human resources management; 2: product development and technical group (engineering); 3: ICT and finance and accounting; 4: production and technical support; 5: sales and logistics. Experience of employees may affect ambidextrous behaviour (Mom et al., 2009). Therefore, age and tenure in the current function are included in the questionnaire.

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Appendix

Appendix 1: Gantt chart

Task	Vacation 1 (Jul 2-6)	V2 (Jul 9-13)	V3 (Jul 16-20)	V4 (Jul 23-27)	V5 (Jul/Aug 30-3)	V6 (Aug 6-10)	V7 (Aug 13-17)	V8 (Aug 20-24)	V9 (Aug 27-31)	P1.1 (Sep 3-7)	P1.2 (Sep 10-14)	P1.3 (Sep 17-21)	P1.4 (Sep 24-28)	P1.5 (Oct 1-5)	P1.6 (Oct 8-12)	P1.7 (Oct 15-19)	P1.8 (Oct 22-26)	P2.1 (Oct/Nov 29-2)	P2.2 (Nov 5-9)	P2.3 (Nov 12-16)	P2.4 (Nov 19-23)	P2.5 (Nov 26-30)	P2.6 (Dec 3-7)	P2.7 (Dec 10-14)	P2.8 (Dec 17-21)	Holiday (Dec 24-28)	(Dec/Jan 31-4)	P3.1 (Jan 7-11)	P3.2 (Jan 14-18)	P3.3 (Jan 21-25)	P3.4 (Jan/Feb 28-1)	P4.1 (Feb 4-8)	P4.2 (Feb 11-15)	P4.3 (Feb 18-22)	P4.4 (Feb/Mar 25-1)
Research Proposal	███	███	███	███	███	███	███	███	███	███	███	███	███	███	███	███	███	███	███	███	███														
Introduction	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒																							
Problem statement	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒																							
Literature review	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒																							
Research question										▒	▒																								
Key concepts and definitions											▒																								
Research design											▒	▒	▒																						
Development of questionnaire													▒	▒	▒																				
Translation of questionnaire																▒																			
Processing feedback on questionnaire																		▒	▒	▒															
Processing feedback on draft																	▒	▒	▒	▒	▒														
Final research proposal																					▓														
Data collection																						███	███	███	███										
Administrating survey																						▒	▒												
Sending reminder of survey																							▒	▒											
Transferring data into SPSS																									▒										
Transferring data into UCINET																						▒													
Data analysis																									███			███	███	███					
Network connectedness in UCINET																												▒							
Network heterogeneity in UCINET																												▒							
Construction of networks in UCINET																									▒										
Factor analysis																													▒						
Linear regression																													▒						
Final report																													███	███	███	███			
Rewrite Chapter 1, 2, 3																													▒						
Write results																													▒						
Write discussion																														▒	▒				
Write conclusion																															▒				
Final report draft																															▓				
Lay-out and finalising final report																																▒			
Processing feedback on draft																																	▒		
Final report																																	▓		
Retardment																																		███	███

Appendix 2: Final questionnaire

Social Network Analysis DLM, Indonesia, 2018: Network & Knowledge

Q1 **Welcome to the DLM survey**

Thank you for participating in the DLM knowledge network survey. The survey will take approximately 20/30 minutes to complete. Your answers will be treated in the strictest confidentiality and will not influence your work at DLM.

Please click the arrow to begin the survey.

Q2 **What is your name?**

To select your name: Type the first few letters of your name on the search bar (the full name will automatically appear)   Click on your name

Q3 **What is your gender?**

○ Male (1)

○ Female (5)

Q4 **Please select your education level**

○ Primary school (9)

○ Middle school (8)

○ High school (10)

○ Associate degree (11)

○ Bachelor's Degree (1)

○ Master's Degree (2)

○ MBA (3)

○ Doctoral Degree (4)

○ None of the above (12)

Q5 When did you start working at DLM?

Please select month / year

Q6 Below you will find a question that helps you identify the work collaborations that you have with your colleagues.

Please choose the people with whom you communicate the most regarding work-related topics
E.g., people that you exchange work-related knowledge and information with - whether they are physically located on site or elsewhere (e.g. through emails).

Q6.1 We noticed that you only chose one person in the previous question. If this was intentional, please continue the survey by clicking the arrow to the right. If this was not intentional, please click the arrow to the left to go back and add more people. You add more people by clicking in <u>the same</u> search bar as where you added the first person, and following the same steps as before.

Q8 To what extent have you <u>provided</u> ${lm://Field/1} with work-related knowledge?

○ Very little extent (1)

○ Little extent (2)

○ Neither little nor large extent (3)

○ Large extent (4)

○ Very large extent (5)

Q7 To what extent have you <u>received</u> work-related knowledge from ${lm://Field/1}?

○ Very little extent (1)

○ Little extent (2)

○ Neither little nor large extent (3)

○ Large extent (4)

○ Very large extent (5)

Q97 **To what extent is the information received from ${lm://Field/1} typically well documented in writing (e.g., memos, reports, manuals, e-mails)?**

○ Very little extent (1)

○ Little extent (2)

○ Neither little nor large extent (3)

○ Large extent (4)

○ Very large extent (5)

Q9 **On average, how often do you talk to ${lm://Field/1}?**

○ Several times a day   (1)

○ Daily   (2)

○ Weekly (3)

○ Monthly   (4)

○ Less than monthly (5)

Q10 **How close are you with ${lm://Field/1}?**

○ Very distant (1)

○ Distant (2)

○ Neither close nor distant (3)

○ Close (4)

○ Very close (5)

Q11 **How long have you been knowing ${lm://Field/1} for?**

○ Less than 6 months (1)

○ 6 to 12 months (2)

○ 1 to 2 years (3)

○ 2 to 5 years (4)

○ More than 5 years (5)

Q12 **What resources do you use to build and maintain the relationship with ${lm://Field/1}?**

You can use resources that depend on your formal role in the firm, or you can use resources that are independent of your formal role (e.g. personal knowledge, expertise, friendship).

○ Formal (1)

○ Often formal (2)

○ Sometimes formal (3)

○ Rarely formal (4)

○ Independent of formal (5)

Q13 **Below you will find a number of statements that help you think about the ways in which you work. Please indicate to what extent you engage in the following tasks**

	Very little extent (1)	Little extent (2)	Neither little nor large extent (3)	Large extent (4)	Very large extent (5)
Coming up with new ideas (1)	○	○	○	○	○
Working to implement new ideas (2)	○	○	○	○	○
Finding improved ways to do things (3)	○	○	○	○	○
Creating better processes and routines (4)	○	○	○	○	○

Note: these questions are displayed only to managers that have people reporting to them directly

Q30 **Below you will find six statements that help you think about the ways in which the colleagues who report directly to you work. Please indicate to what extent you think each colleague engages in the following**

1) Coming up with new ideas

	Very little extent (1)	Little extent (2)	Neither little nor large extent (3)	Large extent (4)	Very large extent (5)
Names of subordinates	○	○	○	○	○

Q32 **Below you will find six statements that help you think about the ways in which the colleagues who report directly to you work. Please indicate to what extent you think each colleague engages in the following**

2) Working to implement new ideas

	Very little extent (1)	Little extent (2)	Neither little nor large extent (3)	Large extent (4)	Very large extent (5)
Names of subordinates	○	○	○	○	○

Q33 **Below you will find six statements that help you think about the ways in which the colleagues who report directly to you work. Please indicate to what extent you think each colleague engages in the following**

3) Finding improved ways to do things

	Very little extent (1)	Little extent (2)	Neither little nor large extent (3)	Large extent (4)	Very large extent (5)
Names of subordinates	○	○	○	○	○

Q34 **Below you will find six statements that help you think about the ways in which the colleagues who report directly to you work. Please indicate to what extent you think each colleague engages in the following**

4) Creating better processes and routines

	Very little extent (1)	Little extent (2)	Neither little nor large extent (3)	Large extent (4)	Very large extent (5)
Names of subordinates	○	○	○	○	○

Q74 Below you will find six statements that help you think about the ways in which the colleagues who report directly to you work. Please indicate to what extent you think each colleague engages in the following

5) Providing work-related knowledge to the people that (s)he works with

	Very little extent (1)	Little extent (2)	Neither little nor large extent (3)	Large extent (4)	Very large extent (5)
Names of subordinates	○	○	○	○	○

Q75 Below you will find six statements that help you think about the ways in which the colleagues who report directly to you work. Please indicate to what extent you think each colleague engages in the following

6) Receiving work-related knowledge from the people that (s)he works with

	Very little extent (1)	Little extent (2)	Neither little nor large extent (3)	Large extent (4)	Very large extent (5)
Names of subordinates	○	○	○	○	○

Q14 Below you will find a number of statements that help you identify the ways in which you collaborate with your colleagues. Please state to what extent you agree or disagree with the following statements

	Strongly disagree (1)	Disagree (2)	Undecided (3)	Agree (4)	Strongly agree (5)
I introduce people to each other who might have a common strategic work interest (1) *(e.g., you introduce to each other two colleagues who currently do not work*	○	○	○	○	○

together, but could be interested in doing so in the future)

I will try to describe an issue in a way that will appeal to a diverse set of interests (2)
(e.g., when describing something to your colleagues, you take different perspectives into account so as to better relate to the multiple and potentially different interests that they may have)

○ ○ ○ ○ ○

I see opportunities for collaboration between people (3)
(e.g., you think that a problem that person A has, could be solved more easily if A talks to another colleague, person B)

○ ○ ○ ○ ○

I point out the common ground shared by people who have different perspectives on an issue (4)
(e.g., in a situation where two colleagues disagree on some things but agree on others, you try to highlight the parts where they agree rather than those where they disagree)

○ ○ ○ ○ ○

I introduce two people when I think they might benefit from becoming acquainted (5)
(e.g., if you think person A could benefit from talking to person B, you introduce person A to person B)

○ ○ ○ ○ ○

I forge connections between different people dealing with a particular issue (6)
(e.g., if person A and person B are dealing with the same issue but do not talk about it with each other, you try to make them discuss the issue or even work on it together)

○ ○ ○ ○ ○

I keep people separate when introducing them to each other is not essential (7) *(e.g., you know person A and person B, but they do not know each other. If there is no particular reason to introduce person A to person B, you do not do so)*	○	○	○	○	○
I value meeting people separately and recombining their insights on my own (8) *(e.g., you prefer to meet person A and B separately rather than the three of you together, and then using on your own the insights you got from the meetings)*	○	○	○	○	○
I believe round tables and open discussions are time consuming (9) *(e.g., you find meetings where colleagues brainstorm around general topics largely time consuming)*	○	○	○	○	○
I see opportunity to act as a bridge conveying information from one person to another (10) *(e.g., you tell person B what person A told you at an earlier point, rather than introducing person A to B and letting them talk directly)*	○	○	○	○	○
I draw analogies among people ostensibly irrelevant to one another (11) *(e.g., you often see similarities between people that are generally largely unrelated to one another)*	○	○	○	○	○

Q15 **Below you will find a number of statements that help you think about the nature of *your* work collaborations. Please state to what extent you agree or disagree with the following statements**

	Strongly disagree (1)	Disagree (2)	Undecided (3)	Agree (4)	Strongly agree (5)
I exchange work-related knowledge with several people in DLM (1) *(e.g., you discuss work related arguments with many people in the firm)*	◯	◯	◯	◯	◯
Most of the people that I exchange work-related knowledge with, also exchange knowledge with one another (2) *(e.g., most of the time, if you work with person A and person B, person A and person B also work together)*	◯	◯	◯	◯	◯
I am important for most of the people that I exchange work-related knowledge with (3) *(e.g., the people that you work with really need you to perform well in their tasks)*	◯	◯	◯	◯	◯
If I need it, I can easily be introduced to people in DLM (4) *(e.g., if you need advice about a specific task from someone in the firm that you do not currently know, you can easily be introduced to this person by asking some of your other colleagues to do so)*	◯	◯	◯	◯	◯
Most of the people that I exchange work-related knowledge with, do not exchange knowledge with one another (5) *(e.g., most of the time, if you work with person A on some tasks and with person B on other tasks, person A and person B do not work with one another)*	◯	◯	◯	◯	◯

Most of the people that I exchange knowledge with, are important in DLM (6) *(e.g., most of the people that you work with, are regarded as important in DLM)*	○	○	○	○	○

Q16 Below you will find a number of statements that help you think about the nature of *your colleagues'* work collaborations. Please choose the colleagues for whom you believe the following statements apply the most

To select names: Type the first few letters of each name on the appropriate search bar (the full name will automatically appear)   Click the name you want to choose   Repeat the process for the other people (you can select up to three people for each question)

Q17 (S)he is one of the greatest experts in DLM

Q18 (S)he exchanges work-related knowledge with several people in DLM

Q19 Most of the people that (s)he exchanges work-related knowledge with, also exchange knowledge with one another

Q20 (S)he is important for most of the people that (s)he exchanges work-related knowledge with

Q21 If she needs it, (s)he can easily be introduced to people in DLM

Q22 Most of the people that (s)he exchanges work-related knowledge with, do not exchange work-related knowledge with one another

Q23 Most of the people that (s)he exchanges work-related knowledge with, are important in DLM

Q24 Below you will find a number of statements that help you think about your engagement in different work activities. Please indicate to what extent you, last year, engaged in work related activities that can be characterized as follows

	Very little extent (1)	Little extent (2)	Neither little nor large extent (3)	Large extent (4)	Very large extent (5)
Activities of which a lot of experience has been accumulated by yourself (1)	○	○	○	○	○
Activities which you carry out as if it were routine (15)	○	○	○	○	○
Activities which serve existing (internal) customers	○	○	○	○	○

with existing services/products (16)					
Activities of which it is clear to you how to conduct them (17)	○	○	○	○	○
Activities primarily focused on achieving short-term goals (18)	○	○	○	○	○
Activities which you can properly conduct by using your present knowledge (19)	○	○	○	○	○
Activities which clearly fit into existing company policy (20)	○	○	○	○	○

Q25 **Below you will find a number of statements that help you think about your engagement in different work activities. Please indicate to what extent you, last year, engaged in work related activities that can be characterized as follows**

	Very little extent (1)	Little extent (2)	Neither little nor large extent (3)	Large extent (4)	Very large extent (5)
Searching for new possibilities with respect to products/services, processes, or markets (1)	○	○	○	○	○
Evaluating diverse options with respect to products/services, processes, or markets (24)	○	○	○	○	○
Focusing on strong renewal of products/services or processes (25)	○	○	○	○	○
Activities of which the associated yields or costs are currently unclear (26)	○	○	○	○	○

Activities requiring quite some adaptability of you (27)	○	○	○	○	○
Activities requiring you to learn new skills or knowledge (28)	○	○	○	○	○
Activities that are not (yet) clearly existing company policy (29)	○	○	○	○	○

Q26 **Below you will find a number of statements that help you think about the ways in which you make decisions in your work. Please state to what extent you agree or disagree with the following statements**

	Strongly disagree (1)	Disagree (2)	Undecided (3)	Agree (4)	Strongly agree (5)
I can undertake little action until my supervisor approves a decision (1)	○	○	○	○	○
If I want to make my own decisions, I will be quickly discouraged (2)	○	○	○	○	○
I have to ask my supervisor before I do almost everything (3)	○	○	○	○	○
Any decision I make has to have my supervisor's approval (4)	○	○	○	○	○
Whatever situation arises, I have procedures to follow in dealing with it (5)	○	○	○	○	○
I have to follow strict operational procedures at all times (6)	○	○	○	○	○

Rules occupy a central place in my work related activities (7)	○	○	○	○	○
There is a written job description for going about my task (8)	○	○	○	○	○

Q27 Below you will find a number of statements that help you think about how you behave in social situations. Please indicate whether you agree or disagree with the following statements

	True (1)	False (2)
I find it hard to imitate the behavior of other people (1)	○	○
At parties and social gatherings, I do not attempt to do or say things that others will like (2)	○	○
I can only argue for ideas which I already believe (3)	○	○
I can make impromptu speeches even on topics about which I have almost no information (4)	○	○
I guess I put on a show to impress or entertain others (5)	○	○
I would probably make a good actor (6)	○	○
In a group of people I am rarely the center of attention (7)	○	○
In different situations and with different people, I often act like very different persons (8)	○	○
I am not particularly good at making other people like me (9)	○	○
I'm not always the person I appear to be (10)	○	○
I would not change my opinions (or the way I do things) in order to please someone or win their favor (11)	○	○
I have considered being an entertainer (12)	○	○
I have never been good at games like charades or improvisational acting (13)	○	○
I have trouble changing my behavior to suit different people and different situations (14)	○	○

At a party I let others keep the jokes and stories going (15)	○	○
I feel a bit awkward in public and do not show up quite as well as I should (16)	○	○
I can look anyone in the eye and tell a lie with a straight face (if for a right end) (17)	○	○
I may deceive people by being friendly when I really dislike them (18)	○	○

SNA DLM, Indonesia, 2018: Jaringan & Pengetahuan

Q1 **Selamat datang di survei DALAM**

Terima kasih telah berpartisipasi dalam survei jaringan pengetahuan DLM. Survei akan memakan waktu sekitar 20-30 menit untuk menyelesaikannya. Jawaban Anda akan diperlakukan dengan kerahasiaan yang ketat. Jawaban dari pertanyaan-pertanyaan ini tidak mempengaruhi pekerjaan di DLM.

Silakan klik tanda panah untuk memulai survei.

Q2 **Siapa namamu?**

Untuk memilih nama Anda: Ketikkan beberapa huruf pertama dari nama Anda di bilah pencarian (nama lengkap akan muncul secara otomatis)   Klik nama Anda

Q3 **Apa jenis kelamin Anda?**

○ Pria (1)

○ Perempuan (5)

Q4 **Silahkan pilih tingkat pendidikan Anda**

○ Sekolah dasar (9)

○ Sekolah menengah (8)

○ SMA (10)

○ Gelar Diploma (11)

○ Gelar Sarjana (1)

○ Gelar Master (2)

○ MBA (Magister Administrasi Bisnis) (3)

○ Gelar doktor (4)

○ Bukan dari salah satu di atas (12)

Q5 **Kapan Anda mulai bergabung dengan DLM**

Silahkan pilih bulan / tahun

Q6 Di bawah ini Anda akan menemukan pertanyaan yang membantu Anda mengidentifikasi kolaborasi kerja yang Anda miliki dengan rekan kerja Anda. Silakan pilih nama karyawan DLM yang paling tepat menjawab pertanyaan.

Silakan pilih orang-orang yang Anda ajak berkomunikasi tentang topik terkait pekerjaan
Misalnya, orang yang Anda bertukar pikiran dan informasi terkait pekerjaan - apakah mereka secara fisik berada di situs atau di tempat lain (misalnya melalui email).

 Untuk memilih nama:
         Ketik beberapa huruf pertama dari setiap nama di bilah pencarian (nama lengkap akan muncul secara otomatis)   Klik nama yang ingin Anda pilih   Ulangi proses untuk orang lain (Anda dapat memilih sebanyak mungkin orang yang Anda inginkan)

Q6.1 Kami perhatikan bahwa Anda hanya memilih satu orang dalam pertanyaan sebelumnya. Jika **ini** disengaja, silakan lanjutkan survei dengan mengklik panah ke kanan. Jika **ini tidak** disengaja, silakan klik panah ke kiri untuk kembali dan menambahkan lebih banyak orang. Anda menambahkan lebih banyak orang dengan mengeklik di bilah penelusuran yang <u>sama</u> dengan tempat Anda menambahkan orang pertama, dan mengikuti langkah yang sama seperti sebelumnya.

Q8 **Sejauh mana Anda <u>memberi</u> ${lm://Field/1} pengetahuan yang berhubungan dengan pekerjaan?**

○ Sangat sedikit (1)

○ Sedikit saja (2)

○ Tidak sedikit maupun besar (3)

○ Tingkat luas (4)

○ Sangat luas (5)

Q7 **Sejauh mana Anda <u>menerima</u> pengetahuan yang berhubungan dengan pekerjaan dari ${lm://Field/1}?**

○ Sangat sedikit (1)

○ Sedikit saja (2)

○ Tidak sedikit maupun besar (3)

○ Tingkat luas (4)

○ Sangat luas (5)

Q97 **Sejauh mana informasi yang diterima dari ${lm://Field/1} biasanya didokumentasikan dengan baik secara tertulis (misalnya Memo, laporan, manual, email)?**

○ Sangat sedikit (1)

○ Sedikit saja (2)

○ Tidak sedikit maupun besar (3)

○ Tingkat luas (4)

○ Sangat luas (5)

Q9 **Rata-rata, seberapa sering Anda berbicara dengan ${lm://Field/1}?**

○ Beberapa kali sehari (1)

○ Harian (2)

○ Mingguan (3)

○ Bulanan (4)

○ Kurang dari sebulan sekali (5)

Q10 **Seberapa dekat kamu dengan ${lm://Field/1}?**

○ Sangat jauh (1)

○ Jauh (2)

○ Tidak dekat atau jauh (3)

○ Dekat (4)

○ Sangat dekat (5)

Q11 Sudah berapa lama Anda mengetahui ${lm://Field/1}?

◯ Kurang dari 6 bulan (1)

◯ 6 hingga 12 bulan (2)

◯ 1 hingga 2 tahun (3)

◯ 2 hingga 5 tahun (4)

◯ Lebih dari 5 tahun (5)

Q12 Sumber daya apa yang Anda gunakan untuk membangun dan mempertahankan hubungan dengan ${lm://Field/1}?

Anda dapat menggunakan sumber daya yang bergantung pada peran formal Anda di perusahaan, atau Anda dapat menggunakan sumber daya yang independen dari peran formal Anda (misalnya pengetahuan pribadi, keahlian, persahabatan).
Formal (1)

◯ Seringkali formal (2)

◯ Terkadang formal (3)

◯ Jarang formal (4)

◯ Independen dari formal (5)

Q13 Di bawah ini Anda akan menemukan sejumlah pernyataan yang membantu Anda memikirkan tentang cara Anda bekerja. Tolong tunjukkan sejauh mana Anda terlibat dalam tugas-tugas berikut

	Sangat sedikit (1)	Sedikit luas (2)	Baik kecil maupun besar (3)	Tingkat luas (4)	Sangat luas (5)
Hadir dengan ide-ide baru (1)	◯	◯	◯	◯	◯
Bekerja untuk mengimplementasikan ide-ide baru (2)	◯	◯	◯	◯	◯
Menemukan cara yang lebih baik untuk melakukan sesuatu (3)	◯	◯	◯	◯	◯
Menciptakan proses dan rutinitas yang lebih baik (4)	◯	◯	◯	◯	◯

Q30 **Dibawah ini anda akan menemukan enam pernyataan yang akan membantu anda dalam menjawab pertanyaan-pertanyaan mengenai rekan kerja yang anda supervisi. Indikasikan seberapa anda kira rekan kerja anda melakukan berikut**

1) Hadir dengan ide-ide baru

	Sangat sedikit (1)	Sedikit luas (2)	Baik kecil maupun besar (3)	Tingkat luas (4)	Sangat luas (5)
Names of subordinates	○	○	○	○	○

Q32 **Dibawah ini anda akan menemukan enam pernyataan yang akan membantu anda dalam menjawab pertanyaan-pertanyaan mengenai rekan kerja yang anda supervisi. Indikasikan seberapa anda kira rekan kerja anda melakukan berikut**

2) Bekerja untuk mengimplemantasikan ide-ide baru

	Sangat sedikit (1)	Sedikit luas (2)	Baik kecil maupun besar (3)	Tingkat luas (4)	Sangat luas (5)
Names of subordinates	○	○	○	○	○

Q33 **Dibawah ini anda akan menemukan enam pernyataan yang akan membantu anda dalam menjawab pertanyaan-pertanyaan mengenai rekan kerja yang anda supervisi. Indikasikan seberapa anda kira rekan kerja anda melakukan berikut**

3) Menemukan cara yang lebih baik untuk melakukan sesuatu

	Sangat sedikit (1)	Sedikit luas (2)	Baik kecil maupun besar (3)	Tingkat luas (4)	Sangat luas (5)
Names of subordinates	○	○	○	○	○

Q34 **Dibawah ini anda akan menemukan enam pernyataan yang akan membantu anda dalam menjawab pertanyaan-pertanyaan mengenai rekan kerja yang anda supervisi. Indikasikan seberapa anda kira rekan kerja anda melakukan berikut**

4) Menciptakan proses dan rutinitas yang lebih baik

	Sangat sedikit (1)	Sedikit luas (2)	Baik kecil maupun besar (3)	Tingkat luas (4)	Sangat luas (5)
Names of subordinates	○	○	○	○	○

Q74 **Dibawah ini anda akan menemukan enam pernyataan yang akan membantu anda dalam menjawab pertanyaan-pertanyaan mengenai rekan kerja yang anda supervisi. Indikasikan seberapa anda kira rekan kerja anda melakukan berikut**

5) Memberikan pengetahuan yang berhubungan dengan pekerjaan kepada rekan kerjanya

	Sangat sedikit (1)	Sedikit luas (2)	Baik kecil maupun besar (3)	Tingkat luas (4)	Sangat luas (5)
Names of subordinates	○	○	○	○	○

Q75 **Dibawah ini anda akan menemukan enam pernyataan yang akan membantu anda dalam menjawab pertanyaan-pertanyaan mengenai rekan kerja yang anda supervisi. Indikasikan seberapa anda kira rekan kerja anda melakukan berikut**

5) Memberikan pengetahuan yang berhubungan dengan pekerjaan kepada rekan kerjanya

	Sangat sedikit (1)	Sedikit luas (2)	Baik kecil maupun besar (3)	Tingkat luas (4)	Sangat luas (5)
Names of subordinates	○	○	○	○	○

Q75 **Dibawah ini anda akan menemukan enam pernyataan yang akan membantu anda dalam menjawab pertanyaan-pertanyaan mengenai rekan kerja yang anda supervisi. Indikasikan seberapa anda kira rekan kerja anda melakukan berikut**

6) Menerima pengetahuan yang berhubungan dengan pekerjan dari rekan kerjanya

	Sangat sedikit (1)	Sedikit luas (2)	Baik kecil maupun besar (3)	Tingkat luas (4)	Sangat luas (5)
Names of subordinates	○	○	○	○	○

Q14 **Di bawah ini Anda akan menemukan sejumlah pernyataan yang membantu Anda mengidentifikasi cara-cara di mana Anda berkolaborasi dengan rekan kerja Anda. Harap nyatakan sejauh mana Anda setuju atau tidak setuju dengan pernyataan berikut**

	Sangat tidak setuju (1)	Tidak setuju (2)	Belum diputuskan (3)	Setuju (4)	Sangat setuju (5)
Saya memperkenalkan orang satu sama lain yang mungkin memiliki minat kerja strategis yang sama (1) *(Contoh: anda memperkenalkan kedua rekan anda yang untuk sekarang tidak bekerja dengan satu sama lain, tetapi ada minat untuk kerja sama di lain hari)*	○	○	○	○	○
Saya akan mencoba untuk menggambarkan masalah dengan cara yang akan menarik minat beragam kepentingan (2) *(Contoh: saat menjelaskan sesuatu kepada rekan kerja, anda juga berusaha melihat sudut pandang rekan kerja yang lain)*	○	○	○	○	○
Saya melihat peluang untuk kolaborasi di antara orang-orang (3) *(Contoh: anda melihat bahwa masalah yang dihadapi rekan A akan sangat mudah diselesaikan bila rekan A berbicara dengan rekan B)*	○	○	○	○	○
Saya menunjukkan kesamaan yang dimiliki oleh orang-orang yang memiliki perspektif berbeda tentang suatu masalah (4) *(Contoh: saat ada perbedaan pendapat diantara rekan-rekan kerja, saya lebih membahas poin poin yang disetujui oleh semua belah pihak)*	○	○	○	○	○

Saya memperkenalkan dua orang ketika saya pikir mereka mungkin mendapat manfaat dari berkenalan (5)
(Contoh: bila anda perkirakan bahwa akan sangat berguna bila rekan A berkenalan dengan rekan B, maka anda akan memperkenalkan rekan A dan B)

○   ○   ○   ○   ○

Saya menjalin hubungan antara orang-orang yang berbeda yang berurusan dengan masalah tertentu (6)
(Contoh: bila rekan A dan rekan B sedang bermasalah tetapi tidak membahas masalah tersebut, maka anda akan berusaha untuk membantu mereka membahas, atau bahkan menyelesaikan masalah tersebut)

○   ○   ○   ○   ○

Saya membuat orang terpisah ketika memperkenalkan mereka satu sama lain tidaklah penting (7)
(Contoh: anda mengenal rekan A dan rekan B, tetapi bila tidak ada alasan untuk memperkenalkan keduanya satu sama lain, maka anda tidak memperkenalkan mereka)

○   ○   ○   ○   ○

Saya menghargai pertemuan yang terpisah dan menggabungkan kembali wawasan orang-orang pada diri saya sendiri (8)
(Contoh: anda mengenal rekan A dan rekan B secara terpisah. Maka anda lebih memilih untuk berdiskusi dengan mereka secara terpisah untuk suatu topilk masalah, dan lebih memilih untuk menggunakan wawasan

○   ○   ○   ○   ○

sendiri untuk memecahkan masalah tersebut)					
Saya percaya meja bundar dan diskusi terbuka memakan waktu (9) *(Contoh: menurut anda meeting seputar topik-topik yang luas sangat memakan waktu)*	◯	◯	◯	◯	◯
Saya melihat peluang untuk bertindak sebagai jembatan yang menyampaikan informasi dari satu orang ke orang lain (10) *(Contoh: anda lebih memilih untuk memberitahu rekan B, secara pribadi, mengenai informasi yang beberapa waktu lalu diberikan oleh rekan A kepada anda, dibandingkan membiarkan mereka bicara secara langsung)*	◯	◯	◯	◯	◯
Saya menggambar analogi di antara orang-orang yang seolah-olah tidak relevan satu sama lain (11) *(Contoh: anda sering melihat kemiripan diantara rekan-rekan anda, yang tidak mengenal satu sama lain)*	◯	◯	◯	◯	◯

Q15 **Di bawah ini Anda akan menemukan sejumlah pernyataan yang membantu Anda berpikir tentang sifat kolaborasi kerja Anda. Harap nyatakan sejauh mana Anda setuju atau tidak setuju dengan pernyataan berikut**

	Sangat tidak setuju (1)	Tidak setuju (2)	Belum diputuskan (3)	Setuju (4)	Sangat setuju (5)
Saya bertukar pengetahuan terkait pekerjaan dengan beberapa orang di DLM (1) *(Contoh: anda membicarakan topik-topik mengenai pekerja dengan banyak rekan di dalam perusahaan)*	◯	◯	◯	◯	◯

Sebagian besar orang yang saya bertukar pengetahuan yang berhubungan dengan pekerjaan, juga bertukar pengetahuan dengan satu sama lain (2) *(Contoh: bila anda bekerja dengan rekan A dan rekan B, kemungkinan besar rekan A dan rekan B juga bekerja sama dengan satu sama lain)*	○	○	○	○	○
Saya penting bagi sebagian besar orang yang saya bertukar pengetahuan terkait pekerjaan (3) *(Contoh: rekan-rekan kerja yang bekerja dengan anda sangat bergantung dengan seberapa baik kinerja anda dalam pekerjaan anda)*	○	○	○	○	○
Jika saya membutuhkannya, saya dapat dengan mudah diperkenalkan kepada orang-orang di DLM (4) *(Contoh: bila anda membutuhkan masukan tentang suatu tugas, anda bisa dengan mudah di kenalkan kepada rekan-rekan dalam DLM bila anda meminta kepada rekan-rekan kerja anda)*	○	○	○	○	○
Sebagian besar orang yang saya bertukar pengetahuan yang berhubungan dengan pekerjaan, tidak saling bertukar pengetahuan satu sama lain (5) *(Contoh: bila saya bekerja dengan rekan A untuk suatu tugas dan dengan rekan B untuk tugas yang lain, kemungkinan besar rekan A dan B tidak bekerja sama satu sama lain)*	○	○	○	○	○
Sebagian besar orang yang saya bertukar pengetahuan	○	○	○	○	○

dengan, penting dalam DLM
(6)
(Contoh: sebagian besar
rekan-rekan yang bekerja
dengan saya dianggap
sebagai sangat penting
di DLM)

Q16 **Di bawah ini Anda akan menemukan sejumlah pernyataan yang membantu Anda berpikir tentang sifat kolaborasi kerja kolega Anda. Pilihlah rekan kerja yang Anda yakini bahwa pernyataan berikut ini paling banyak berlaku**

Untuk memilih nama: Ketikkan beberapa huruf pertama dari setiap nama pada bilah pencarian yang sesuai (nama lengkap akan muncul secara otomatis).   Klik nama yang ingin Anda pilih.   Ulangi proses untuk orang lain (Anda dapat memilih hingga tiga orang untuk setiap pertanyaan)

Q17 **Dia adalah salah satu ahli terhebat di DLM**

Q18 **Dia bertukar pengetahuan terkait pekerjaan dengan beberapa orang di DLM**

Q19 **Sebagian besar orang yang ia bertukar pengetahuan yang berhubungan dengan pekerjaan, juga bertukar pengetahuan dengan satu sama lain**

Q20 **Dia penting bagi sebagian besar orang yang dia tukar pengetahuan yang berhubungan dengan pekerjaan**

Q21 **Jika dia membutuhkannya, dia dapat dengan mudah diperkenalkan kepada orang-orang di DLM**

Q22 **Sebagian besar orang yang ia bertukar pengetahuan yang berhubungan dengan pekerjaan, tidak bertukar pengetahuan yang berhubungan dengan pekerjaan satu sama lain**

Q23 **Sebagian besar orang yang ia tukar pengetahuan terkait pekerjaan dengan, penting dalam DLM**

Q24 **Di bawah ini Anda akan menemukan sejumlah pernyataan yang membantu Anda berpikir tentang keterlibatan Anda dalam berbagai aktivitas kerja. Tolong tunjukkan sejauh mana Anda, tahun lalu, terlibat dalam kegiatan terkait pekerjaan yang dapat dicirikan sebagai berikut**

	Sangat sedikit (1)	Sedikit luas (2)	Baik kecil maupun besar (3)	Tingkat luas (4)	Sangat luas (5)
Kegiatan yang banyak pengalamannya telah Anda kumpulkan sendiri (1)	◯	◯	◯	◯	◯

Aktivitas yang Anda lakukan kira kira rutin (15)	○	○	○	○	○
Kegiatan yang melayani pelanggan (internal) yang ada dengan layanan / produk yang ada (16)	○	○	○	○	○
Aktivitas yang jelas bagi Anda bagaimana melakukannya (17)	○	○	○	○	○
Kegiatan yang awalnya difokuskan untuk mencapai tujuan jangka pendek (18)	○	○	○	○	○
Aktivitas yang dapat Anda lakukan dengan benar dengan menggunakan pengetahuan Anda saat ini (19)	○	○	○	○	○
Kegiatan yang jelas sesuai dengan kebijakan perusahaan yang ada (20)	○	○	○	○	○

Q25 **Di bawah ini Anda akan menemukan sejumlah pernyataan yang membantu Anda berpikir tentang keterlibatan Anda dalam berbagai aktivitas kerja. Tolong tunjukkan sejauh mana Anda, tahun lalu, terlibat dalam kegiatan terkait pekerjaan yang dapat dicirikan sebagai berikut**

	Sangat sedikit (1)	Sedikit luas (2)	Baik kecil maupun besar (3)	Tingkat luas (4)	Sangat luas (5)
Mencari kemungkinan baru sehubungan dengan produk / layanan, proses, atau pasar (1)	○	○	○	○	○

Mengevaluasi berbagai opsi sehubungan dengan produk / layanan, proses, atau pasar (24)	○	○	○	○	○
Berfokus pada pembaruan yang kuat dari produk / jasa atau proses (25)	○	○	○	○	○
misalnya sebuah perusahaan makanan yang memperbarui resep dan bahannya setiap tahun					
Kegiatan yang pengembalian atau biayanya saat ini tidak jelas (26)	○	○	○	○	○
Kegiatan yang membutuhkan cukup kemampuan beradaptasi Anda (27)	○	○	○	○	○
Kegiatan yang mengharuskan Anda mempelajari keterampilan atau pengetahuan baru (28)	○	○	○	○	○
Kegiatan yang tidak (belum) merupakan bagian yang jelas dari kebijakan perusahaan yang ada (29)	○	○	○	○	○

Q26 **Di bawah ini Anda akan menemukan sejumlah pernyataan yang membantu Anda memikirkan tentang cara Anda membuat keputusan dalam pekerjaan Anda. Harap nyatakan sejauh mana Anda setuju atau tidak setuju dengan pernyataan berikut**

	Sangat tidak setuju (1)	Tidak setuju (2)	Belum diputuskan (3)	Setuju (4)	Sangat setuju (5)
Saya dapat melakukan sedikit tindakan sampai	○	○	○	○	○

penyelia saya menyetujui keputusan (1)					
Jika saya ingin membuat keputusan sendiri, saya akan cepat putus asa (2)	○	○	○	○	○
Saya harus bertanya kepada atasan saya sebelum saya melakukan hampir semuanya (3)	○	○	○	○	○
Keputusan apa pun yang saya buat harus mendapatkan persetujuan atasan saya (4)	○	○	○	○	○
Situasi apa pun yang muncul, saya memiliki prosedur untuk diikuti (5)	○	○	○	○	○
Saya harus mengikuti prosedur operasional yang ketat setiap saat (6)	○	○	○	○	○
Aturan menempati tempat utama dalam kegiatan terkait pekerjaan saya (7)	○	○	○	○	○
Ada deskripsi pekerjaan tertulis untuk mengerjakan tugas saya (8)	○	○	○	○	○

Q27 **Di bawah ini Anda akan menemukan sejumlah pernyataan yang membantu Anda berpikir tentang bagaimana Anda berperilaku dalam situasi sosial. Tolong tunjukkan apakah Anda setuju atau tidak setuju dengan pernyataan berikut**

	Benar (1)	Salah (2)
Saya merasa sulit untuk meniru perilaku orang lain (1)	○	○

Di pesta-pesta dan pertemuan sosial, saya tidak berusaha untuk melakukan atau mengatakan hal-hal yang disukai orang lain (2)	○	○
Saya hanya bisa berdebat untuk ide-ide yang sudah saya yakini (3)	○	○
Saya dapat membuat pidato spontan bahkan pada topik yang hampir tidak ada informasinya (4)	○	○
Saya kira saya melakukan pertunjukan untuk mengesankan atau menghibur orang lain (5)	○	○
Saya mungkin akan menjadi aktor yang baik (6)	○	○
Dalam sekelompok orang, saya jarang menjadi pusat perhatian (7)	○	○
Dalam situasi yang berbeda dan dengan orang yang berbeda, saya sering bertindak seperti orang yang sangat berbeda (8)	○	○
Saya tidak pandai membuat orang lain menyukai saya (9)	○	○
Saya tidak selalu orang yang kelihatannya seperti itu (10)	○	○
Saya tidak akan mengubah pendapat saya (atau cara saya melakukan sesuatu) untuk menyenangkan seseorang atau memenangkan hati mereka (11)	○	○
Saya anggap sebagai penghibur (12)	○	○
Saya tidak pernah pandai dalam permainan seperti tebakan atau akting improvisasi (13)	○	○
Saya mengalami kesulitan untuk mengubah perilaku saya agar sesuai dengan orang yang berbeda dan situasi yang berbeda (14)	○	○
Di pesta, saya membiarkan orang lain membuat lelucon dan membuat cerita terus berlanjut (15)	○	○
Saya merasa sedikit canggung di depan umum dan tidak muncul cukup baik sebagaimana seharusnya (16)	○	○
Saya bisa melihat mata siapa pun dan berbohong dengan wajah lurus (jika untuk ujung kanan) (17)	○	○
Saya dapat menyesatkan orang dengan bersikap ramah ketika saya benar-benar tidak menyukai mereka (18)	○	○

Appendix 4: Confirmatory factor analysis

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	72	444,419	203	,000	2,189
Saturated model	275	,000	0		
Independence model	22	1226,698	253	,000	4,849

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	,638	,548	,764	,691	,752
Saturated model	1,000		1,000		1,000
Independence model	,000	,000	,000	,000	,000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	,802	,512	,603
Saturated model	,000	,000	,000
Independence model	1,000	,000	,000

NCP

Model	NCP	LO 90	HI 90
Default model	241,419	184,332	306,247
Saturated model	,000	,000	,000
Independence model	973,698	868,296	1086,607

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	2,726	1,481	1,131	1,879
Saturated model	,000	,000	,000	,000
Independence model	7,526	5,974	5,327	6,666

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	,085	,075	,096	,000
Independence model	,154	,145	,162	,000

			Estimate
IDMA4	<---	IDMA	,500
IDMA3	<---	IDMA	,805
IDMA2	<---	IDMA	,481
IDMA1	<---	IDMA	,417
TF4	<---	TF	,527
TF3	<---	TF	,728
TF2	<---	TF	,592
TF1	<---	TF	,576
Exploitation7	<---	EXPLOIT	,482
Exploitation6	<---	EXPLOIT	,676
Exploitation5	<---	EXPLOIT	,561
Exploitation4	<---	EXPLOIT	,742
Exploitation3	<---	EXPLOIT	,287
Exploitation2	<---	EXPLOIT	,605
Exploitation1	<---	EXPLOIT	,656
Exploration7	<---	EXPLOR	,263
Exploration6	<---	EXPLOR	,679
Exploration5	<---	EXPLOR	,595
Exploration4	<---	EXPLOR	,333
Exploration3	<---	EXPLOR	,764
Exploration2	<---	EXPLOR	,836
Exploration1	<---	EXPLOR	,721

Appendix 5: Exploratory factor analysis – full model

Descriptive Statistics

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Activities of which a lot of experience is accumulated by yourself	3,88	,914	154
Activities which you carry out as if it were routine	3,88	,835	154
Activities which serve existing (internal) customers with existing products/services	3,40	1,213	154
Activities of which it is clear to you how to conduct them	3,97	,767	154
Activities primarily focused on achieving short-term goals	3,50	,992	154
Activities which you can properly conduct by using your present knowledge	3,95	,765	154
Activities which clearly fit in the current strategy, plans and guidelines	3,99	,812	154
Searching for new products/services, processes or customers	3,55	1,109	154
Evaluating potential new products/services, processes or customers	3,63	1,003	154
Focusing on strong renewal of products/services or processes	3,51	1,092	154
Activities of which the associated yields or costs are unclear	2,31	1,233	154
Activities of which you need to change work routines, work procedures or work behaviour	3,37	1,102	154

Activities requiring you to learn new skills or knowledge	3,71	,975	154
Activities that are not (yet) in the current strategy, plans and guidelines	2,44	1,242	154
I can undertake little action until my supervisor approves a decision	2,6558	1,03140	154
If I want to make my own decisions, I will be quickly discouraged	3,7857	1,03510	154
I have to ask my supervisor before I do almost anything	2,7403	1,07743	154
Any decision I make has to have my supervisor's approval	2,4091	1,01372	154
Whatever situation arises, I have procedures to follow in dealing with it	3,87	,822	154
I have to follow strict operational procedures at any time	3,54	1,011	154
Rules occupy a central place in my work related activities	3,86	,768	154
There is a written job description for going about my tasks	3,88	,848	154

Correlation Matrix

Correlation Matrix

Columns are numbered 1–22 corresponding to the row variables below.

Correlation	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. Activities of which a lot of experience is accumulated by yourself	1,000	0,392	0,025	0,462	0,360	0,505	0,184	0,321	0,444	0,380	0,090	0,244	0,446	0,080	0,116	0,181	0,168	-0,033	0,127	0,040	0,238	0,227
2. Activities which you carry out as if it were routine	0,392	1,000	0,185	0,475	0,375	0,471	0,278	0,179	0,273	0,112	0,011	0,235	0,366	-0,079	-0,042	-0,001	-0,079	-0,125	0,205	0,033	0,269	0,118
3. Activities which serve existing (internal) customers with existing products/services	0,025	0,185	1,000	0,166	0,212	0,276	0,175	0,254	0,215	0,176	0,201	0,367	0,181	0,081	-0,108	0,001	-0,140	-0,108	0,263	0,136	-0,060	-0,151
4. Activities of which it is clear to you how to conduct them	0,462	0,475	0,166	1,000	0,413	0,455	0,430	0,232	0,353	0,297	-0,012	0,244	0,357	-0,057	-0,003	0,281	0,118	-0,146	0,337	0,145	0,338	0,257
5. Activities primarily focused on achieving short-term goals	0,360	0,375	0,212	0,413	1,000	0,379	0,272	0,202	0,338	0,223	0,179	0,284	0,243	0,127	0,029	-0,099	0,018	-0,159	0,152	0,023	0,124	0,070
6. Activities which you can properly conduct by using your present knowledge	0,505	0,471	0,276	0,455	0,379	1,000	0,304	0,257	0,298	0,227	0,135	0,240	0,374	-0,003	-0,006	0,068	0,055	-0,107	0,187	0,036	0,133	0,152
7. Activities which clearly fit in the current strategy, plans and guidelines	0,184	0,278	0,175	0,430	0,272	0,304	1,000	0,106	0,133	0,335	-0,063	0,127	0,088	-0,081	-0,081	0,154	0,043	-0,171	0,390	0,235	0,261	0,198
8. Searching for new products/services, processes or customers	0,321	0,179	0,254	0,232	0,202	0,257	0,106	1,000	0,647	0,531	0,265	0,417	0,484	0,104	0,011	0,199	0,076	-0,014	0,143	0,004	0,134	-0,022
9. Evaluating potential new products/services, processes or customers	0,444	0,273	0,215	0,353	0,338	0,298	0,133	0,647	1,000	0,668	0,219	0,397	0,560	0,158	-0,004	0,200	0,183	0,086	0,100	0,011	0,061	-0,013
10. Focusing on strong renewal of products/services or processes	0,380	0,112	0,176	0,297	0,223	0,227	0,335	0,531	0,668	1,000	0,302	0,468	0,438	0,306	-0,007	0,178	0,196	0,113	0,176	0,112	0,122	0,057
11. Activities of which the associated yields or costs are unclear	0,090	0,011	0,201	-0,012	0,179	0,135	-0,063	0,265	0,219	0,302	1,000	0,330	0,144	0,462	0,016	-0,148	-0,107	0,014	0,046	0,150	0,017	-0,153
12. Activities of which you need to change work routines, work procedures or work behaviour	0,244	0,235	0,367	0,244	0,284	0,240	0,127	0,417	0,397	0,468	0,330	1,000	0,567	0,271	-0,071	-0,050	-0,056	-0,136	0,234	0,125	0,060	-0,093
13. Activities requiring you to learn new skills or knowledge	0,446	0,366	0,181	0,357	0,243	0,374	0,088	0,484	0,560	0,438	0,144	0,567	1,000	0,148	0,032	0,094	-0,015	-0,093	0,198	0,111	0,096	0,102
14. Activities that are not (yet) in the current strategy, plans and guidelines	0,080	-0,079	0,081	-0,057	0,127	-0,003	-0,081	0,104	0,158	0,306	0,462	0,271	0,148	1,000	0,038	-0,139	-0,060	0,120	-0,091	-0,014	-0,156	-0,211
15. I can undertake little action until my supervisor approves a decision	0,116	-0,042	-0,108	-0,003	0,029	-0,006	-0,081	0,011	-0,004	-0,007	0,016	-0,071	0,032	0,038	1,000	0,359	0,266	0,273	-0,130	-0,191	-0,035	-0,024
16. If I want to make my own decisions, I will be quickly discouraged	0,181	-0,001	0,001	0,281	-0,099	0,068	0,154	0,199	0,200	0,178	-0,148	-0,050	0,094	-0,139	0,359	1,000	0,401	0,115	0,128	-0,164	0,053	0,009
17. I have to ask my supervisor before I do almost anything	0,168	-0,079	-0,140	0,118	0,018	0,055	0,043	0,076	0,183	0,196	-0,107	-0,056	-0,015	-0,060	0,266	0,401	1,000	0,421	-0,156	-0,393	-0,138	-0,026
18. Any decision I make has to have my supervisor's approval	-0,033	-0,125	-0,108	-0,146	-0,159	-0,107	-0,171	-0,014	0,086	0,113	0,014	-0,136	-0,093	0,120	0,273	0,115	0,421	1,000	-0,242	-0,280	-0,062	-0,149
19. Whatever situation arises, I have procedures to follow in dealing with it	0,127	0,205	0,263	0,337	0,152	0,187	0,390	0,143	0,100	0,176	0,046	0,234	0,198	-0,091	-0,130	0,128	-0,156	-0,242	1,000	0,368	0,386	0,259
20. I have to follow strict operational procedures at any time	0,040	0,033	0,136	0,145	0,023	0,036	0,235	0,004	0,011	0,112	0,150	0,125	0,111	-0,014	-0,191	-0,164	-0,393	-0,280	0,368	1,000	0,432	0,272
21. Rules occupy a central place in my work related activities	0,238	0,269	-0,060	0,338	0,124	0,133	0,261	0,134	0,061	0,122	0,017	0,060	0,096	-0,156	-0,035	0,053	-0,138	-0,062	0,386	0,432	1,000	0,438
22. There is a written job description for going about my tasks	0,227	0,118	-0,151	0,257	0,070	0,152	0,198	-0,022	-0,013	0,057	-0,153	-0,093	0,102	-0,211	-0,024	0,009	-0,026	-0,149	0,259	0,272	0,438	1,000

KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,771
Bartlett's Test of Sphericity	Approx. Chi-Square	1184,638
	df	231
	Sig.	,000

Communalities

Communalities

	Initial	Extraction
Activities of which a lot of experience is accumulated by yourself	1,000	,659
Activities which you carry out as if it were routine	1,000	,607
Activities which serve existing (internal) customers with existing products/services	1,000	,637
Activities of which it is clear to you how to conduct them	1,000	,648
Activities primarily focused on achieving short-term goals	1,000	,588
Activities which you can properly conduct by using your present knowledge	1,000	,597
Activities which clearly fit in the current strategy, plans and guidelines	1,000	,607
Searching for new products/services, processes or customers	1,000	,669
Evaluating potential new products/services, processes or customers	1,000	,740
Focusing on strong renewal of products/services or processes	1,000	,715

Activities of which the associated yields or costs are unclear	1,000	,657
Activities of which you need to change work routines, work procedures or work behaviour	1,000	,596
Activities requiring you to learn new skills or knowledge	1,000	,681
Activities that are not (yet) in the current strategy, plans and guidelines	1,000	,666
I can undertake little action until my supervisor approves a decision	1,000	,427
If I want to make my own decisions, I will be quickly discouraged	1,000	,674
I have to ask my supervisor before I do almost anything	1,000	,643
Any decision I make has to have my supervisor's approval	1,000	,505
Whatever situation arises, I have procedures to follow in dealing with it	1,000	,622
I have to follow strict operational procedures at any time	1,000	,673
Rules occupy a central place in my work related activities	1,000	,664
There is a written job description for going about my tasks	1,000	,616

Extraction Method: Principal Component Analysis.

Total Variance Explained

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5,065	23,023	23,023	5,065	23,023	23,023	3,216	14,620	14,620
2	2,717	12,351	35,374	2,717	12,351	35,374	2,755	12,523	27,143
3	2,303	10,466	45,840	2,303	10,466	45,840	2,259	10,267	37,410
4	1,445	6,569	52,410	1,445	6,569	52,410	1,989	9,042	46,452
5	1,253	5,697	58,107	1,253	5,697	58,107	1,859	8,448	54,900
6	1,106	5,029	63,136	1,106	5,029	63,136	1,812	8,235	63,136
7	,958	4,357	67,492						
8	,815	3,703	71,195						
9	,698	3,175	74,370						
10	,682	3,100	77,470						
11	,652	2,962	80,432						
12	,598	2,717	83,149						
13	,533	2,425	85,574						
14	,516	2,346	87,920						
15	,470	2,135	90,055						
16	,433	1,966	92,021						
17	,388	1,763	93,784						
18	,331	1,505	95,289						
19	,310	1,409	96,699						
20	,282	1,281	97,980						
21	,251	1,142	99,122						

| 22 | ,193 | ,878 | 100,000 | | | | | | | |

Extraction Method: Principal Component Analysis.

Scree Plot

Scree Plot

Unrotated Component Matrix

Component Matrix[a]

	Component					
	1	2	3	4	5	6
Activities of which a lot of experience is accumulated by yourself	,653	,095	,274	-,117	,359	-,078
Activities which you carry out as if it were routine	,563	-,200	,137	-,464	,125	-,029
Activities which serve existing (internal) customers with existing products/services	,385	-,008	-,352	-,189	-,535	,206
Activities of which it is clear to you how to conduct them	,681	-,190	,339	-,134	-,027	,125
Activities primarily focused on achieving short-term goals	,552	-,026	-,040	-,404	,189	,287
Activities which you can properly conduct by using your present knowledge	,624	-,055	,132	-,412	,085	,102
Activities which clearly fit in the current strategy, plans and guidelines	,467	-,331	,216	,043	-,296	,379
Searching for new products/services, processes or customers	,623	,324	-,099	,201	-,144	-,324
Evaluating potential new products/services, processes or customers	,705	,398	-,015	,112	-,028	-,267
Focusing on strong renewal of products/services or processes	,668	,342	-,077	,381	-,040	,009
Activities of which the associated yields or costs are unclear	,290	,254	-,549	,175	,231	,351
Activities of which you need to change work routines, work procedures or work behaviour	,614	,171	-,409	,019	-,119	-,090

Activities requiring you to learn new skills or knowledge	,695	,167	-,095	-,009	,076	-,395
Activities that are not (yet) in the current strategy, plans and guidelines	,152	,404	-,499	,121	,292	,362
I can undertake little action until my supervisor approves a decision	-,030	,376	,397	,090	,152	,309
If I want to make my own decisions, I will be quickly discouraged	,184	,259	,600	,240	-,391	,054
I have to ask my supervisor before I do almost anything	,037	,532	,578	,048	-,078	,130
Any decision I make has to have my supervisor's approval	-,165	,546	,259	,211	,155	,208
Whatever situation arises, I have procedures to follow in dealing with it	,447	-,474	,006	,261	-,317	,170
I have to follow strict operational procedures at any time	,248	-,582	-,276	,431	,071	,075
Rules occupy a central place in my work related activities	,362	-,508	,212	,390	,274	,057
There is a written job description for going about my tasks	,216	-,494	,350	,257	,351	-,119

Extraction Method: Principal Component Analysis.

a. 6 components extracted.

Rotated Component Matrix

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
Activities of which a lot of experience is accumulated by yourself	,400	,605	,194	,288	-,106	,024
Activities which you carry out as if it were routine	,149	,737	-,141	,069	,069	-,114
Activities which serve existing (internal) customers with existing products/services	,217	,169	-,242	-,405	,563	,145
Activities of which it is clear to you how to conduct them	,238	,607	,119	,249	,363	-,128
Activities primarily focused on achieving short-term goals	,079	,705	-,027	-,021	,129	,259
Activities which you can properly conduct by using your present knowledge	,199	,732	-,002	,007	,147	,006
Activities which clearly fit in the current strategy, plans and guidelines	,009	,316	,070	,196	,679	-,048
Searching for new products/services, processes or customers	,807	,075	,034	-,018	,093	,039
Evaluating potential new products/services, processes or customers	,810	,238	,142	-,009	,029	,080
Focusing on strong renewal of products/services or processes	,706	,069	,222	,132	,233	,302
Activities of which the associated yields or costs are unclear	,209	,031	-,053	-,023	,058	,779
Activities of which you need to change work routines, work procedures or work behaviour	,607	,194	-,221	-,124	,193	,297

Activities requiring you to learn new skills or knowledge	,740	,331	-,118	,079	-,062	,009
Activities that are not (yet) in the current strategy, plans and guidelines	,140	,000	,069	-,118	-,087	,788
I can undertake little action until my supervisor approves a decision	-,080	,062	,634	,025	-,059	,103
If I want to make my own decisions, I will be quickly discouraged	,237	-,056	,612	,003	,340	-,353
I have to ask my supervisor before I do almost anything	,114	,055	,765	-,129	-,020	-,157
Any decision I make has to have my supervisor's approval	,002	-,168	,634	-,060	-,192	,184
Whatever situation arises, I have procedures to follow in dealing with it	,140	,081	-,188	,328	,671	-,045
I have to follow strict operational procedures at any time	,047	-,110	-,422	,563	,350	,203
Rules occupy a central place in my work related activities	,057	,138	-,053	,768	,219	-,004
There is a written job description for going about my tasks	-,012	,162	-,035	,740	-,003	-,202

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

Appendix 6: Exploratory Factor Analysis – reduced model

Descriptive statistics

Descriptive Statistics

	Mean	Std. Deviation	Analysis N
Activities of which a lot of experience is accumulated by yourself	3,88	,914	154
Activities which you carry out as if it were routine	3,88	,835	154
Activities of which it is clear to you how to conduct them	3,97	,767	154
Activities primarily focused on achieving short-term goals	3,50	,992	154
Activities which you can properly conduct by using your present knowledge	3,95	,765	154
Activities which clearly fit in the current strategy, plans and guidelines	3,99	,812	154
Searching for new products/services, processes or customers	3,55	1,109	154
Evaluating potential new products/services, processes or customers	3,63	1,003	154
Focusing on strong renewal of products/services or processes	3,51	1,092	154
Activities of which you need to change work routines, work procedures or work behaviour	3,37	1,102	154
Activities requiring you to learn new skills or knowledge	3,71	,975	154
I can undertake little action until my supervisor approves a decision	2,6558	1,03140	154

If I want to make my own decisions, I will be quickly discouraged	3,7857	1,03510	154
I have to ask my supervisor before I do almost anything	2,7403	1,07743	154
Any decision I make has to have my supervisor's approval	2,4091	1,01372	154
Whatever situation arises, I have procedures to follow in dealing with it	3,87	,822	154
I have to follow strict operational procedures at any time	3,54	1,011	154
Rules occupy a central place in my work related activities	3,86	,768	154
There is a written job description for going about my tasks	3,88	,848	154

Correlation matrix

Correlation Matrix

Correlation	Activities of which a lot of experience is accumulated by yourself	Activities which you carry out as if it were routine	Activities of which it is clear to you how to conduct them	Activities primarily focused on achieving short-term goals	Activities which you can properly conduct by using your present knowledge	Activities which clearly fit in the current strategy, plans and guidelines	Searching for new products/services, processes or customers	Evaluating potential new products/services, processes or customers	Focusing on strong renewal of products/services or processes	Activities of which you need to change work routines, work procedures or work behaviour	Activities requiring you to learn new skills or knowledge	Activities that are not (yet) in the current strategy, plans and guidelines	I can undertake little action until my supervisor approves a decision	If I want to make my own decisions, I will be quickly discouraged	I have to ask my supervisor before I do almost anything	Any decision I make has to have my supervisor's approval	Whatever situation arises, I have procedures to follow in dealing with it	I have to follow strict operational procedures at any time	Rules occupy a central place in my work related activities	There is a written job description for going about my tasks
Activities of which a lot of experience is accumulated by yourself	1,000	0,392	0,462	0,360	0,505	0,184	0,321	0,444	0,380	0,244	0,446	0,080	0,116	0,181	0,168	-0,033	0,127	0,040	0,238	0,227
Activities which you carry out as if it were routine	0,392	1,000	0,475	0,375	0,471	0,278	0,179	0,273	0,112	0,235	0,366	-0,079	-0,042	-0,001	-0,079	-0,125	0,205	0,033	0,269	0,118
Activities of which it is clear to you how to conduct them	0,462	0,475	1,000	0,413	0,455	0,430	0,232	0,353	0,297	0,244	0,357	-0,057	-0,003	0,281	0,118	-0,146	0,337	0,145	0,338	0,257
Activities primarily focused on achieving short-term goals	0,360	0,375	0,413	1,000	0,379	0,272	0,202	0,338	0,223	0,284	0,243	0,127	0,029	-0,099	0,018	-0,159	0,152	0,023	0,124	0,070
Activities which you can properly conduct by using your present knowledge	0,505	0,471	0,455	0,379	1,000	0,304	0,257	0,298	0,227	0,240	0,374	-0,003	-0,006	0,068	0,055	-0,107	0,187	0,036	0,133	0,152
Activities which clearly fit in the current strategy, plans and guidelines	0,184	0,278	0,430	0,272	0,304	1,000	0,106	0,133	0,335	0,127	0,088	-0,081	-0,081	0,154	0,043	-0,171	0,390	0,235	0,261	0,198
Searching for new products/services, processes or customers	0,321	0,179	0,232	0,202	0,257	0,106	1,000	0,647	0,531	0,417	0,484	0,104	0,011	0,199	0,076	-0,014	0,143	0,004	0,134	-0,022
Evaluating potential new products/services, processes or customers	0,444	0,273	0,353	0,338	0,298	0,133	0,647	1,000	0,668	0,397	0,560	0,158	-0,004	0,200	0,183	0,086	0,100	0,011	0,061	-0,013
Focusing on strong renewal of products/services or processes	0,380	0,112	0,297	0,223	0,227	0,335	0,531	0,668	1,000	0,468	0,438	0,306	-0,007	0,178	0,196	0,113	0,176	0,112	0,122	0,057
Activities of which you need to change work routines, work procedures or work behaviour	0,244	0,235	0,244	0,284	0,240	0,127	0,417	0,397	0,468	1,000	0,567	0,271	-0,071	-0,050	-0,056	-0,136	0,234	0,125	0,060	-0,093
Activities requiring you to learn new skills or knowledge	0,446	0,366	0,357	0,243	0,374	0,088	0,484	0,560	0,438	0,567	1,000	0,148	0,032	0,094	-0,015	-0,093	0,198	0,111	0,096	0,102
I can undertake little action until my supervisor approves a decision	0,116	-0,042	-0,003	0,029	-0,006	-0,081	0,011	-0,004	-0,007	-0,071	0,032	0,038	1,000	0,359	0,266	0,273	-0,130	-0,191	-0,035	-0,024
If I want to make my own decisions, I will be quickly discouraged	0,181	-0,001	0,281	-0,099	0,068	0,154	0,199	0,200	0,178	-0,050	0,094	-0,139	0,359	1,000	0,401	0,115	0,128	-0,164	0,053	0,009
I have to ask my supervisor before I do almost anything	0,168	-0,079	0,118	0,018	0,055	0,043	0,076	0,183	0,196	-0,056	-0,015	-0,060	0,266	0,401	1,000	0,421	-0,156	-0,393	-0,138	-0,026
Any decision I make has to have my supervisor's approval	-0,033	-0,125	-0,146	-0,159	-0,107	-0,171	-0,014	0,086	0,113	-0,136	-0,093	0,120	0,273	0,115	0,421	1,000	-0,242	-0,280	-0,062	-0,149
Whatever situation arises, I have procedures to follow in dealing with it	0,127	0,205	0,337	0,152	0,187	0,390	0,143	0,100	0,176	0,234	0,198	-0,091	-0,130	0,128	-0,156	-0,242	1,000	0,368	0,386	0,259
I have to follow strict operational procedures at any time	0,040	0,033	0,145	0,023	0,036	0,235	0,004	0,011	0,112	0,125	0,111	-0,014	-0,191	-0,164	-0,393	-0,280	0,368	1,000	0,432	0,272
Rules occupy a central place in my work related activities	0,238	0,269	0,338	0,124	0,133	0,261	0,134	0,061	0,122	0,060	0,096	-0,156	-0,035	0,053	-0,138	-0,062	0,386	0,432	1,000	0,438
There is a written job description for going about my tasks	0,227	0,118	0,257	0,070	0,152	0,198	-0,022	-0,013	0,057	-0,093	0,102	-0,211	-0,024	0,009	-0,026	-0,149	0,259	0,272	0,438	1,000

KMO and Bartlett's Test

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,775
Bartlett's Test of Sphericity	Approx. Chi-Square	1020,564
	df	171
	Sig.	,000

Communalities

Communalities

	Initial	Extraction
Activities of which a lot of experience is accumulated by yourself	1,000	,641
Activities which you carry out as if it were routine	1,000	,602
Activities of which it is clear to you how to conduct them	1,000	,665
Activities primarily focused on achieving short-term goals	1,000	,515
Activities which you can properly conduct by using your present knowledge	1,000	,592
Activities which clearly fit in the current strategy, plans and guidelines	1,000	,706
Searching for new products/services, processes or customers	1,000	,633
Evaluating potential new products/services, processes or customers	1,000	,737
Focusing on strong renewal of products/services or processes	1,000	,712
Activities of which you need to change work routines, work procedures or work behaviour	1,000	,598

Activities requiring you to learn new skills or knowledge	1,000	,656
I can undertake little action until my supervisor approves a decision	1,000	,430
If I want to make my own decisions, I will be quickly discouraged	1,000	,634
I have to ask my supervisor before I do almost anything	1,000	,650
Any decision I make has to have my supervisor's approval	1,000	,491
Whatever situation arises, I have procedures to follow in dealing with it	1,000	,587
I have to follow strict operational procedures at any time	1,000	,652
Rules occupy a central place in my work related activities	1,000	,680
There is a written job description for going about my tasks	1,000	,603

Extraction Method: Principal Component Analysis.

Total Variance Explained

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,877	25,668	25,668	4,877	25,668	25,668	3,183	16,753	16,753
2	2,629	13,837	39,505	2,629	13,837	39,505	2,768	14,570	31,323
3	1,806	9,504	49,009	1,806	9,504	49,009	2,533	13,334	44,657
4	1,420	7,476	56,485	1,420	7,476	56,485	2,247	11,828	56,485
5	1,052	5,539	62,024						
6	,943	4,963	66,987						
7	,807	4,247	71,234						
8	,743	3,912	75,146						
9	,665	3,501	78,648						
10	,624	3,285	81,933						
11	,543	2,856	84,789						
12	,528	2,777	87,566						
13	,466	2,454	90,020						
14	,431	2,269	92,289						
15	,371	1,951	94,240						
16	,317	1,666	95,906						
17	,307	1,618	97,524						
18	,270	1,421	98,944						
19	,201	1,056	100,000						

Extraction Method: Principal Component Analysis.

Scree plot

Unrotated Component Matrix

Component Matrix[a]

	Component			
	1	2	3	4
Activities of which a lot of experience is accumulated by yourself	,679	,158	,157	-,208
Activities which you carry out as if it were routine	,581	-,138	,068	-,485
Activities of which it is clear to you how to conduct them	,711	-,083	,323	-,163
Activities primarily focused on achieving short-term goals	,543	-,037	-,049	-,455
Activities which you can properly conduct by using your present knowledge	,625	-,004	,094	-,438
Activities which clearly fit in the current strategy, plans and guidelines	,489	-,254	,311	,056
Searching for new products/services, processes or customers	,603	,305	-,306	,282
Evaluating potential new products/services, processes or customers	,695	,393	-,263	,165
Focusing on strong renewal of products/services or processes	,650	,298	-,181	,397
Activities of which you need to change work routines, work procedures or work behaviour	,570	,062	-,505	,099
Activities requiring you to learn new skills or knowledge	,692	,146	-,316	,034
I can undertake little action until my supervisor approves a decision	-,018	,455	,406	-,001
If I want to make my own decisions, I will be quickly discouraged	,217	,426	,516	,279

I have to ask my supervisor before I do almost anything	,067	,673	,414	,030
Any decision I make has to have my supervisor's approval	-,167	,582	,210	,155
Whatever situation arises, I have procedures to follow in dealing with it	,451	-,445	,166	,296
I have to follow strict operational procedures at any time	,240	-,648	-,040	,393
Rules occupy a central place in my work related activities	,400	-,446	,370	,272
There is a written job description for going about my tasks	,271	-,393	,447	,135

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Rotated Component Matrix

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Activities of which a lot of experience is accumulated by yourself	,336	,604	,176	,214
Activities which you carry out as if it were routine	,099	,747	,133	-,108
Activities of which it is clear to you how to conduct them	,207	,622	,437	,153
Activities primarily focused on achieving short-term goals	,182	,679	,011	-,107
Activities which you can properly conduct by using your present knowledge	,180	,740	,108	,017
Activities which clearly fit in the current strategy, plans and guidelines	,099	,317	,539	,045
Searching for new products/services, processes or customers	,781	,103	,045	,087
Evaluating potential new products/services, processes or customers	,801	,255	,000	,166
Focusing on strong renewal of products/services or processes	,793	,064	,187	,183
Activities of which you need to change work routines, work procedures or work behaviour	,701	,195	-,017	-,252
Activities requiring you to learn new skills or knowledge	,686	,350	,054	-,070
I can undertake little action until my supervisor approves a decision	-,065	,046	-,061	,602
If I want to make my own decisions, I will be quickly discouraged	,141	-,004	,241	,703

I have to ask my supervisor before I do almost anything	,075	,072	-,134	,775
Any decision I make has to have my supervisor's approval	,047	-,201	-,227	,583
Whatever situation arises, I have procedures to follow in dealing with it	,184	,090	,671	-,158
I have to follow strict operational procedures at any time	,121	-,145	,639	-,436
Rules occupy a central place in my work related activities	,034	,109	,745	-,029
There is a written job description for going about my tasks	-,131	,146	,637	,036

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Appendix 7: Reliability analysis

Exploitation activities – full construct

Reliability Statistics

Cronbach's Alpha	N of Items
,746	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Activities of which a lot of experience is accumulated by yourself	22,72	12,371	,462	,715
Activities which you carry out as if it were routine	22,74	12,401	,525	,703
Activities which serve existing (internal) customers with existing products/services	23,20	12,538	,252	,783
Activities of which it is clear to you how to conduct them	22,63	12,299	,612	,688
Activities primarily focused on achieving short-term goals	23,11	11,774	,506	,705
Activities which you can properly conduct by using your present knowledge	22,66	12,252	,623	,686
Activities which clearly fit in the current strategy, plans and guidelines	22,61	13,135	,405	,727

Exploitation activities – reduced construct

Reliability Statistics

Cronbach's Alpha	N of Items
,783	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Activities of which a lot of experience is accumulated by yourself	19,31	8,800	,534	,750
Activities which you carry out as if it were routine	19,33	9,105	,543	,748
Activities of which it is clear to you how to conduct them	19,22	8,978	,645	,726
Activities primarily focused on achieving short-term goals	19,70	8,641	,502	,761
Activities which you can properly conduct by using your present knowledge	19,25	9,134	,607	,734
Activities which clearly fit in the current strategy, plans and guidelines	19,20	9,849	,397	,781

Exploration activities – full construct

Reliability Statistics

Cronbach's Alpha	N of Items
,799	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Searching for new products/services, processes or customers	18,97	20,476	,578	,765
Evaluating potential new products/services, processes or customers	18,88	20,692	,637	,756
Focusing on strong renewal of products/services or processes	19,01	19,863	,663	,749
Activities of which the associated yields or costs are unclear	20,21	21,251	,416	,797
Activities of which you need to change work routines, work procedures or work behaviour	19,14	20,411	,590	,762
Activities requiring you to learn new skills or knowledge	18,80	21,561	,552	,771
Activities that are not (yet) in the current strategy, plans and guidelines	20,07	21,936	,346	,811

Exploration activities – reduced construct (1)

Reliability Statistics

Cronbach's Alpha	N of Items
,811	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Searching for new products/services, processes or customers	16,53	15,192	,638	,766
Evaluating potential new products/services, processes or customers	16,44	15,516	,685	,758
Focusing on strong renewal of products/services or processes	16,56	15,123	,662	,761
Activities of which the associated yields or costs are unclear	17,77	17,095	,326	,841
Activities of which you need to change work routines, work procedures or work behaviour	16,70	15,583	,590	,777
Activities requiring you to learn new skills or knowledge	16,36	16,349	,588	,779

Exploration activities – reduced construct (2)

Reliability Statistics

Cronbach's Alpha	N of Items
,841	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Searching for new products/services, processes or customers	14,22	11,075	,649	,808
Evaluating potential new products/services, processes or customers	14,14	11,217	,725	,788
Focusing on strong renewal of products/services or processes	14,26	11,095	,661	,804
Activities of which you need to change work routines, work procedures or work behaviour	14,40	11,639	,564	,832
Activities requiring you to learn new skills or knowledge	14,05	11,853	,639	,811

Individual decision-making authority

Reliability Statistics

Cronbach's Alpha	N of Items
,639	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I can undertake little action until my supervisor approves a decision	8,9351	5,316	,406	,580
If I want to make my own decisions, I will be quickly discouraged	7,8052	5,334	,398	,585
I have to ask my supervisor before I do almost anything	8,8506	4,742	,513	,500
Any decision I make has to have my supervisor's approval	9,1818	5,548	,363	,609

Task formalisation

Reliability Statistics

Cronbach's Alpha	N of Items
,684	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Whatever situation arises, I have procedures to follow in dealing with it	11,29	4,035	,442	,634
I have to follow strict operational procedures at any time	11,62	3,401	,469	,625
Rules occupy a central place in my work related activities	11,29	3,855	,573	,560
There is a written job description for going about my tasks	11,27	4,056	,409	,654

Appendix 8: Casewise diagnostics

Case Summaries

	Case Number	Mahalanobis Distance	Cook's Distance	Centered Leverage Value
1	1	13,52102	,00010	,08667
2	2	6,14839	,00303	,03941
3	3	18,33901	,00561	,11756
4	4	4,09547	,00053	,02625
5	5	21,17670	,05376	,13575
6	6	11,29347	,00008	,07239
7	7	21,98941	,01781	,14096
8	8	22,36218	,00005	,14335
9	9	2,60515	,00008	,01670
10	10	8,92402	,00483	,05721
11	11	6,17167	,00002	,03956
12	12	23,94872	,02428	,15352
13	13	9,48709	,00049	,06081
14	14	14,03557	,00204	,08997
15	15	31,88932	,01507	,20442
16	16	8,90127	,00240	,05706
17	17	15,89866	,00024	,10191
18	18	21,29884	,10546	,13653
19	19	5,54596	,00001	,03555
20	20	10,21431	,00922	,06548
21	21	8,20522	,00280	,05260
22	22	10,76793	,00000	,06903
23	23	19,11719	,00696	,12255
24	24	5,28335	,00000	,03387
25	25	6,10866	,00002	,03916
26	26	27,35597	,00194	,17536
27	27	34,45737	,00003	,22088
28	28	7,46382	,00062	,04784
29	29	16,14143	,00036	,10347
30	30	7,06083	,00137	,04526
31	31	11,93891	,00469	,07653
32	32	9,20438	,00032	,05900
33	33	9,07535	,00654	,05818
34	34	5,21473	,00007	,03343
35	35	8,78265	,00101	,05630
36	36	8,16863	,00185	,05236

37	37	24,90388	,01451	,15964
38	38	4,11802	,00029	,02640
39	39	20,73130	,00818	,13289
40	40	10,58267	,00248	,06784
41	41	21,67502	,00433	,13894
42	42	17,77888	,00490	,11397
43	43	4,14485	,00478	,02657
44	44	4,57490	,00208	,02933
45	45	10,01248	,00168	,06418
46	46	22,39190	,00037	,14354
47	47	16,14245	,00268	,10348
48	48	15,59590	,00001	,09997
49	49	10,47346	,00000	,06714
50	50	9,95088	,00497	,06379
51	51	9,02781	,00000	,05787
52	52	26,97042	,00243	,17289
53	53	8,64060	,00015	,05539
54	54	8,25312	,00902	,05290
55	55	18,19537	,00265	,11664
56	56	26,84838	,01015	,17211
57	57	54,05706	,01939	,34652
58	58	42,85225	,00714	,27469
59	59	6,49065	,00538	,04161
60	60	8,15229	,00022	,05226
61	61	16,43391	,00028	,10535
62	62	10,28653	,00313	,06594
63	63	13,75838	,01386	,08819
64	64	10,16922	,00021	,06519
65	65	18,64600	,00085	,11953
66	66	8,60697	,00043	,05517
67	67	6,63165	,00040	,04251
68	68	18,06317	,00179	,11579
69	69	11,66481	,00076	,07477
70	70	27,32079	,00173	,17513
71	71	21,75024	,01278	,13942
72	72	9,94952	,00000	,06378
73	73	7,56334	,00029	,04848
74	74	13,65606	,00246	,08754
75	75	28,97416	,05437	,18573
76	76	41,87515	,02865	,26843
77	77	14,25176	,00002	,09136

78	78	5,41362	,00016	,03470
79	79	5,16624	,00022	,03312
80	80	11,72321	,00276	,07515
81	81	34,59153	,00321	,22174
82	82	15,31789	,00318	,09819
83	83	15,16385	,00225	,09720
84	84	10,46594	,00609	,06709
85	85	17,78871	,01006	,11403
86	86	6,97429	,00291	,04471
87	87	25,67920	,00518	,16461
88	88	12,94954	,00009	,08301
89	89	40,81142	,02095	,26161
90	90	18,25955	,00142	,11705
91	91	13,39354	,00003	,08586
92	92	8,82992	,00060	,05660
93	93	15,64159	,00009	,10027
94	94	16,07314	,01417	,10303
95	95	34,08310	,00819	,21848
96	96	25,83583	,00141	,16561
97	97	11,09497	,00413	,07112
98	98	10,73922	,00230	,06884
99	99	22,29499	,00000	,14292
100	100	11,37605	,00006	,07292
101	101	6,08310	,00081	,03899
102	102	9,43964	,00358	,06051
103	103	4,56743	,00075	,02928
104	104	5,60384	,00002	,03592
105	105	14,29555	,00341	,09164
106	106	50,50693	,01090	,32376
107	107	9,27402	,00243	,05945
108	108	7,48731	,01124	,04800
109	109	11,80866	,02805	,07570
110	110	18,96530	,02013	,12157
111	111	30,28489	,00192	,19413
112	112	30,55271	,02178	,19585
113	113	10,01766	,00022	,06422
114	114	8,68414	,00268	,05567
115	115	22,02676	,02205	,14120
116	116	19,47997	,03547	,12487
117	117	28,26322	,02005	,18117
118	118	5,82210	,00871	,03732

119		119	35,21676	,01043	,22575
120		120	16,56825	,00004	,10621
121		121	25,69012	,01179	,16468
122		122	19,52905	,00016	,12519
123		123	31,12723	,00079	,19953
124		124	9,96575	,02431	,06388
125		125	14,46668	,00007	,09274
126		126	27,43817	,03041	,17589
127		127	14,03130	,00094	,08994
128		128	17,19526	,04349	,11023
129		129	48,82285	,00390	,31297
130		130	21,35385	,01849	,13688
131		131	19,79457	,00048	,12689
132		132	9,16684	,00077	,05876
133		133	30,43172	,03853	,19508
134		134	30,20177	,01347	,19360
135		135	17,35111	,00040	,11123
136		136	42,78274	,00326	,27425
137		137	107,76799	,12520	,69082
138		138	4,06200	,00094	,02604
139		139	9,30250	,00079	,05963
140		140	13,61966	,00067	,08731
141		141	15,09706	,00807	,09678
142		142	9,11326	,00489	,05842
143		143	23,78606	,00519	,15247
144		144	7,61575	,00000	,04882
145		145	6,77046	,00008	,04340
146		146	21,66042	,00127	,13885
147		147	141,86819	1,11579	,90941
148		148	38,10900	,00488	,24429
149		149	19,26481	,00716	,12349
150		150	61,16670	,01234	,39209
151		151	22,53931	,00000	,14448
152		152	20,29186	,00806	,13008
153		153	64,94479	,25937	,41631
154		154	19,33179	,00102	,12392
155		155	9,68694	,00009	,06210
156		156	3,63357	,00085	,02329
157		157	76,04446	,23124	,48746
Total	N		157	157	157

Appendix 9: Cluster analysis

Hierarchical Clustering

Dendogram
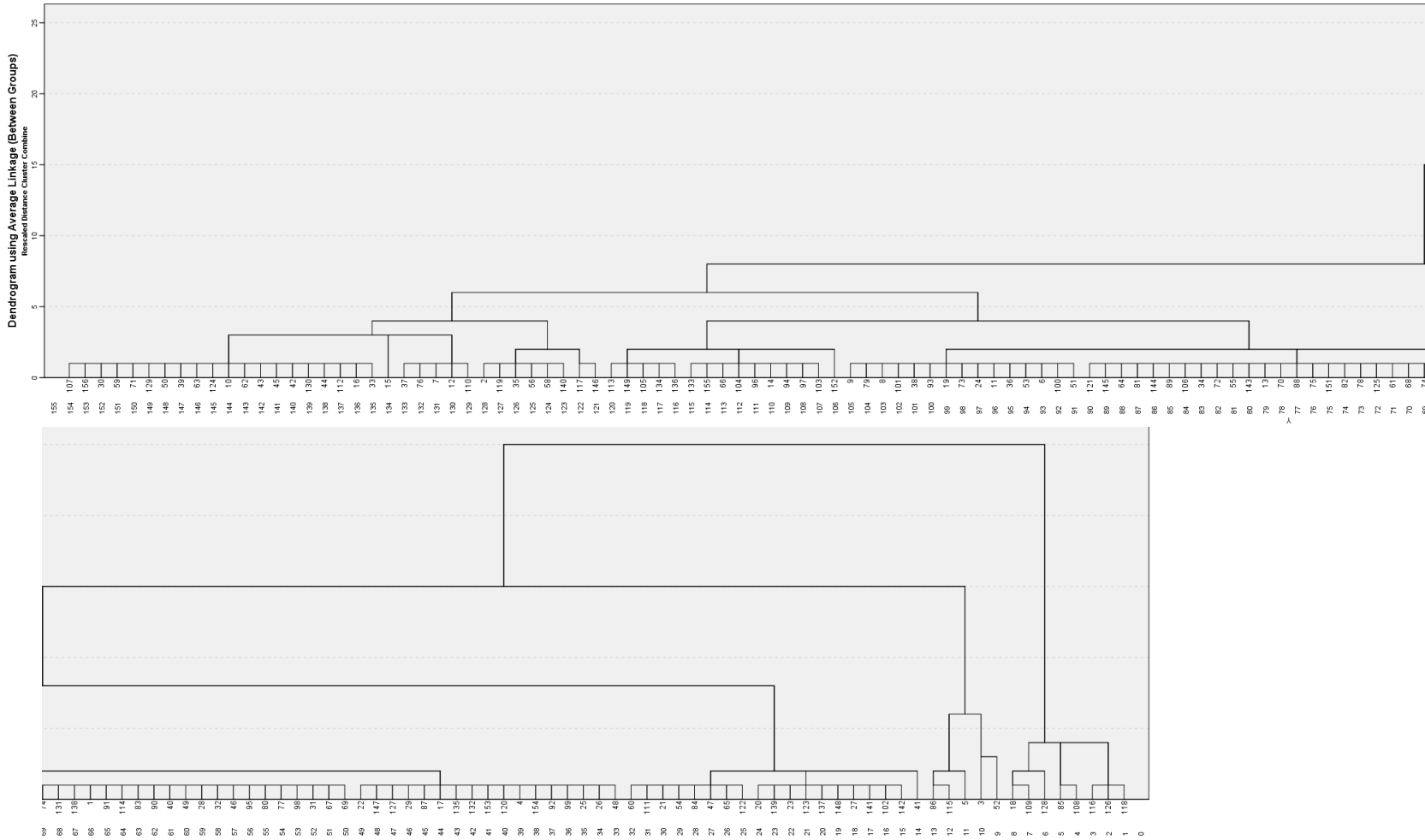
Agglomeration Schedule

Agglomeration Schedule

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	107	156	,000	0	0	20
2	4	154	,000	0	0	109
3	132	153	,000	0	0	66
4	75	151	,000	0	0	76
5	137	148	,000	0	0	114
6	22	147	,000	0	0	68
7	121	145	,000	0	0	16
8	55	143	,000	0	0	49
9	27	141	,000	0	0	98
10	131	138	,000	0	0	13
11	17	135	,000	0	0	104
12	105	134	,000	0	0	90
13	114	131	,000	0	10	17
14	42	130	,000	0	0	86
15	78	125	,000	0	0	37
16	81	121	,000	0	7	35
17	91	114	,000	0	13	29
18	44	112	,000	0	0	52
19	60	111	,000	0	0	46
20	71	107	,000	0	1	42
21	89	106	,000	0	0	31
22	66	104	,000	0	0	73
23	6	100	,000	0	0	83
24	92	99	,000	0	0	28
25	77	98	,000	0	0	38
26	46	95	,000	0	0	74
27	14	94	,000	0	0	70
28	26	92	,000	0	24	59
29	90	91	,000	0	17	30
30	83	90	,000	0	29	34
31	72	89	,000	0	21	41
32	70	88	,000	0	0	94
33	54	84	,000	0	0	81
34	49	83	,000	0	30	50
35	64	81	,000	0	16	63
36	9	79	,000	0	0	60

37	74	78	,000	0	15	40
38	67	77	,000	0	25	44
39	37	76	,000	0	0	54
40	68	74	,000	0	37	43
41	34	72	,000	0	31	87
42	59	71	,000	0	20	47
43	61	68	,000	0	40	93
44	31	67	,000	0	38	77
45	10	62	,000	0	0	85
46	21	60	,000	0	19	95
47	30	59	,000	0	42	67
48	35	56	,000	0	0	89
49	13	55	,000	0	8	87
50	40	49	,000	0	34	53
51	43	45	,000	0	0	85
52	33	44	,000	0	18	56
53	32	40	,000	0	50	57
54	7	37	,000	0	39	88
55	11	36	,000	0	0	82
56	16	33	,000	0	52	86
57	28	32	,000	0	53	58
58	1	28	,000	0	57	93
59	25	26	,000	0	28	103
60	8	9	,000	0	36	71
61	133	155	,028	0	0	97
62	113	149	,028	0	0	112
63	64	144	,028	35	0	113
64	102	142	,028	0	0	98
65	20	139	,028	0	0	111
66	120	132	,028	0	3	104
67	30	129	,028	47	0	106
68	22	127	,028	6	0	100
69	116	126	,028	0	0	128
70	14	103	,028	27	0	119
71	8	101	,028	60	0	99
72	87	97	,028	0	0	120
73	66	96	,028	22	0	97
74	46	80	,028	26	0	96
75	38	93	,028	0	0	99
76	75	82	,028	4	0	94
77	31	69	,028	44	0	96

78	39	63	,028	0	0	106
79	19	73	,028	0	0	101
80	50	58	,028	0	0	110
81	47	54	,028	0	33	95
82	11	53	,028	55	0	117
83	6	51	,028	23	0	103
84	29	48	,028	0	0	100
85	10	43	,028	45	51	102
86	16	42	,028	56	14	102
87	13	34	,028	49	41	105
88	7	12	,028	54	0	126
89	35	140	,040	48	0	110
90	105	136	,040	12	0	112
91	23	123	,040	0	0	111
92	2	119	,040	0	0	129
93	1	61	,040	58	43	107
94	70	75	,049	32	76	113
95	21	47	,049	46	81	121
96	31	46	,051	77	74	107
97	66	133	,054	73	61	119
98	27	102	,054	9	64	114
99	8	38	,054	71	75	131
100	22	29	,054	68	84	122
101	19	24	,054	79	0	117
102	10	16	,054	85	86	125
103	6	25	,056	83	59	105
104	17	120	,059	11	66	116
105	6	13	,062	103	87	122
106	30	39	,063	67	78	123
107	1	31	,067	93	96	118
108	86	115	,068	0	0	136
109	4	65	,068	2	0	116
110	35	50	,083	89	80	129
111	20	23	,089	65	91	130
112	105	113	,094	90	62	137
113	64	70	,097	63	94	118
114	27	137	,110	98	5	130
115	18	109	,111	0	0	141
116	4	17	,115	109	104	127
117	11	19	,116	82	101	131
118	1	64	,122	107	113	135

119	14	66	,132	70	97	120
120	14	87	,138	119	72	134
121	21	122	,142	95	0	140
122	6	22	,145	105	100	127
123	30	124	,148	106	0	125
124	85	108	,188	0	0	145
125	10	30	,201	102	123	138
126	7	110	,215	88	0	144
127	4	6	,223	116	122	135
128	116	118	,229	69	0	147
129	2	35	,250	92	110	138
130	20	27	,261	111	114	133
131	8	11	,268	99	117	139
132	117	146	,271	0	0	150
133	20	41	,314	130	0	140
134	14	152	,353	120	0	137
135	1	4	,429	118	127	143
136	5	86	,441	0	108	146
137	14	105	,474	134	112	148
138	2	10	,479	129	125	144
139	8	52	,494	131	0	142
140	20	21	,506	133	121	145
141	18	128	,512	115	0	147
142	8	15	,653	139	0	143
143	1	8	,761	135	142	148
144	2	7	,861	138	126	149
145	20	85	,903	140	124	151
146	3	5	,928	0	136	151
147	18	116	1,010	141	128	152
148	1	14	1,185	143	137	149
149	1	2	1,514	148	144	150
150	1	117	1,907	149	132	153
151	3	20	2,457	146	145	152
152	3	18	3,013	151	147	153
153	1	3	4,307	150	152	0

K-means Clustering

Initial Cluster Centers

Initial Cluster Centers

	Cluster			
	1	2	3	4
Exploitation activities score	4,50	1,83	5,00	2,50
Exploration activities score	1,40	1,20	5,00	3,60

Iteration History

Iteration History[a]

	Change in Cluster Centers			
Iteration	1	2	3	4
1	1,146	,812	1,068	1,048
2	,081	,182	,059	,048
3	,000	,000	,019	,024
4	,055	,000	,029	,049
5	,058	,000	,033	,053
6	,048	,000	,004	,014
7	,043	,000	,010	,000
8	,060	,000	,000	,023
9	,000	,000	,000	,000

a. Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is ,000. The current iteration is 9. The minimum distance between initial centers is 2,491.

Final Cluster Centers

Final Cluster Centers

	Cluster			
	1	2	3	4
Exploitation activities score	4,31	2,77	4,17	3,40
Exploration activities score	2,79	1,43	4,14	3,28

Number of Cases per cluster

Number of Cases in each Cluster

Cluster	1	19,000
	2	8,000
	3	77,000
	4	50,000

Valid	154,000
Missing	4,000

Appendix 10: Post-hoc analysis

Descriptives per cluster

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Exploitation activities score	1	8	2,7708	,48744	,17234	2,3633	3,1783	1,83	3,33
	2	19	4,3070	,38595	,08854	4,1210	4,4930	3,67	5,00
	3	50	3,4000	,38686	,05471	3,2901	3,5099	2,50	4,00
	4	77	4,1667	,37071	,04225	4,0825	4,2508	3,17	5,00
	Total	154	3,8626	,58984	,04753	3,7687	3,9565	1,83	5,00
Exploration activities score	1	8	1,4250	,40620	,14361	1,0854	1,7646	1,00	2,20
	2	19	2,7895	,58299	,13375	2,5085	3,0705	1,40	3,40
	3	50	3,2760	,39773	,05625	3,1630	3,3890	2,60	4,00
	4	77	4,1429	,39183	,04465	4,0539	4,2318	3,60	5,00
	Total	154	3,5532	,82693	,06664	3,4216	3,6849	1,00	5,00

Homogeneity of Variances

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Exploitation activities score	Based on Mean	,604	3	150	,614
	Based on Median	,413	3	150	,744
	Based on Median and with adjusted df	,413	3	132,262	,744
	Based on trimmed mean	,569	3	150	,636
Exploration activities score	Based on Mean	2,527	3	150	,060
	Based on Median	,918	3	150	,434
	Based on Median and with adjusted df	,918	3	128,351	,434
	Based on trimmed mean	2,187	3	150	,092

ANOVA table

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Exploitation activities score	Between Groups	31,107	3	10,369	70,308	,000
	Within Groups	22,122	150	,147		
	Total	53,230	153			
Exploration activities score	Between Groups	77,931	3	25,977	145,978	,000
	Within Groups	26,693	150	,178		
	Total	104,623	153			

Post-hoc analysis

Multiple Comparisons

Dependent Variable		(I) Cluster Number of Case	(J) Cluster Number of Case	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Exploitation activities score	Hochberg	1	2	-1,53618*	,16186	,000	-1,9675	-1,1049
			3	-,62917*	,14624	,000	-1,0188	-,2395
			4	-1,39583*	,14266	,000	-1,7760	-1,0157
		2	1	1,53618*	,16186	,000	1,1049	1,9675
			3	,90702*	,10350	,000	,6312	1,1828
			4	,14035	,09837	,634	-,1218	,4025
		3	1	,62917*	,14624	,000	,2395	1,0188
			2	-,90702*	,10350	,000	-1,1828	-,6312
			4	-,76667*	,06975	,000	-,9525	-,5808
		4	1	1,39583*	,14266	,000	1,0157	1,7760
			2	-,14035	,09837	,634	-,4025	,1218
			3	,76667*	,06975	,000	,5808	,9525
	Games-Howell	1	2	-1,53618*	,19375	,000	-2,1203	-,9521
			3	-,62917*	,18081	,032	-1,2009	-,0575
			4	-1,39583*	,17744	,000	-1,9663	-,8253
		2	1	1,53618*	,19375	,000	,9521	2,1203
			3	,90702*	,10408	,000	,6253	1,1887
			4	,14035	,09811	,492	-,1283	,4090
		3	1	,62917*	,18081	,032	,0575	1,2009
			2	-,90702*	,10408	,000	-1,1887	-,6253
			4	-,76667*	,06912	,000	-,9472	-,5861
		4	1	1,39583*	,17744	,000	,8253	1,9663
			2	-,14035	,09811	,492	-,4090	,1283
			3	,76667*	,06912	,000	,5861	,9472
Exploration activities score	Hochberg	1	2	-1,36447*	,17779	,000	-1,8382	-,8907
			3	-1,85100*	,16063	,000	-2,2790	-1,4230
			4	-2,71786*	,15670	,000	-3,1354	-2,3003
		2	1	1,36447*	,17779	,000	,8907	1,8382
			3	-,48653*	,11369	,000	-,7895	-,1836
			4	-1,35338*	,10806	,000	-1,6413	-1,0654
		3	1	1,85100*	,16063	,000	1,4230	2,2790
			2	,48653*	,11369	,000	,1836	,7895
			4	-,86686*	,07662	,000	-1,0710	-,6627
		4	1	2,71786*	,15670	,000	2,3003	3,1354
			2	1,35338*	,10806	,000	1,0654	1,6413
			3	,86686*	,07662	,000	,6627	1,0710
	Games-Howell	1	2	-1,36447*	,19625	,000	-1,9166	-,8123
			3	-1,85100*	,15424	,000	-2,3295	-1,3725
			4	-2,71786*	,15040	,000	-3,1941	-2,2416
		2	1	1,36447*	,19625	,000	,8123	1,9166
			3	-,48653*	,14509	,013	-,8860	-,0870
			4	-1,35338*	,14101	,000	-1,7447	-,9621
		3	1	1,85100*	,15424	,000	1,3725	2,3295
			2	,48653*	,14509	,013	,0870	,8860
			4	-,86686*	,07182	,000	-1,0544	-,6793
		4	1	2,71786*	,15040	,000	2,2416	3,1941
			2	1,35338*	,14101	,000	,9621	1,7447
			3	,86686*	,07182	,000	,6793	1,0544

*. The mean difference is significant at the 0.05 level.

Appendix 11: Harman's single-factor test

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4,877	25,668	25,668	4,877	25,668	25,668
2	2,629	13,837	39,505			
3	1,806	9,504	49,009			
4	1,420	7,476	56,485			
5	1,052	5,539	62,024			
6	,943	4,963	66,987			
7	,807	4,247	71,234			
8	,743	3,912	75,146			
9	,665	3,501	78,648			
10	,624	3,285	81,933			
11	,543	2,856	84,789			
12	,528	2,777	87,566			
13	,466	2,454	90,020			
14	,431	2,269	92,289			
15	,371	1,951	94,240			
16	,317	1,666	95,906			
17	,307	1,618	97,524			
18	,270	1,421	98,944			
19	,201	1,056	100,000			

Extraction Method: Principal Component Analysis.