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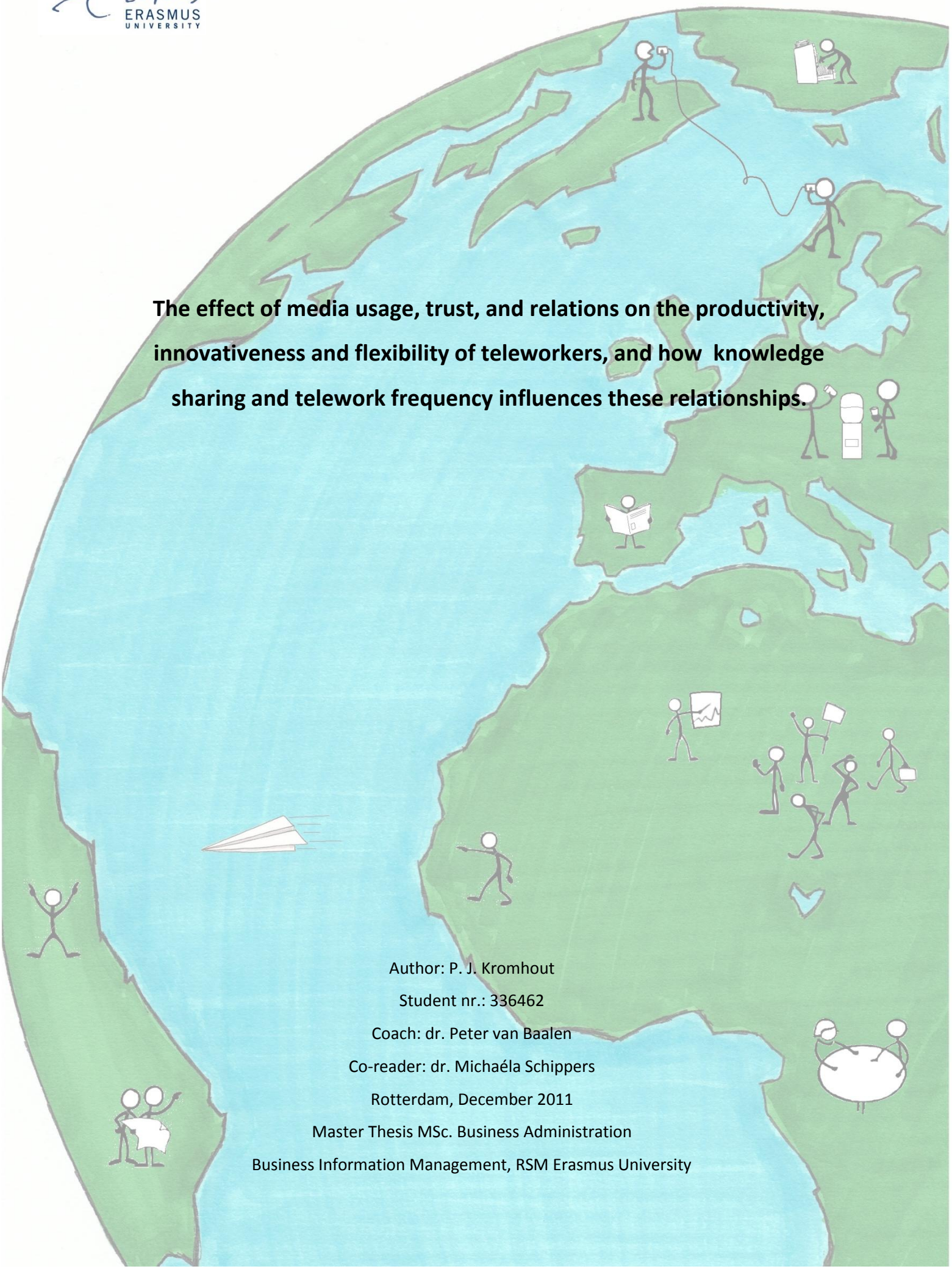

# The effect of media usage, trust, and relations on the productivity, innovativeness and flexibility of teleworkers, and how knowledge sharing and telework frequency influences these relationships.


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Rotterdam, December 2011

Master Thesis MSc. Business Administration


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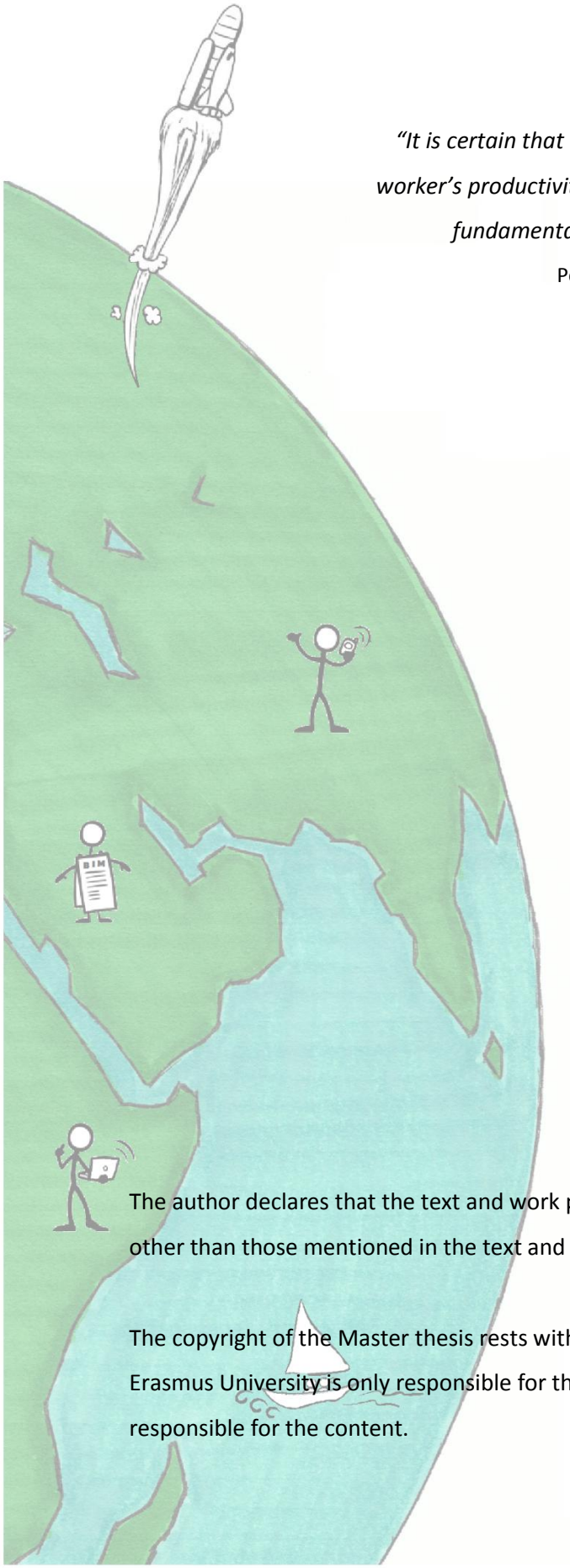


*"It is certain that the emergence of the knowledge worker and of the knowledge worker's productivity as key questions will, within a very few decades, bring about fundamental changes in the structure and nature of the economic system"*

Peter Drucker in: Management Challenges for the 21st Century (1999)

**Acknowledgements**

In your hands you find the cultivation of a very enjoyable, often challenging and foremost enriching fourtheen months of studying Business Information Management. Not only have these months given me a great deal of knowledge specific to this field, it has also tought me the necessary skills to proceed into a new chapter in my life. Even while conducting the research for this thesis, and analyzing and reporting the results, a suprisingly large amount of new knowledge and skills have been developed. For this I have several people to thank.

First, I would like to thank the members of the RSM New World of Work research team, for without them this thesis would not have been achievable. I appreciate in particular the guidance and feedback given to me by my coach Peter van Baalen and my co-reader Michaéla Schippers. Were the former aided me primarily during the literature review and the development of new theory, and the latter gave me great lessons in model development and statistical analysis. I also must thank Nick van der Meulen, for answering the endless stream of questions I had and for his aid in developing and conducting the online questionnaire used for this thesis. Thanks also to Marcel van Oosterhout for accepting me as a member of the research team and to all other students whom I have had the pleasure of working and sparring with during our meetings. Second, I am thankful for the help and cooperation of several people from CBG, without their contribution this thesis would also not have been possible. I would like to thank all in the organization who took the time to fill out the questionnaire and help me collect my data.

Last but not least, I am very gratefull to have the unconditional support and continued encouragement of my girlfriend, whom I have neglected sometimes during the many late hours I was working on this thesis. The same holds true for my family and friends, who have listened to all I had to say and provided me with great hints and tips.

A feeling of satisfaction and fulfillment creeps in as I am writing these final words, all I have left to say is that I sincerely hope that you will enjoy reading this thesis.

*Peter Kromhout*
*Leiden, November 2011*

**Executive summary**

More than half of the organizations in the Netherlands offer their employees possibilities to telework, this is even more than 90% for large organizations with more than 500 employees. Telework is “a form of organizing and/or performing work, using information technology, in the context of an employment contract/relationship, where work, which could also be performed at the employer´s premises, is carried out away from those premises on a regular basis.” (EFILWC, 2010). For a firm, the adaption of teleworking programs can have several implications, it means introducing teleworking, changing the traditional offices into meeting places and adapting ICT´s that support this new way of working. Telework affects mainly professional and managerial workers whose jobs may be classified as knowledge work (Taskin & Bridoux, 2010), i.e. work that is requiring the interpretation, communication and manipulation of data related to a variety of contexts (Daniels et al. 2001).

The benefits and drawbacks of teleworking in regard to numerous outcomes have been researched over the years, resulting in contradicting outcomes. Possible benefits related to teleworking are found in e.g. enhanced productivity, job satisfaction, improved performance (Bélanger et al. 2001), greater flexibility for employees (Egan, 1997) and a more healthy work/life balance for employees (Shamir & Salomon, 1985). But other research has shown that extensive levels of teleworking may result in lower satisfaction, and that other possible drawbacks are related to professional and social isolation (Cooper & Kurland, 2002), which can be assigned to a decrease in face-to-face social interactions and strained relationships with co-workers and managers (Golden & Viega, 2005).

These developments in the field of telework and the ambiguities about the results have been the inspiration for this thesis. The outcome of any telework initiative must benefit both the organization and the individual, therefore not only the performance dimensions productivity and innovativeness are analyzed but also the individual flexibility is studied. Introducing telework successfully has proven to be dependent on issues such as trust and relation (Eaton, 2003, Golden & Viega, 2005), therefore the direct effect of these two factors in the performance dimensions is studied. It is obvious that communication patterns change when individuals start teleworking, to assess how this changes and what its effect on the performance dimensions is the theory on media richness is used and adapted. Furthermore, as knowledge work is a characteristic of telework, the role of knowledge sharing in such a context is also analyzed. Finally, teleworking frequency is used to study the changes in all these dimensions when teleworking frequencies change.

The study conducted for this thesis is part of a large investigation into the new world of work by the Erasmus University RSM New World of Work research team. The study is conducted at CBG, an organization responsible for the evaluation and monitoring of the efficacy, risks and quality of human and

veterinary medicinal products (CBG, 2010). The organization is in the process of introducing a telework program which includes a move to a new building, enhanced possibilities for teleworking and increased technical support for employees. By providing them with valuable insights they will be able to make more informed decisions on a range of aspects related to their teleworking program.

Media usage measures how rich the communication of individuals is, and the results show that this communication richness decreases when individuals increase their telework frequency. This effect is attributed to the fact that the rich face-to-face interactions occurring at the office are replaced mainly by less rich communication via e-mail. When organizations require the richness of communications to remain high there are technologies available that can substitute face-to-face interactions better than e-mail, such as videoconferencing. This study however does not show that the richness of communication significantly influence the performance dimensions productivity, innovativeness and flexibility. The findings concerning trust support the idea that it is important for the success of teleworking programs that managers place trust in their employees; productivity, innovativeness and flexibility benefits from this. Employees who perceive higher levels of trust from their manager also perceive themselves to be more productive. Trust allows risk taking and improvising behavior by individuals, because they are assured they will not be overly penalized for new ideas that fail. These results also support the theory of horizontal and vertical relationships. Trust in relations of a vertical nature (superior-subordinate) are efficient types of trust and positively influence performance, in this case productivity and innovativeness. Trust in horizontal relations however is expected to be an inefficient type of trust with a negative influence. Results also show that a good relation with colleagues has a positive influence on productivity while a good relation with manager has a negative influence. Regarding the effect of relations on the other two performance dimensions there are no significant influences in this study.

For knowledge sharing the results indicate that different types of knowledge have a different effect, organizational knowledge sharing benefits innovativeness, while domain knowledge sharing decreases it. Finally, teleworking frequency result show that an increasing frequency lower the richness of communication, and that an increasing frequency is positively associated with productivity, innovativeness and flexibility.

With these results an answer is provided for the research question stated in this thesis. A contribution is made to current literature on these topics, by using and adapting existing theories, developing new theory, and clarifying some of the ambiguity in the effects of teleworking. Furthermore, management practices can benefit from this thesis when making decisions on the implementation and design of teleworking programs.

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## Chapter 1 Introduction

The number of organizations in the Netherlands offering their employees possibilities to telework has grown substantially in the last years; starting from approximately 28% in 2003, placing the Netherlands at the top of all European countries (Gareis, 2004), and doubling this to 56% in 2009 (CBS, 2011). In 93% of the large organizations (more than 500 employees) it is possible for employees to work at home. There is much interest in the possibilities teleworking has to offer for organizations. Literature reviews show that many academic research papers are published concerning this topic (Taskin & Bridoux, 2010; Bailey & Kurland, 2002). Different definitions all have in common that they symbolize the possibility employees within a company have to work outside of the office. This flexibility that employees have to work outside of the traditional office space is greatly facilitated by information technology. This trend was already recognized by Nilles in 1994: "Teleworking is an alternative work arrangement facilitated by ICT´s that enables employees to work physically outside the conventional workplace by bringing work to workers". The general themes that can be found in teleworking definitions have been included in the definition given by the European Foundation for the Improvement of Living and Working Conditions (EFILWC) in 2002, which is the definition used for this research paper:

*" Telework is a form of organizing and/or performing work, using information technology, in the context of an employment contract/relationship, where work, which could also be performed at the employer´s premises, is carried out away from those premises on a regular basis." (EFILWC, 2010)*

Implementing a telework program involves the development of a management style based on trust rather than control, which is also more output based than presence based. Trust and relationships between management and employees, or the lack thereof, is found to be an important factor in the decision of organizations to adopt teleworking. Not only does the lack of trust from managers inhibit employees to telework (Harrington & Ruppel, 1999), when the employees have little trust and bad relationships with both their managers and their colleagues the possibilities of telework become underutilized (Hill et al. 2001).

For a firm, the adaption of a teleworking program has several implications, it means introducing teleworking, changing the traditional offices into meeting places and adapting ICT´s that support this new way of working. The more powerful software and computing systems, the Internet and wireless connectivity, i.e. IT, is evolving in ways that empower organizations, teams and individuals to adapt new ways of working (Microsoft, 2007). One main aspect that follows the adaption of new ways of working is teleworking, also called telecommuting (Nilles, 1975), remote work (Olson, 1983) or home-based work (Daniels et al. 2001). Teleworking is an alternative working arrangement that has been mentioned for the first time by J.M. Nilles more than three decades ago (Nilles, 1975). The benefits and drawbacks of

teleworking in regard to numerous outcomes have been researched over the years, resulting in contradicting outcomes. Possible benefits related to teleworking are found in e.g. enhanced productivity, innovative behavior, job satisfaction, improved performance (Bélanger et al. 2001), greater flexibility for employees and lower commuting time (Hill et al. 1998), decreasing real-estate costs (Egan, 1997), a more healthy work/life balance for employees (Shamir & Salomon, 1985) and the reduction of air pollution and traffic congestion (Handy & Mokhtarian, 1995). However, other studies have shown that extensive levels of teleworking may result in lower satisfaction and that other possible drawbacks are related to professional and social isolation (Cooper & Kurland, 2002), which can be assigned to a decrease in face-to-face social interactions and strained relationships with co-workers and managers (Golden & Viega, 2005).

Telework affects mainly professional and managerial workers whose jobs may be classified as knowledge work (Taskin & Bridoux, 2010), i.e. work that requires the interpretation, communication and manipulation of data related to a variety of contexts (Daniels et al. 2001). Teleworkers have the capacity to create new knowledge and to contribute to the organizations knowledge base, they can thus be a strategic asset (Taskin & Bridoux, 2010). They require considerable communication to perform their jobs because information gathering and knowledge sharing are key activities (Long, 1987). The work is often non-routine with large amounts of task variety and uncertainty, and with tasks that are often complex and involve ambiguous outputs. Examples of knowledge work include university research, technology support, insurance claim processing and sales (Bélanger & Allport, 2008). There is a high requirement for communication in order to successfully perform these jobs. The impact of any teleworking program on the communication patterns that occur both inside as outside the organization (e.g. suppliers or partners) can be substantial. Research has shown that teleworkers interact with others significantly less (Olszewski and Mokhtarian, 1994).

### 1.1 Research goal & question

As many ambiguities about the effects of teleworking on the organizational performance still exist, that will be the focus of this study. Adopting teleworking is often considered beneficial for the individuals working at the organization, however, performance improvements are also possible for the organization as a whole. For individuals the increased flexibility offered by teleworking is an important benefit. However, “flexibility includes more than starting and quitting times. Many employees require flexibility to visit children's schools, take elders to the doctor, or take time off during a family emergency, flexibility also may mean taking days off in return for working at nonstandard times or being able to work part time temporarily at certain points in life” (Eaton, 2003, pg. 147). One of the often mentioned positive outcomes of teleworking for organizations is improved worker productivity. Factors such as the elimination of stress associated with the daily commute, avoiding interruptions at the workplace, the

opportunity to tend to family and personal issues without affecting job related commitments and a decrease in absenteeism are positively associated with productivity (Frolick et al., 1993). Many empirical studies have shown proof of higher productivity when teleworking is introduced (Frolick et al, 1993; Bélanger & Allport, 1999; Ruth, 2008). Another performance dimension crucial for many organizations and their competitiveness is innovativeness; "in the private sector half of today´s revenues flow from products and services less than five years old" (Mechling, 1995,). In literature it is suggested that telework can contribute to an improvement of innovative behavior (Martínez-Sánches et al., 2007). To accommodate both the organizational and personal benefits the performance dimensions that will be studied are productivity, innovativeness and flexibility.

The definition of telework highlights the important role information technologies play in the realm of teleworking. The introduction of numerous types of technologies allow individuals in organizations to communicate even though they are located at dispersed locations. In this study, using the media richness theory, an assessment will be made of the influence of media usage on the performance dimensions stated previously. Besides, literature makes it clear that trust and relational bond within organizations influence the success of teleworking programs in general, how these determine the productivity, innovativeness and flexibility individuals experience is less clear however. Therefore the relation between these three determinants and the three performance dimensions are the primary relations that will be studied in this thesis. Furthermore there are a number of factors that might be of influence on these relationships. As teleworking is mostly suited for knowledge workers whom have to interpret, communicate and create knowledge, it is plausible to assume that the actual sharing of such knowledge influences the main relations studied in this thesis. Also, the actual frequency of telework is likely to influence these relations, as telework can range from only a few hours a month to fulltime.

Knowledge is an important asset for organizations, knowledge is used to solve problem, innovate with new products or services, organize the organization and formulate strategies for competing and surviving in the industry. Knowledge is a very abstract and broad term, but in literature it is often defined as "information possessed in the mind of individuals: it is personalized information (which may or may not be new, unique, useful, or accurate) related to facts, procedures, concept, interpretations, ideas, observations, and judgments" (Alavi & Leidner, 2001). In organizational context knowledge sharing is defined as "the activities of transferring or disseminating knowledge from one person, group or organization to another" (Lee, 2001). The levels of knowledge sharing between individuals in an organization are expected to moderate the relation between the two determining dimensions trust and relation and the performance dimensions productivity, innovativeness, and flexibility. The other moderating variable in this research is teleworking frequency, which is expected to influence the determinants trust, relations and media usage. From the definition of telework stated earlier two aspects

are abstracted that form the foundation of the telework frequency construct in current research, i.e. the location and frequency of teleworking activities. The previous translates into the following research question:

*"What is the effect of media usage, trust, and relations on the productivity, innovativeness and flexibility of teleworkers and how does knowledge sharing and telework frequency influence these relationships?"*

**1.2 Contribution to theory & management practice.**

There are several reasons for studying the effect media usage, trust and relations have on performance outcomes of teleworking programs, and what the influence of knowledge sharing and telework frequency has on this. First, there are a number of gaps in literature and empirical research that are addressed in this thesis. Trust and interpersonal relationships in respect to teleworking are both studied before, the focus however has not been on its effect on performance outcomes such as productivity and innovativeness in a teleworking context. Also, this thesis contributes to the literature on information richness theory. New media communication channels such as video conferencing, social media and collaborative workspaces challenge the original theory, Sproull (1991) and Valacich (1993) proposed several additions to complement the theory but these are also out-dated by new technologies. Furthermore this thesis contributes to theory concerning knowledge sharing by proposing a new typology. As Taskin & Bridoux (2010) state: "despite the widespread use of telework among knowledge workers, the literature has not yet explored how working remotely may affect the organization´s knowledge base". They themselves do explore the challenges teleworking pose to knowledge transfer in organizations, the paper however is theoretical in nature and lacks empirical research.

Second, this thesis has an important contribution for management practices. Telework has been promoted as way to improve many organizational facets such as productivity, flexibility and innovativeness. However, organizations are also hesitating to implement teleworking processes, issues with trust (Eaton, 2003; Grundy, 2005), manager-employee relationships (Dambrin, 2004), communication (Bélanger & Allport, 2008), and knowledge transfer (Taskin & Bridoux, 2010) are among the reasons for this hesitation. By providing knowledge on these topics organizations will be better apt to evaluate possible teleworking decisions, develop successful telework programs, and control or influence important determinants of performance dimensions.

Third, the thesis contributes to the organization at which the study is conducted specifically. The organization is in the process of introducing a telework program which includes a move to a new building, enhanced possibilities for teleworking and increased technical support for employees. By providing them

with valuable insights they will be able to make more informed decisions on a range of aspects related to their teleworking program.

### 1.3 Research design & thesis structure

A survey is developed and conducted to study and answer the posed research question. A survey is based upon the use of structured questionnaires given to a sample or population. Most questions are fixed-response alternative questions that require the respondent to select from a predetermined set of responses. The data collected with this research method is analyzed in a quantitative statistical manner. This research is part of the overall research project Erasmus @ Work by the RSM Erasmus University, which is "an interdisciplinary research programme focusing on high performance work and provides state-of-the-art knowledge and insights about the key issues for the design and implementation of new ways of working" (Erasmus @ Work, 2011). For this thesis the study is conducted at CBG, an organization responsible for the evaluation and monitoring of the efficacy, risks and quality of human and veterinary medicinal products (CBG, 2010). This organization finds itself in the process of adopting a telework program and requires scientific research into the effects this program has and will have on the organization.

This chapter introduced this thesis by describing the topic, defining the goals of the research and the research question that this study aims to answer, indicating the contribution to theory and practice and by describing the research design. The second chapter will describe the review of existing literature on a broad range of teleworking topics, also found in the second chapter are the hypotheses that will be tested and the conceptual model that is developed. The third chapter concerns the research methodology, describing the research design in more detail and defining the measurement constructs, followed by the results of the research in chapter four. Finally, chapter five concludes this study by discussing the findings, implications and limitations of current research and possible directions for future research.

## Chapter 2 Literature review

In the following chapter an overview of existing literature concerning the research topic will be given, after each section the expectations based on the literature are translated into hypotheses. The first section contains the literature review on the factors that are in a direct relation to the performance dimensions, i.e. media usage, trust and relations. The second section contains the literature review on knowledge sharing and will describe how the knowledge sharing typology for this thesis is developed, after which the literature on telework frequency will be discussed. The final section will depict the conceptual model for this research.

### 2.1 Media usage

Media usage refers to the distribution of way´s members of an organization have contact with other members of the organization. Recent technologies such as cellular phones, wireless networks, portable computers, social networks, and collaborative tools provide teleworkers with an aptitude of possibilities to work from remote locations while keeping in contact with the organization. Collaborative technologies such as e-mail, videoconferencing and virtual project space allow group members to more easily share files, information and ideas (Bélanger & Allport, 2008). “The use of electronic technology to communicate has been frequently suggested as a critical factor for successfully working from a distance” (Golden & Raghuram, 2010, pg. 1068). The use of a variety of (new) media allows for “a reduction in errors and delays in transmission, improvements in work quantity and quality, increased awareness and diversity of relevant information and colleagues and improvements in one´s ability to distribute and obtain information.” (Rice, 1992, pg. 480). The potential impacts are influencing spatial and temporal factors of work such as the possibilities to work on different times and locations (Markus, 1994).

In order to define and measure media usage three dimensions are integrated into the definition and measurement of this construct. The first two dimensions come from media richness theory and assess the synchronicity of communications media and its ability to convey para-verbal and nonverbal cues. Daft & Lengel (1986) suggest that phenomena characterized by high levels of task complexity and interdependence requires the use of media with high levels of richness. The third dimensions is the distribution of total communication over the different types of media available.

#### Media richness theory

According to the Media Richness Theory communication media can be classified along a continuum of richness. Media richness is defined as a medium´s capacity to process information (Lengel & Daft, 1986, pg. 7), a rich medium is capable of processing rich information and a lean medium is not. The placement along this continuum is based on 4 criteria; (1) the medium´s capacity for immediate feedback, (2) the

ability to convey multiple information cues simultaneously, (3) the personalization of messages, and (4) the language variety (Daft & Lengel, 1986).

The basic proposition of the Media Richness Theory is that oral media (e.g. face-to-face and telephone) is richer than written media (e.g. documents and reports). And that synchronous media (those that facilitate immediate feedback such as the telephone) is richer than asynchronous media (those that interpose delays between the origination of a communication and its completion, like email) (Markus, 1994). Rich media facilitate equivocality reduction by enabling managers to overcome different frames of reference and by providing the capacity to process complex, subjective messages. Media of low richness process fewer cues and restrict feedback, and are less appropriate for resolving equivocal issues. However, an important point is that media of low richness are effective for processing well understood messages and standard data (Daft & Lengel, 1986).

**Face-to-face** is considered the richest medium because it has the capacity for immediate feedback, carries multiple cues and uses natural language. The **telephone** medium is less rich than face-to-face communication, the feedback capability is fast but visual cues are not available. Individuals have to rely on language content and audio cues to reach understanding (Lengel & Daft, 1984). **Email** is ranked low on the richness continuum due to its written and asynchronous nature (Markus, 1994), but also the delay in feedback and leanness of cues results in this low richness. Email can be defined as an interactive communication medium that facilitates communication between individuals or groups of individuals in the form of a note or document (El-Shinnawy & Markus, 1997). “It is an asynchronous computer mediated messaging systems that uses computer text processing and communication tools to provide a high-speed information exchange service” (Sproull & Kiesler, 1986, pg. 1493). These traditional communication media are often discussed in relation to media richness, currently a number of new communication media are used in organization settings that have yet to receive as much attention. Firstly, **videoconferencing**, i.e. using a set of telecommunication technologies which allow two or more locations to interact via two-way video and audio transmissions simultaneously, is a communication medium which is not often placed in the richness continuum. Compared to face-to-face meeting environments, the feeling of contact or social presence is lessened and communication is likely to be described as less friendly, impersonal, business-like and task oriented, also the flow of information exchange between participants is often slower than in traditional meetings (Campbell, 2006). Compared to telephone and email however videoconference is a relatively rich multichannel environment that supports both verbal and nonverbal communication and allows for immediate feedback (Valacich, 1993). **Chat and instant messaging** is the textual equivalent of videoconferencing and allows for two or more individuals to exchange written communication messages. This medium lacks the richness of face-to-face conversations and videoconferencing because eye contact

and other non-verbal feedback is missing, but users of instant messaging media often resort to typing emoticons and extraneous punctuations in an attempt to incorporate contextual affect information in the text communication (DiMicco, 2002). Compared to email the medium is richer due to the fact that feedback is more immediate and the aforementioned use of emoticons and extraneous punctuations. **Social media** applications enable individuals to connect by creating personal information profiles, inviting friends and colleagues to have access to those profiles and sending messages between each other. These personal profiles can include any type of information, including photos, video, audio files, and blogs (Kaplan, 2010). **Virtual project spaces** enable users to simultaneously and jointly create and maintain content, files and documents can be managed in shared databases, and task lists and calendars can be viewed. An examples of use in organizational context is the internal wiki used to update employees on project status. Kaplan (2010) reviewed the media richness and social presentation of social media applications, virtual project spaces and several other new types of media, see table 2.1 Concluding that application such as collaborative workspaces (e.g. Wikis) and blogs score lowest, as they are often text-based and hence only allow for a relative simple exchange of information. Social networking sites, which in addition to text-based communication also enable the sharing of pictures, videos and other forms of media, have a medium score for media richness.

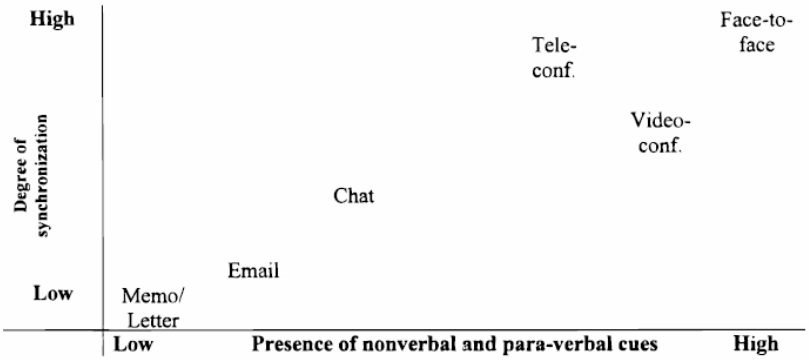
*Table 2.1 - Ranking of social media on media richness and self-presentation*

| | | Social presence/media richness | | |
|---|---|---|---|---|
| | | Low | Medium | High |
| Self-presentation/ Self-disclosure | High | Blogs | Social networking sites (e.g. Facebook) | Virtual social worlds (e.g. Second Life) |
| | Low | Collaborative projects (e.g. Wikipedia | Content communities (e.g. YouTube) | Virtual game worlds (e.g. World of Warcraft) |

Source: adapted from Kaplan (2010, p. 62)

A more complete overview of the placement of media in the media richness continuum is given by Baltes (2002). The paper finds that the dimensions degree of synchronization and the presence of verbal and non-verbal cues are consistently used in literature. For the development of figure 2.1 Baltes (2002) combined these dimensions, where it is noticeable that new media are placed relatively high in the media richness continuum. In general they state that a particular medium which is high on one or both of these dimensions has greater success in communication and decision making. The placement of the media in the figure is based on a meta-analysis of literature concerning this topic.

*Figure 2.1 - Media placed in media richness continuum*




*Adapted from de Jong (2008, p. 371)*

**New media richness**

New media communication channels such as video conferencing, social media and collaborative workspaces challenge the original theory as the criteria do not seem apt to sufficiently place these types of media in the media richness continuum. A number of additional criteria are proposed in literature to complement this theory. Sproull (1991) adds (1) multiple addressability (the ability to reach many people simultaneously), (2) externally recordable (provides the ability to document and modify communication flows), and (3) computer processable memory (this permits searches of messages electronically). Valacich (1993) adds a criteria similar but broader than multiple addressability called concurrency, which refers to the capacity of the media to support distinct communication episodes, without detracting from any episodes that may be occurring between the same or different individuals, basically stating that a media is able to allow more than one person to communicate at any given time. Empirical usage of these additional criteria for media richness determination is unknown. For this reason, in current research only the extensively discussed and tested dimensions of synchronization and presence of nonverbal and para-verbal cues are used. Please refer to chapter 3 for a more detailed discussion of the calculation of this construct.

### 2.1.1 Media usage influences productivity

As stated previously the use of new media with a richer character allows for a number of improvements in the overall performance of individuals in an organization. In the research on computer mediated communication by Hiltz & Johnson (1989) clear evidence was found that such communication methods allow for an increase in self-reported productivity. The use of richer media allows for an increase in both the quantity as in the quality of work performed, besides it becomes easier to reach people. But not only new media is tested positive regarding the effect on productivity, in the study on the effect of the richness of traditional media (face-to-face, telephone and e-mail) by Vickery et al. (2008) it is shown that richer media increase productivity. A combination of higher quality and quantity of information, faster

exchange of information and better reachability apparently contribute to an increased productivity. To test these expectations the following hypothesis is formulated:

*H1a: Higher media usage increases productivity*

**2.1.2 Media usage influences innovativeness**

Not only productivity gains with using more rich communication media, also innovation is found to benefit. Rowe & Struck (1999) found that the use of new media was more related to an orientation towards innovation, reactivity or entrepreneurship than the telephone, that study also showed that the use of email is not correlated to innovative behavior. Argumentation for these results are that adoption leaders, individuals with an orientation towards new and innovative technologies, are more apt to adopt and experiment with new media. Another explanation for higher innovativeness is provided by Lind and Zmud (1991, in Rice, 1992), who found that the use of information rich channels contributed to convergence between individuals in an organization, which led to an increase in innovativeness. Other possible contributors to innovativeness are fast problem solving (Von Hippel, 1994) and access to information, and increased organizational learning (Cohen & Levinthal, 1990), all aspects supported by the use of richer media. Based on these findings the expectation that individuals who use more rich communication media behave more innovative is developed. To test this expectation the following hypothesis is formulated:

*H2a: Higher media usage increases innovativeness*

**2.1.3 Media usage influences flexibility**

Possible teleworking drawbacks, that hinder the flexibility envisioned by teleworking programs, are feelings of social and professional isolation, becoming invisible at the workplace, missing out on information and receiving poor evaluations (Bailey & Kurland, 2002). The use of rich media by individuals teleworking can reduce the risks of these negative effects. Workman et al. (2003) state that rich media serves to reduce the feelings of solitude and the ambiguity created by electronic mediation surrounding tasks and interpersonal situations. Leaner media however serves to increase solitude and ambiguity surrounding tasks and interpersonal situations. Following this argumentation the expectation that individuals who use more rich communication media experience greater levels of flexibility is developed. To test this expectation the following hypothesis is formulated:

*H3a: Higher media usage increases flexibility*

**2.2 Trust**

Trust refers to an individual´s expectations, assumptions, or beliefs that the future actions of other members in the organization will follow a generally accepted set of values, norms and principles, and will

be beneficial, favourable, or at least not detrimental to one´s interests (Chiu, 2006; Golden & Raghuram, 2010). This is in line with the description of trust given by Mayer et al. (1995), who suggest that employees can be said to trust another party when they have optimistic expectations of that party, are willing to be vulnerable and take a risk that the other party will not fulfil those expectations, and cannot control or force the other party to fulfil those expectations. When trust is present individuals increase their cooperation and attribute positive characteristics to the other party. Trust can demonstrate itself in a variety of different relations, it can occur between different parties in an organizations and can be mutual or not. For this study trust is measured by assessing the trust individuals place in their direct colleagues and the management of their organization, and the perceived trust individuals receive from their manager. Trust is shown to have an effect on a variety of job performance behaviors such as risk taking, task performance, citizenship behavior and counterproductive behavior (Colquitt, 2007).

For teleworkers trust is crucial, since less frequent and more formal contact with supervisors and peers creates uncertainty regarding the intentions of other´s behavior (Raghuram et al. 2001). Also trust is suggested to replace traditional means of control to realize the benefits of virtual work (Handy, 1995). “Important for teleworking is that there is a climate and culture based on trust, instead of control” (Brewster et al, 2000, pg. 102).

### 2.2.1 Trust influences productivity

Argumentation for the direct effect of trust on productivity is relatively straightforward. Trust increases the ability of organizational members to work together, since work often requires that individuals work together, trust is expected to increase the productivity of those workers (Dirks, 1999). Trust also reduces the need for controls such as rules and monitoring, and increases the ability to confront performance problems, increasing the efficient use of individuals resources. Problem resolution is also reliable on trust in order to address issues effectively. Furthermore, trust promotes more efficient communication and coordination, allowing for more efficient use of the time and energy devoted to work activities (Larson & LaFasto, 1989).

Although many studies assume the relation between trust and productivity to exist (Prusak & Cohen, 2002; Tzafrir, 2007; Pirson & Malhorta, 2008) there is only little empirical evidence that supports the assumption that overall trust actually increases productivity. Klimosky & Karol (1976) show that in an experimental environment the manipulation of trust influences the performance of groups of students, resulting in a higher productivity when higher levels of trust are established. However the results of a number of other studies are contradicting (Dirks, 1999), which prohibits a positive confirmation of the effect of trust on performance.

A possible explanation for these contradicting results can be found in the actual distribution of trust. Wintrobe & Breton (1986) states that an increase in trust throughout the organization will not necessarily increase productivity, the effect is dependent upon the distribution of trust. Their assumption is that trust which is vertical (superior-subordinates) is an efficient type of trust which leads to an increase in productivity, while horizontal trust (subordinate-subordinate) is primarily inefficient. This assumption is partly supported by Simons (2002), who shows that higher levels of trust in the management of an organization is positively correlated with an increase in productivity and profitability.

As stated previously in this research trust is measured in three different ways, first, the trust an individual has in the management of the organization is measured, which is an example of vertical trust. Second, the trust an individual has in his or her own colleagues is measured, which is horizontal trust. And third, the perceived trust an individual receives from his or her manager is measured, which is another example of vertical trust. Based on the theory on horizontal and vertical trust the expectation is that trust occurring in vertical relationships is a facilitator of increased productivity, while trust in horizontal relationships diminish productivity. To test these expectations the following hypotheses are formulated:

*H1b: Trust in management increases productivity*

*H1c: Trust in colleagues decreases productivity*

*H1d: Trust of manager increases productivity*

**2.2.2 Trust influences innovativeness**

Trust is also often regarded as a prerequisite for innovative performance in organizations, trust facilitates both risk taking by organizational members as well as collaboration between individuals or other parties. Larson & LaFasto (1989) explain how an increase in trust allows for risk taking by members of a group. "Trust can assure individuals that they will not be overly penalized for new ideas that fail or that they are free to try improvisations leading to competitive innovations in products, markets, methods, and technologies" (Ruppel & Harrington, 2000, pg. 319). When a lack of trust occurs there is the possibility of anxiety, self-doubt and wasted effort to protect oneself, diminishing an individual's commitment and failing efforts of innovation (Ring & van de Ven, 1989). Traditionally organizations try to minimize risks by imposing control mechanisms, such as contracts and monitoring. As stated before, teleworking requires a different approach where management is more focussed on output control. This is similar for innovation in an organizations, which requires creativity and freedom of actions instead of control. However, trust may go too far in taking a relationship and its continuation for granted, which generates rigidity and lack of innovation (Nooteboom, 2006). For this study the assumption is made that such events are more likely to occur in the relationship between colleagues, the so-called horizontal relationships. Colleagues at the horizontal level have higher levels of interaction, similar goals and work activities and have no formal

means of control over each other, allowing relationships to evolve into taken for granted. As managers have a certain degree of responsibility and control over the employees of an organization, and a divergent set of work activities and goals, the risk of too much trust is less likely.

The theory of horizontal and vertical relationships of Wintrobe & Breton (1986) and its effects on productivity is extended to the relation between trust and innovativeness. Higher levels of trust in relations of a vertical nature are considered efficient types of trust with a positive effect on innovative behavior, in current study this is the case for the trust an individual has in the management of the organizations and for the perceived trust he or she receives from his or her manager. However, the trust occurring in the horizontal relation between colleagues is considered an inefficient type of trust, and has a higher likeliness of rigidity, resulting in lower levels of innovativeness. To test these expectations the following hypotheses are formulated:

*H2b: Trust in management increases innovativeness*

*H2c: Trust in colleagues decreases innovativeness*

*H2d: Trust of manager increases innovativeness*

**2.2.3 Trust influences flexibility**

One of the main benefits for individuals participating in telework programs is an increased flexibility in choosing the location, time and manner of working. These temporal and locational flexibilities however can only be achieved when sufficient levels of trust are present. It is noted that when telework programs lack support in an organization these may be used infrequently (Hill et al. 2001).

Trust between colleagues allows for a greater sense of flexibility, individuals working at a location away from the office will have confidence in the correct execution of working activities and sound decision making. When an individual has to be worried about such things this would only decrease the sense of flexibility and impose feelings of stress and anxiety.

Employees may also be frightened that teleworking will negatively influence their career (Hill et al., 2001), such fears decrease the flexibility in choosing the location and time of performing work activities as working outside the office is seen as dangerous to the career. Therefore it is crucial that employees trust their management to be just and sound in their decision making. Furthermore, when individuals feel they receive trust from their managers it becomes easier to choose for a location outside the office and a time outside the regular working hours. All types of trust are expected to have a positive influence on flexibility, to test these expectations the following hypotheses are formulated:

*H3b: Trust in management increases flexibility*

*H3c: Trust in colleagues increases flexibility*

*H3d: Trust of manager increases flexibility*

### 2.3 Relations

Relations are an important part of any organization, both employees among each other as with their managers develop these relationships on a daily basis. The importance is clearly stressed in literature: "Strong relationships are the grease of an organization" (Prusak & Cohen, 2002, pg. 86). Relationships refers to the attachment and cohesion that an individual has with his or her co-workers, which stems from the extent to which one knows, likes, and feels similar to them (Golden & Raghuram, 2010). In literature other terms are used for the indication of relationships between individuals in an organizations; social capital (Tsai & Goshal 1998) includes relationship within and beyond the organization; interpersonal bond or common bond (Sassenberg, 2002) also indicate the strength of the relationships of individuals in a group or organization. There are numerous results from having good relations within and beyond the organization, for example improved value creation, smoother deals, more productive teams, faster learning and more creativity. In the following section the effect of relations on productivity, innovativeness and flexibility are discussed in detail.

#### 2.3.1 Relations influence productivity

The interpersonal relations influence organizational commitment and job performance. As Liden et al. (2000) state "important in determining levels of commitment to the organization are the support and guidance that one receives from relationships formed with the immediate superior and co-workers". Karen & Pradhan (1997) provide empirical support that group processes related to positive interpersonal relations improve group performance. When the interpersonal relations of individuals belonging to an organizational or group are not optimal this might result in process loss, the members´ resources are combined in the group in a less than optimal way (Guzzo & Shea, 1992). Such process loss is the extent to which group performance is inhibited by misunderstandings, miscommunication, and dislike among group members, resulting in wasted energy and decreased productivity stemming from interpersonal difficulties (Karen & Pradhan, 1997).

For this study the relations between an individual and his or her colleagues, and the relation between an individual and his or her manager is measured. It is expected that both relations result in higher productivity when individuals perceive them to be good rather than bad. To test these expectations the following hypotheses are formulated:

*H1e: A better relation with colleagues improves productivity*

*H1f: A better relation with manager improves productivity*

### 2.3.2 Relations influence innovativeness

Good relations in an organization do not only facilitate increased productivity but also allow for greater innovation in organizations. Tsai & Goshal (1998) show that social capital, which includes relations within and beyond the organizations, is positively associated with value creation and innovation. Social interactions "allow innovators to go across formal lines and levels in the organization to find what they need" (Kanter, 1988, pg. 190). Wong (2004) also found that mutual respect and resource exchange contribute to innovation. The motivation for these findings is straightforward, an increase in social relations allows for greater resource exchange and combination, which is a source of innovative behavior.

For this study the relations between an individuals and his or her colleagues, and the relation between an individual and his or her manager is measured. It is expected that relations perceived as better result in higher innovativeness. To test these expectations the following hypotheses are formulated:

*H2e: A better relation with colleagues improves innovativeness*

*H2f: A better relation with manager improves innovativeness*

### 2.3.3 Relations influence flexibility

The actual flexibility employees in an organization experience is dependent on the relations they have with both their colleagues and their managers. Research has shown that managers in organizations can apply policies that are developed to improve flexibility inconsistently within organizations, discriminating between individual employees based on their relations (Eaton & Bailyn, 2000). "Managers often express ambivalence about whether to promote flexible policies, they worry about ´everyone´ wanting to schedule flexibility" (Eaton, 2003, pg. 9). Better relations with a manager therefore increase the likeliness that an employee actually feels the teleworking programs are available for use and thus flexibility is actually experienced.

Considering the effect good relations among colleagues has on the perceived flexibility is also important. In affective relationships individuals experience affinity and feel responsibility towards others, are apt to share experiences, are sensitive towards others needs and are willing to provide timely help when needed (Golden & Raghuram, 2010). These effects of relations allow individuals to feel more flexibility in their choice of work location and time. To test these expectations the following hypotheses are formulated:

*H3e: A better relation with colleagues improves flexibility*

*H3f: A better relation with manager improves flexibility*

### 2.4 knowledge sharing

In research toward knowledge within organizations numerous different typologies for knowledge sharing are used. The most important and researched typologies will be discussed in the following section, followed by a determination and description of the knowledge typology used in current research.

#### Tacit - explicit knowledge

The most common distinction is the tacit - explicit knowledge distinction made by Nonaka (1994), where tacit and explicit knowledge are the two types of knowledge which can be shared. The explicit knowledge refers to knowledge which can be codified and that is transmissible in formal and systematic language. Tacit knowledge on the other side is knowledge which is deeply rooted in action, commitment and involvement in a specific context which makes it hard to formalize and communicate. Van Baalen et al (2005) discuss the near tangible view on this distinction, in which tacit- and explicit knowledge can be converted, and the distributed view, in which it cannot. This is a taxonomy used in research often, for example by Osterloh & Frey (2000) in their research towards motivation, knowledge transfer and organizational forms, by Lindkvist (2005) in his research on Communities of Practice (CoP) and knowledge sharing within these CoP´s, and by Golden & Raghuram (2010) in their research on teleworker knowledge sharing.

An extension on the tacit - explicit knowledge typology is found in the distinction between the codifiability and non-codifiability of knowledge (Hansen, 2002). Firms using a codification strategy store their knowledge in a database, where it can be accessed and used by anyone, the personalization strategy deals with non-codified knowledge which is closely tied to the person who developed it and sharing is mainly through direct face-to-face contact (Hansen et al., 1999, pg. 1-2). Although codified and non-codified are not direct synonyms for explicit knowledge and respectively tacit knowledge, these terms are often coupled together. For example by Noorderhaven & Harzing (2008) who state that non-codifiable and tacit knowledge is not easy to transmit within a firm, and that codified and explicit knowledge can be transferred more easily.

#### Component – architectural knowledge

Matusik & Hill (1998) discuss the component and architectural knowledge taxonomy. Where component knowledge is the knowledge that relates to a subroutine or discrete aspect of an organization´s operations, it is knowledge that relates to “parts” or “components” rather than the whole (Matusik & Hill, 1998, pg. 684). In technology-oriented industries skills such as scientific, technical, engineering and design skills are considered component knowledge (Tallman et al. 2004) On the other hand, architectural knowledge relates to organizational routines and schemas for coordinating the various components of the organization and putting them to productive use (Henderson & Clark, 1990), it relates to an

understanding of a system of knowledge or organization, and is typically complex, intangible, tacit knowledge which is very path dependent (Tallman et al. 2004). The organizational and managerial processes that separate one firm in an industry from another are of the architectural type (Tallman et al. 2004). These two types of knowledge are strongly related to each other, the component knowledge is embedded in the architectural knowledge and the architectural knowledge can be used to enhance the component knowledge (Matusik & Hill, 1998).

**Conceptual – operational knowledge**

Another typology used to capture organizational knowledge sharing is the distinction between conceptual learning and operational learning (Lapré & Wassenhove 2003). Conceptual learning is the process of acquiring a better understanding of cause-and-effect relationships. The more one uses science and statistical experimentation and the more detail of the theory developed is incorporated in the final design; the higher is the level of conceptual learning. Operational learning is the process of obtaining validation of action-outcome links, if one modifies action variables and observes the experimental results. Thus, conceptual learning yields know-why and operational learning yields know-how.

Knowledge concerning know-why and know-how is also incorporated in the knowledge distinction introduced by Zack (1999), which contains declarative- (knowledge about terminology and facts), procedural- (know-how, knowledge about procedures, steps and methods), causal- (know-why, knowledge about causes and effect), conditional- (know when, knowledge about conditions and context), and relational knowledge (know-with, knowledge about relationships among concepts). These distinctions are useful for mapping and managing knowledge at the process level (Zack, 1999).

**Knowledge sharing typology in current research**

The suitability of these taxonomies of knowledge for current research is limited. They are often a bit abstract, especially the architectural knowledge has a high level of abstraction. Furthermore, the typology does not always apply to the individual level, for example the characteristics of architectural knowledge (knowledge about the whole) make it that it is not individual knowledge but collective knowledge. Third, the before discussed typologies of knowledge sharing do not fully comprehend the different types of knowledge that are exchanged within modern organization. For example socialization between members of the organisation, resulting in social knowledge, is not included in these descriptions. For these reasons, a new typology, based on previous examples and additional literature is developed for current research. This typology makes a clear distinction between three types of knowledge which are shared among individual members of an organisation and all have their own specific function in the workings of an organization. The three types of knowledge are social knowledge, domain knowledge and organizational knowledge; these will be explained in detail in the following section.

### 2.4.1 Social knowledge sharing

Social knowledge sharing refers to the interaction between individuals, their relationships and network, and the possibilities to engage new relationships and expand their network. Also shared values, traditions and habits are part of the social knowledge of an organization. Social knowledge is the product of a process called organizational socialization. Organizational socialization refers to the process by which an individual comes to appreciate the values, abilities and expected behavior essential for assuming and for participating as an organizational member (Louis, 1980, pp. 229-230). In this process of socialization members of an organization gain information and knowledge about the general culture of the organization and engage in role-related learning. During the interaction between members of an organization role-related abilities are identified, expectations are conveyed and incentives are clarified, all with the aim of enhancing motivation to perform. Also members need to gain an understanding of critical organization values in order to identify essential or pivotal role behaviors (Louis, 1980). Through socialization, organization's members do not only acquire knowledge about values, traditions and habits but they also develop relationships with other members and an understanding of formal and informal work relationship and power structures (Chao et al. 1994), this forms a network from which individuals can extract and put in knowledge. Social knowledge is continuously constructed through the interaction of organizational members.

Developing relations is also an important function of social knowledge, when individuals share personal information about unique individual attributes and participate in self-disclosure interpersonal bond rises (Yugin, 2011). Furthermore, by behaving trustworthy and disclosing personal and possibly sensitive information to others, people can encourage others to trust them. Knowledge is often shared between individuals through the telling of stories and other personal experiences, which provide vivid descriptions of prior observations, behaviors, and corresponding consequences (Nonaka, 1994). These stories are often shared between individuals on an impromptu basis, whereby individuals feel comfortable spontaneously disclosing personal experiences (Cross et al. 2001).Through such informal and impromptu encounters participants in the knowledge sharing process acquire not only insights in about the topic discussed but also knowledge about other topics they may have an interest in exploring in the future in order to uncover sought-after expertise or judgement (Golden & Raghuram, 2010). Besides influencing trust and relations, this type of knowledge also influences the sharing of domain specific knowledge. Taskin and Bridoux (2010) argue that in order to transfer technical knowledge (which is similar to domain specific knowledge) it is required that among others an organization's traditions, customs and stories are shared among its members. Based on the literature the expectations are that the sharing of social knowledge has a positive influence on the relationship between the independent variables trust and

relations and the dependent variables productivity, innovativeness and flexibility. To test these expectations the following hypotheses are formulated:

*H4a,b,c: The relation between trust in colleagues and (a) productivity, (b) innovativeness, (c) flexibility is moderated by social knowledge sharing.*
*H5a,b,c: The relation between trust in management and (a) productivity, (b) innovativeness, (c) flexibility is moderated by social knowledge sharing.*
*H6a,b,c: The relation between trust of manager and (a) productivity, (b) innovativeness, (c) flexibility is moderated by social knowledge sharing.*
*H7a,b,c: The relation between relation with colleagues and (a) productivity, (b) innovativeness, (c) flexibility is moderated by social knowledge sharing.*
*H8a,b,c: The relation between relation with manager and (a) productivity, (b) innovativeness, (c) flexibility is moderated by social knowledge sharing.*

### 2.4.2 Domain knowledge sharing

Domain knowledge sharing refers to the transfer of knowledge specific to a certain professional domain concerning its definitions, concepts, and rules. Also the interactions and relationships within this domain are part of domain knowledge. Alexandra & Judy (1988) define domain specific knowledge as the declarative, procedural or conditional knowledge one possesses relative to a particular field or study (pg. 376). Using this definition for domain specific knowledge causes the knowledge typology discussed by Zack (1999), see chapter 2.4, to be largely incorporated in this knowledge type. Declarative knowledge refers to factual information concerning phenomena, definitions, laws, and rules. (knowing what). Procedural knowledge is the compilation of declarative knowledge into functional units that incorporate domain specific strategies (knowing how), in other words it is the knowledge of certain actions one must perform in order to recognize connections between phenomena, definitions, laws, and rules. Conditional knowledge entails the understanding of when and where to access certain facts or employ particular procedures. Individuals never possess the exact same domain specific knowledge, even though they may have followed the same learning path. This is due to aspects such as completeness, structure, availability and correctness. Domain knowledge has an important influence on learning and problem-solving. When more knowledge is available, which is highly organized and has little misconceptions, there is an increasingly efficient learning and problem-solving process (Chi et al., 1981).

This domain knowledge is strongly task related, in literature such task related knowledge is often called technical knowledge. Besides being an important type of knowledge in learning and problem solving it is also knowledge necessary to perform the job (Taskin & Bridoux, 2010). Domain knowledge includes

professional expertise, skills, knowledge of customers (Taskin & Bridoux, 2010), best practices (Szulanski, 1996), and intellectual capital (Nahapiet & Goshal, 1998). "Task related knowledge may be tacit or explicit. Explicit knowledge is objective and rational and can be expressed as data, scientific models, specific actions and manuals. Tacit knowledge, such as mental models and crafts is subjective, experimental and hard to formalize" (Taskin & Bridoux, 2010, pg. 2505).

The exchange of specific knowledge between individual members of an organization is influenced by the presence of other types of knowledge. As stated before Taskin & Birdoux state that the presence of social knowledge is a facilitator for the sharing of domain specific knowledge. Furthermore, Carlile (2004) distinguishes between common knowledge and domain knowledge in his paper on managing knowledge across boundaries. Common knowledge is knowledge actors use to share and assess each other´s domain knowledge. This common knowledge is also known as mutual knowledge which is a shared body of knowledge that allows for communication between actors. In dispersed and computer-mediated conditions challenges for communication and collaboration arise due to the absence of mutual knowledge (Cramton, 2001), these conditions are clearly also present in any teleworking environment. Without mutual knowledge, people may speak and understand what is said on the basis of their own information and interpretation of the situation, falsely assuming that the other speaks and understands on the basis of that same information and interpretation (Blakar, 1985). Social knowledge, which is discussed in the previous section, and organizational knowledge, which is discussed in the following section, are both important contributors to this mutual knowledge, and therefore play an important role in the exchange of domain knowledge.

The effect of domain knowledge sharing on trust and relations is similar to the effect of social knowledge. The transfer of this type of knowledge builds feelings of trust, as the information can be valuable for competitive position within and beyond the organization (Taskin & Birdoux, 2010). Similar to the positive effect that the disclosure of personal information has on trust, the disclosure of such information improves the mutual trust between individuals. Karen & Pradhan (1997) discuss the effect of collective information sharing, which includes disclosing factual, task-relevant information to other group members, talking about the task, expressing feelings and ideas, and freely exchanging task-related thoughts are examples of information sharing. In their study this information sharing is a moderating factor between interpersonal relationships and task performance. Based on this the expectation is that an increase in domain knowledge sharing positively moderates the relation between the independent variables trust and relation and the dependent variables productivity, innovativeness and flexibility. To test these expectations the following hypotheses are formulated:

*H9a,b,c: The relation between trust in colleagues and (a) productivity, (b) innovativeness, (c) flexibility is moderated by domain knowledge sharing.*
*H10a,b,c: The relation between trust in management and (a) productivity, (b) innovativeness, (c) flexibility is moderated by domain knowledge sharing.*
*H11a,b,c: The relation between trust of manager and (a) productivity, (b) innovativeness, (c) flexibility is moderated by domain knowledge sharing.*
*H12a,b,c: The relation between relation with colleagues and (a) productivity, (b) innovativeness, (c) flexibility is moderated by domain knowledge sharing.*
*H13a,b,c: The relation between relation with manager and (a) productivity, (b) innovativeness, (c) flexibility is moderated by domain knowledge sharing.*

### 2.4.3 Organisational knowledge sharing

Organisational knowledge sharing refers to the transfer of knowledge about more general organizational aspects such as the mission and vision, the strategy, and the goals of an organization. Alexandra & Judy (1988, pg. 376) indicate strategies to be a special form of procedural knowledge that can exist in varying degrees of generality or separation from specific domains. Strategies are goal-directed procedures that are planfully or intentionally evoked either prior to, during, or after the performance of a task. As such, strategies aid in the regulation, execution, or evaluation of that task. In research on virtual teams it has been found that formalizing strategies is critical for team performance (Martins, 2004). The vision of an organization is an ideal that represents or reflects the shared values to which the organization should aspire; it is an ideal and unique image of the future (Kirkpatrick, 1998). It is important that members of an organization understand the vision and mission and the gap between the current situation and the vision and the mission to be able to act in line with the strategy. Well formalized and understood vision and mission statements may for example lead to an increase in creativity and innovation (Martins, 2003), and venture growth (Kirkpatrick, 1998).

The sharing of organizational knowledge also concerns communication about the goals of the organization. Accomplishing goal congruence by interaction between organization's members, where they disclose and define individual and team goals, exchange ideas and align both types of goals, positively influences cohesion, commitment, collaboration, and decision quality in virtual teams (Huang et al., 2002). Taskin & birdoux (2010) indicate that the sharing of organizational goals is a requirement for the transfer of domain specific knowledge. Also, the transfer of organizational knowledge is necessary to form common understandings among member concerning the organization's strategy and direction, the importance of common grounds is already discussed in the previous section.

Sharing of organizational knowledge is a fruitful source of both trust and relations. Whit the dissemination of information on organizational decisions and transparency in the decision making process feelings of fairness are created (Abrams et al., 2003). This does primarily influence the relations individuals have with managers but also ´trickle down´ to influence the relation among colleagues. Furthermore, the development of a shared vision and common goals increases trust within informal networks (Abrams et al., 2003). The reflection upon and adaption of objectives and strategies is theorized to benefit the maintenance of interpersonal relations (Wong, 2004). Based on these findings the expectations are that increased organizational knowledge sharing positively moderates the relation between the independent variables trust and relation and the dependent variables productivity, innovativeness and flexibility. To test these expectations the following hypotheses are formulated:

*H14a,b,c: The relation between trust in colleagues and (a) productivity, (b) innovativeness, (c) flexibility is moderated by organizational knowledge sharing.*
*H15a,b,c: The relation between trust in management and (a) productivity, (b) innovativeness, (c) flexibility is moderated by organizational knowledge sharing.*
*H16a,b,c: The relation between trust of manager and (a) productivity, (b) innovativeness, (c) flexibility is moderated by organizational knowledge sharing.*
*H17a,b,c: The relation between relation with colleagues and (a) productivity, (b) innovativeness, (c) flexibility is moderated by organizational knowledge sharing.*
*H18a,b,c: The relation between relation with manager and (a) productivity, (b) innovativeness, (c) flexibility is moderated by organizational knowledge sharing.*

**2.5 Telework frequency**

The frequency of telework indicates the amount of time which is spent teleworking. Teleworking frequency can range from less than one day per week (occasional teleworking), through more than one day per week (alternate teleworking), to full time (permanent teleworking) (Taskin & Bridoux, 2010). For those practicing telework there are several options regarding the location. Sometimes teleworking is defined as working at home but in most definitions the focus is on working outside of the office at a variety of alternative locations, which can also be alternate work sites (e.g. neighbourhood work centres), clients´ premises (mobile working) or while traveling (working on the move) (Taskin & Bridoux, 2010). The different location can influence the outcome of a teleworking program. For example homeworking will influence the work/life balance where mobile working probably won´t, also working in neighbourhood work centres will presumably cause less isolation issues then working at home. Walrave and De Bie (2005) showed that home-based teleworking has a stronger impact on the feeling of social isolation than working from a neighbourhood work centre.

In literature it is shown that the frequency of telework can have a significant influence on telework outcomes. Golden & Veiga (2005) for example show that relative low levels of telework, which is a greater portion of the time spent in the primary office, allow teleworkers to maintain important face-to-face work relationships, to minimize any feelings of isolation, and to begin to satisfy both individual and organizational needs that enhance job satisfaction. Whereas higher levels of telework have a negative influence on the job satisfaction (pg. 303). Taskin & bridoux (2010) discuss that workers who telework frequently need to develop new routines to interact with colleagues and managers, resulting in relations that may be perceived as more distant and laborious. Also, trust is likely to be negatively affected by a lack of face-to-face communications. The expectations therefore are that higher levels of teleworking frequency have a negative influence on the relations between the independent variables trust and relations and the dependent variables productivity, innovativeness and flexibility.

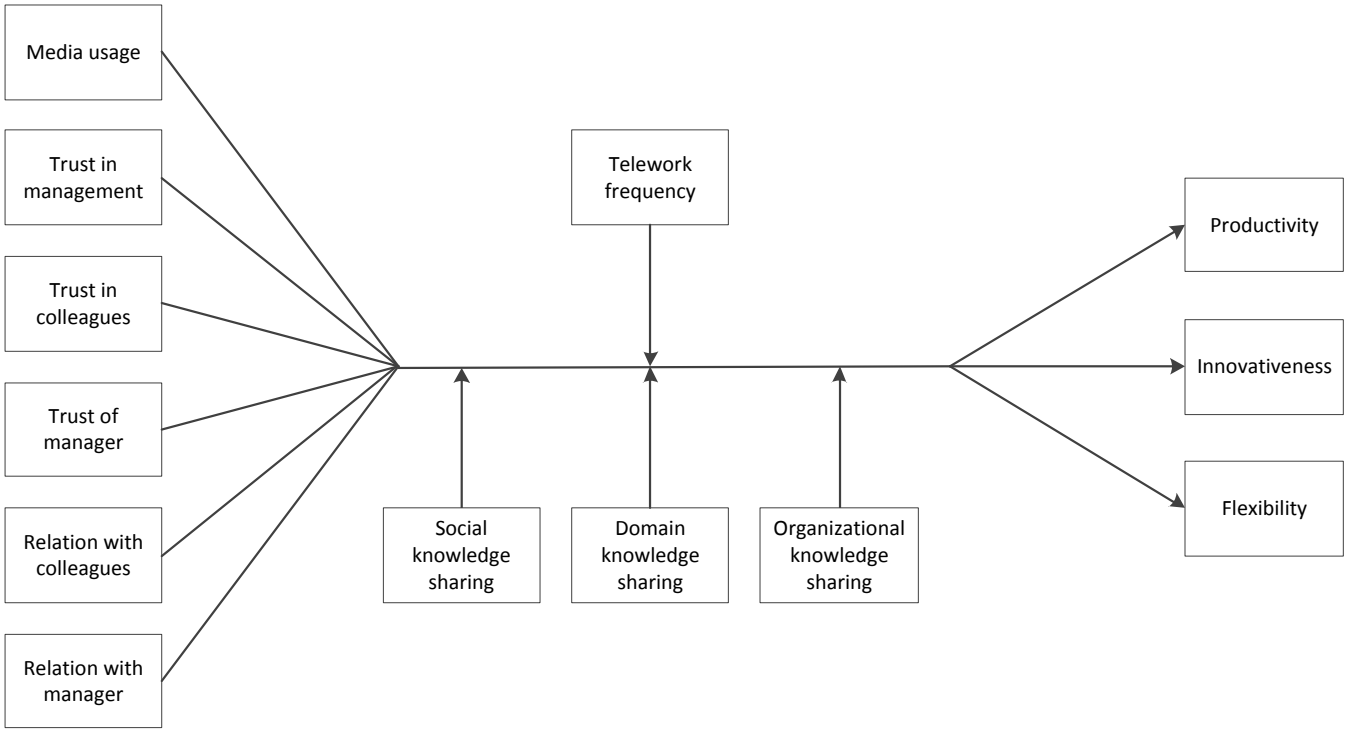
Concerning the effect the frequency of telework has on communication within the organization several studies have been conducted. Bélanger (1999) finds that employees who have a low frequency of telework are not left out of the office network and that telework does not determine which individuals communicate with each other. Duxbury and Neufeld (1999) found that telework programs can change the way teleworkers communicate, with decreasing use of face-to-face meetings and increasing use of the telephone and written memos. Also the frequency of which these teleworkers communicated with both their manager and colleagues decreased. In line with these results the expectations are that an increase in lean media will occur when telework frequency rises, resulting in a lower media usage value. To test these expectations the following hypotheses are formulated:

*H19a,b,c: The relation between media usage and (a) productivity, (b) innovativeness, (c) flexibility is moderated by telework frequency.*
*H20a,b,c: The relation between trust in colleagues and (a) productivity, (b) innovativeness, (c) flexibility is moderated by telework frequency.*
*H21a,b,c: The relation between trust in management and (a) productivity, (b) innovativeness, (c) flexibility is moderated by telework frequency.*
*H22a,b,c: The relation between trust of manager and (a) productivity, (b) innovativeness, (c) flexibility is moderated by telework frequency.*
*H23a,b,c: The relation between relation with colleagues and (a) productivity, (b) innovativeness, (c) flexibility is moderated by telework frequency.*
*H24a,b,c: The relation between relation with manager and (a) productivity, (b) innovativeness, (c) flexibility is moderated by telework frequency.*

## 2.6 Conceptual model

The conceptual model which represents the hypotheses and relationships as discussed in this chapter is depicted in figure 2.2. The following chapter will address how this model will be tested.

*Figure 2.2 - Conceptual model*



## Chapter 3 Research methodolgy

This chapter will describe the research methodology used in this thesis. First, the case this thesis is based on will be described and the unit of analysis will be specified. Second, the determined method of data collection will be discussed. Followed by the measurement instruments, including variable development and tests of construct validity and reliability using factor analysis and reliability tests.

### 3.1 Unit of analysis

The unit of analysis identifies the entity that is being studied, for example individuals, groups or organizations. The research of this thesis focuses on the individual level of telework, therefore the unit of analysis must be individual employees of an organization. In this research it primarily concerns members of the organization CBG, furthermore a number of individuals who are joining CBG in the short future but are currently still working for the RIVM are included in the research. The central issue at the organization is evaluating and monitoring the efficacy, risks and quality of human and veterinary medicine products. All employees of CBG are included in the research, because they belong to only one single organization this research is limited in generalizability.

Currently the organization has five separate locations in the Netherlands, in the end of 2011 they will move to one central location in Utrecht. This location will become the meeting location for all employees working at the five current locations. Simultaneously with this move a telework program is introduced, allowing all employees to work independently from time and place. This independence is expected to increase the flexibility employees have and to improve the work-life balance they experience. Furthermore, management will focus more on output performance, both qualitative and quantitative, than on hours worked by employees. It is expected that this telework program will lead to a higher productivity and efficiency (Annual report CBG, 2010).

At the moment teleworking is not actively promoted but nevertheless grounded in the organization, working at home is considered normal. Individuals come to agreements with their managers concerning working outside the office. The work activities lend themselves for teleworking, often individuals take work home because of a deadline or such. When this results in working through the weekend to get things done this is compensated by some additional days-off during the following period. It is possible for employees to log in to their digital workspace, containing all necessary documents and software, from any computer. Together with the introduction of the telework program there will be an increase in facilities to support teleworking, IT facilities such as laptops and telephones will be more widely available. The approach taken by the RSM New World of Work research project is to perform measurements at three moments in time for each organization participating in the research. The first measurement occurs just before a new telework program is introduced. A second measurement to identify the effects of such a

program occurs approximately six months after the introduction, and a final measurement is taken again a year later, this helps eliminate possible honeymoon effects regarding the telework program. The survey on which this thesis is based was the first measurement.

### 3.2 Data collection

The data collection occurred through the use of an online survey, there are several reasons why this is the preferred data collection method for this thesis. First, this method is most suitable to meet the demands of the stakeholders. This thesis is part of a larger investigation into the effects of new ways of working at CBG. Also, it is part of RSM Erasmus University´s New Worlds of Work research project. For both CBG and the RSM it was important to provide fast and accurate results. Using an online survey allows for fast deployment once the survey is developed, and allows for real time updates regarding response, dropout and usage statistics.

Second, the user friendliness of the survey was an important consideration. As the total time to complete the survey is on average an half hour it is imperative that respondents experience the survey to be user-friendly. One feature that accomplished this is the functionality to close the survey at any stage and continue at a later moment. Another feature that improved user friendliness and also kept the completion time as low as possible is the use of filters in the online survey. This allowed for branching, which meant that certain questions were only asked if they were relevant to that particular respondent. The survey was conducted in Dutch, because all participants were Dutch speaking individuals.

Third, online survey tools have several features that improve the quality of the resulting data set. For example, it is possible to check for not (correctly) answered questions and to leave instruction for completion. Also the possibilities to recode or randomize questions minimizes the risk of anchored and adjusted responses, and increases actual reliability (Malhotra & Birks, 2010). In the survey used for this thesis several items were recoded. Randomization is not used because the survey is structured according to topics and randomizing it would cause inconvenience and confusion. Lastly, the possibility to automatically code and export the survey data into a format ready for statistical analysis reduces both time spend on data entry and eliminates errors made during data entry.

Prior to sending the survey to participants they received information from their manager about the importance of the survey and the request to respond to the invitation. An invitation e-mail was send to all participants with an introduction text and a personal link to the online survey. As the personal link allowed for individual back tracing of results, data confidentiality was assured in the introduction text also. The survey has been available for completion for four weeks, after two weeks a reminder is send to those that had not (fully) answered the questions in the survey. Although participation in the research

was voluntary, participants were made aware of the importance of their response by their managers. All these characteristics of the data collection method resulted in a high response rate and a low number of errors in the data set, please refer to chapter 4 for more information about the response rate and handling of data errors.

### 3.3 Measurement

This thesis is a part of the RSM New World of Work research project. From this research project a great deal of constructs and scales with a theoretical foundation and extensive testing is adopted for the research at CBG. Several new variables were introduced for the specific purpose of this thesis, these are the items developed for measuring knowledge sharing. For the productivity variable a number of additional items are added to test the cohesion with the existing items. The other existing questions that were adopted from previous RSM New World of Work research projects were not changed for this research. The majority of questions were measured using a 5-point likert scale which ranges from totally disagree to totally agree. For each variable a more detailed description of the measurement is given in this chapter.

#### 3.3.1 Pre-test

For this research a pre-test with a select group of eight CBG employees was carried out to test the fit with the organization. During this pre-test user friendliness characteristics were tested and the reliability of the multi-item variables was checked. A number of comments regarding question wording were given and taken into account in the development of the final survey. The various Likert-scale variables were tested for reliability but no constructs failed to meet the requirements.

#### 3.3.2 Measurement constructs

In the following section the measurement of the constructs and its relation to the theoretical model will be discussed. For each construct an overview of the questions or propositions is given and the source on which they are based. Refer to appendix A for a complete overview of the survey questions used for this thesis.

**Demographic and descriptive variables**

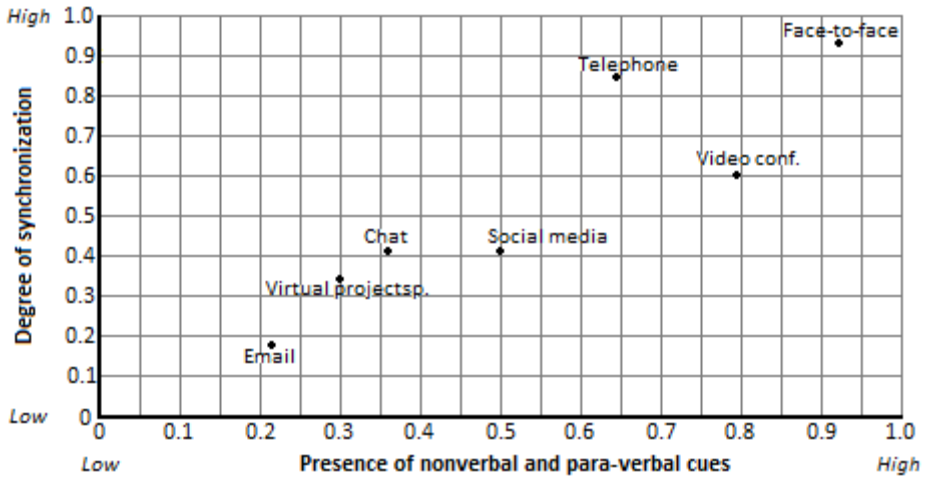
The demographic variables age, level of education, hours of employement and years of employement are placed at the end of the survey in a personal information section. Age, hours of employement and years of employement are ratio variables, asking the resondent to fill in the exact answer. Level of education is an ordinal variable, asking the respondent to tick the correct box. Gender information was already

available when the list of participants was deliverd by CBG, therefore this information was already coupled with the personal invitation code.

**Media Usage**

Media usage is a ratio variable wich is computed using several information sources. This method is inspired by Baltes et al (2002). The ways of contact respondents have with their colleagues and managers is measured by asking the respondent to divide his or her total contact over the available media, indicating a percentage for each and adding up to 100 percent. In this thesis eight types of media are distinguished; face-to-face, telephone, e-mail, chat/instant messaging, social media or networkapplications, videoconferencing, virtual projectspaces and the option “other”. With this information the media usage score can be calculated. First, the media richness theory is used to attribute a score to each of the media types, refer to appendix B for an overview of these scores. Each media has a certain level of synchronization and presence of non verbal and paraverbal cues, the product of these scores result in a certain media richness score (between 0 and 1). Not included in the original figure are the options virtual project space and social media. Based on the literature discussion in chapter 2 these two are placed in the figure 3.1 accordingly.

*Figure 3.1 Media placed in media richness continuum*




*Adapted from de Jong (2008, pg. 371)*

Virtual project space is placed above email and below chat. This media is richer than email due to its added functionalities such as calendar view and document categorization, it is leaner than chat and instant messaging because that media allows for the use of emoticons and extraneous punctuations as substitute for verbal and non-verbal cues. Social media is placed above chat due to its added richness from pictures, movies and such, the level of synchronization remains similar. Compared to telephone and videoconference both the degree of synchronization and presence of non-verbal and para-verbal cues is

far less. Second the percentage the respondent has attributed to each type of media is multiplied with this media´s richness score. Finally the total of the scores for both the media usage with colleagues and with managers gives the score for the variable media usage. Table 3.1 gives an example of this calculation.

*Table 3.1 - Media usage score calculation example*

| | Distribution of communication | | Richness score | | Media usage |
|---|---|---|---|---|---|
| Communication Medium | Colleagues | Manager | Colleagues | Manager | Total |
| Face-to-face | 55 | 40 | 46,55 | 33,86 | |
| Telephone | 10 | 10 | 5,31 | 5,31 | |
| Video conference | 0 | 0 | 0,00 | 0,00 | |
| Social media | 5 | 5 | 1,03 | 1,03 | |
| Chat | 0 | 0 | 0,00 | 0,00 | |
| Virtual project space | 0 | 0 | 0,00 | 0,00 | |
| Email | 30 | 45 | 1,25 | 1,88 | |
| Total | 100 | 100 | 54,14 | 42,07 | **96,22** |

**Relations with manager & with colleagues**

The measurement of the relations the respondents have with their manager and colleagues is based on the Dutch Questionnaire on the Experience and Evaluation of Work (VBBA), a self-administered survey instrument developed to evaluate the work situation of individual employees (Veldhoven, 1994). The original measure for both relations consists of nine propositions, due to constraints on the length of the survey used for this thesis this is reduced. The relation with ones manager is measured using four propositions; “I can rely on my manager when I am confronted with problems at work”, “I get along well with my manager”, “My manager is friendly towards me”, and “I have a good relationship with my manager”. The relation with ones colleagues is measured using the same four propositions, replacing “manager” by “colleagues”, and one additional reversed proposition is added, i.e. “I feel isolated from my colleagues (reversed)”. All propositions are measured using a 5-point scale, ranging from totally disagree to totally agree. The proposition are translated in Dutch for the survey.

**Trust in management & colleagues**

For this thesis trust in management and trust in colleagues refers to the employees´ perception of the level of their trust in management´s and colleagues´ competence to make effective decisions and their honesty. This measure is based on Cook & Wall (1980), whom developed a six-item scale for the measurement of interpersonal trust. The six items are reduced to four propositions for both trust in colleagues and trust in management in the survey used for this thesis. Propositions are “The management/my colleagues is/are sincere in its aim to accommodate the opinions of its employees”, “The management/my colleagues carrie(s) out its tasks efficiently, as far as I can assess”, “I trust that the

management/my colleagues take(s) sound decisions on the future of (the organisation)", and "I have every confidence that (the organisation)/my colleagues will always try to treat me justly". Trust in management and colleagues is measured using proposition with a 5-point scale ranging from totally disagree to totally agree. The proposition are translated in Dutch for the survey.

**Trust of manager**

Trust of manager refers to the believed trust one receives from his or her manager, te measure is developed by the RSM New World of Work research team and is based on Dietz & Den Hartog (2006). The propositions start with "As far as I can assess my manager…" and are completed in four different ways to finish the propositions, i.e. "… sees me as a dedicate employee", "… thinks I perform appropriately", "… regards me to be a reliable person", and "… has every confidence in me". The propositions are measured using a 5-point scale ranging from totally disagree to totally agree. The proposition are translated in Dutch for the survey.

**Domain-, Organizational-, and Social knowledge sharing**

The measures for knowledge sharing are newly developed for this thesis and are inspired by Krathwohl (2002) and Taskin & Birdoux (2010). Krathwohl (2002) developed a knowledge taxonomy in which factual, conceptual, procedural and cognitive knowledge are distinguished. In this thesis both factual and procedural knowledge are combined to form the measure for domain knowledge. Taskin & Bridoux (2010) distinguish between technical knowledge and organizational social knowledge, the technical knowledge is very similar to domain knowledge and the organizational knowledge is split in two separate measures for this thesis.

Domain knowledge sharing refers to the transfer of information specific to a certain proffesional domain concerning its definitions, concepts, and rules. Also the interactions and relationships within this domain are part of this type of knowledge. This variable is measured using two propositions with a 5-point scale ranging from totally agree to totally disagree; i.e. "I frequently share domain specific knowledge with colleagues or work-relationships, for example (new) rules, developments or methods", and "With colleagues or work-relationships I regularly discuss ways we can (best) apply newly acquired domain specific knowledge". The propositions are translated in Dutch for the survey.

Organizational knowledge sharing refers to the transfer of information about more general organizational aspects such as the mission and vision, the strategy, and the goals of an organization. This variable is measured using two propositions with a 5-point scale ranging from totally agree to totally disagree; i.e. "I often discuss with my colleagues developments that (the organization) is going through, and its potential

impact of its mission and vision", and "I regularly share knowledge about the goals of (the organization) and possible ways or strategies to achieve these goals". The propositions are translated in Dutch for the survey.

Social knowledge sharing refers to the interaction between individuals, their relationships and network, and the possibilities to engage new relationships and expand their network. Also shared values, traditions and habits are part of the social knowledge type. This variable is measured using four propositions with a 5-point scale ranging from totally agree to totally disagree; i.e." I often exchange information with colleagues about who is doing what, for example which assignments or tasks", "I regularly discuss (both during as outside working hours) informal, non-work-related topics with my colleagues, such as someone´s wellbeing or private activities", "When I talk about work with colleagues, we regularly use organization-specific jargon and/or organization-specific ´codes´", and "I often exchange (success)stories about work or colleagues with other colleagues ". The propositions are translated in Dutch for the survey.

**Telework frequenty**

This variable is based on the paper by Hartman et al. (1991), where two statements are used to measure the time spent telecommuting. The first statement measures the average number of hours worked per week, the second statement deals with time spent working at home. In current thesis the frequency of telework is determined using the information obtained from two similar questions. For the first question respondents are asked to indicate at which locations they perform their work activities. The possible locations are; "at the primary office", "at an external office or meeting point", "on the road (e.g. on the train, this excludes commuting time)", "at home". Over the four options, respondents have to divide 100 percent to proportion. These are more options than the orignial measure developed by Hartman (1991), but is in line with the construct developed by Golden & Viega (2005), called extent of telecommuting, where all work outside the office is respected as telework. For the second question resondents are asked to indicate their contractual number of work hours.

*Table 3.2 - Telework frequency calculation example*

| Location | | |
|---|---|---|
| At the primary office | | 45% |
| At an external office or meeting location | | 10% |
| On the road | | 5% |
| At home | | 40% |
| Contractual number of work hours | | 24,00 |
| **Telework frequency** | 24 * (10% + 5% + 40%) = | **13,20** |

By multiplying the number of contractual work hours with the percentage of time spent working outside the primary office (at an external office or meeting location, on the road and at home) the frequency of telework is calculated, which is in line with Golden & Viega (2005). An example of this calculation is given in table 3.2.

**Productivity**

Productivity reflects the degree of how productive an employee perceives him/herself to be. The measure consists of a total of 12 propositions which are based on several sources. Erasmus @ Work has developed this combination of propositions based on Staples et al. (1999) originally. Propositions extracted from that paper are: “I believe that I am an effective employee”, “I am satisfied with the quality of my working results”, “I work extremely efficiently”, and “I am an extremely productive employee”.

The other propositions are developed by Erasmus @ Work based on Ramirez & Nembhart (2004), these are: “I generally do much (or large amounts of) work”, “I make sure I meet the deadlines”, “I regularly put in overtime to finish my work (reversed)”, “In my work, I regularly have moments which I regard as 'lost' (reversed)”, “My working results generally meet all relevant requirements”, “I always do my work in the appropriate manner, also if this means that I would not meet certain requirements or deadlines”, “Customers (both external as well as internal departments or groups) are always very satisfied with the work I have done”, “The projects that I am involved in are always regarded as successful”. All propositions use a 5-point scale ranging from totally disagree to totally agree. The propositions are translated in Dutch for the survey.

**Innovativeness**

Innovativeness refers to the attitude towards innovation (e.g. adoption of innovation or ease of implementation (Baalen et al, 2009). The measure is an indication of the extent to which an employee feels he/she is creative and comes up with new ideas or solutions. This measure is developed by the RSM New World of Work research team and adapted from Ettlie and O´keefe (1982). The porpositions used are: “When a non-routine situation arises in my work, I am quite good at thinking up new ways of dealing with the situation”, “I try to use new ideas and approaches to problems”, “People can rely on me to find a new use for existing methods or existing equipment”, and “I am nearly always the first of my colleagues to try out a new idea or a new method”. All propositions are measured using a 5-point scale ranging from totally disagree to totally agree. The propositions are translated in Dutch for the survey.

**Flexibility**

Flexibility reflects the perceived flexibility in location, timing and execution of work. The measure for flexibility is based on Hill et al. (2001) but adapted by the RSM New World of Work research team. The original measure consists of questions concerning the degree of flexibility, in the survey used for this thesis the questions are changed into propositions with a 5-point scale ranging from totally disagree to totally agree, i.e. “I have much flexibility to determine where I work”, “I have much flexibility to determine when I work (e.g. hours or times of the day)”, and “I have much flexibility to determine what I do (e.g. the contents of the work or tasks to carry out)”. Also one additional propositions is added adressing the way in which work is carried out, i.e. “I have much flexibility to determine the way in which I carry out my work”. The propositions are translated in Dutch for the survey.

### 3.4 Construct validity & reliability

Before analysing the data it must be confirmed that the constructs are valid and reliable. Therefore a principal component factor analysis is conducted and the reliability figures of the constructs are examined. In the following sections first factor analysis and second the reliability analysis will be discussed.

#### 3.4.1 Factor analysis

Factor analysis is a statistical technique used to identify underlying variables, or factors, that explain a pattern of correlation within a set of observed variables. In this thesis confirmatory factor analysis is used to test whether the specified set of constructs is influencing responses in the predicted way (DeCoster, 1998). In the steps described below, based on Malhorta & Birks (2010), first the appropriateness of the method is examined, followed by the actual analysis of possible factors. This chapter concludes with the actual creation of factors representing different constructs. Factor analysis is conducted using SPSS Statistics 17.0.

The first step is to formulate the problem, which includes several tasks, i.e. formulate the objectives, specifie the variables to be included and determine wheter the factor analysis is allowed given the available data. In the previous section the variables are already discussed, as stated the objective is to confirm the conceptual model. There are a number of criteria that need to be met in order to establish the approriateness of factor analysis. First, an appropriate sample size must be used with at least four or five times as many observations as there are variables. This criteria is met as there are 13 variables and 248 respondents. Second, for factor analysis to be meaningfull the variables should be correlated. A Barlett´s test of Spherity shows there are in fact significant correlations among variables ($\chi^2$ = 6130.533, Df = 1176, P = .000), varifying this second criteria is met. Third, there needs to be significant inter-

correlation among variables, a Kasier-Meyer-Olkin (KMO) test of sampling adequacy results in a score of 0.825, exceeding the minimum of 0,5 and thus varifying that the third criteria is also met, that factor analysis is allowed and that the various items may be structured into factors.

The second step is to determine an appropriate factor analysing method. Principal component analysis is used as this determines the minimum of factors that will account for a maximum of variance in the data.

The third step is to determine the number of possible underlying constructs for the variables. This can either be done based on a priori knowledge, which is available and would result in a number of factors to be extracted set at 11. The variables media usage and telework frequency are excluded from factor analysis as these are not multi-item scales. Nevertheless the choice is made to let the statistical programm decide how many factors can be created based on eigenvalues. This approach retains only factors with eigenvalues greater than 1.0.

The fourth step is to analyse the results from the factor analysis. The resulting Rotated Component Matrix indicates the presence of 13 factors with a eigenvalue greater than 1.0, which is 2 factors more than anticipated. A closer investigation into the single factor loadings revealed a poor factor loading for several items from the productivity construct. These items are “I always do my work in the appropriate manner, also if this means that I would not meet certain requirements or deadlines” (0.112), and “I regularly put in overtime to finish my work (reversed)”(-0.157). “Customers (both external as well as internal departments or groups) are always very satisfied with the work I have done” (0.388), “The projects that I am involved in are always regarded as successful” (0.354), and “In my work, I regularly have moments which I regard as 'lost' (reversed)” (0.378). These items form two additional factors in the rotated component matrix. Therefore these five items are dropped from subsequent analysis, which means that the productivity construct consists of seven items, of which four come from the original measure developed by Staples (1999). An updated rotated component matrix indicates the presence of 12 factors with an eigen value greater than 1.0, which is still 1 factor more than anticipated. Analysis of the matrix reveals a poor factor loading for one of the social knowledge sharing items; “I often exchange information with colleagues about who is doing what, for example which assignments or tasks” (0.235). This items creates an additional factor together with another social knowledge sharing item; “I regularly discuss (both during as outside working hours) informal, non-work-related topics with my colleagues, such as someone´s wellbeing or private activities” (0.460). Because the second item has a strong loading on the other social knowledge items only the first item is dropped from subsequent analysis.

The second and final updated Rotated Component Matrix is in line with expectations, indicating the presence of 11 factors with a eigenvaule exceeding 1.0 and a total variance explanation of 70.360 percent. Please refer to appendix C for a complete overview of the results. Concerning the validity of the measures Segar and Grover (1993) state the following: Scales with good measurement properties should exhibit high factor loadings or "converge" on the latent factors of which they are indicators. Conversely, these same indicators should exhibit small loadings on factors that are measured by differing sets of indicators. Respectively, such results provide evidence of convergent and discriminant validity of scale items.

The Rotated Component Matrix shows that the items load cleanly to their respective constructs. A factor loading value of 0.50 and above is considered good and very significant; 0.45 as fair as 0.32 and below as poor (Comrey, 1973). All 43 items score well above 0.50 with only 3 items scoring lower than 0.60, 29 items even score above 0.70 which can be classified as excellent (Comrey, 1993). This indicates the presence of a good convergent validity, the items converge on the latent factors of which they are indicators.

Discriminant validity is also the case as only few items have a cross loading above 0.32. These items are no reason for concern and are discussed in the following section. First, two items score factor loadings on relation with colleagues, one is a relation with manager item which has a factor loading of 0.402, and the second is a trust in colleagues items which has a factor loading of 0.373. These loadings are not suprising as ones manager can be considered a colleague as well and relation with and trust in colleagues are related topics. Also, the items for the factor relation with colleagues show loadings between 0.644 and 0.830, indicating a clean break from the relation with manager and trust in colleagues items. Second, one items belonging to the trust in colleagues factor has factor loading of 0.414 on the trust in manager factor, again this is not very suprising and the factor loading of the items belonging to trust in managament ranging between 0.768 and 0.878 indicate a clean break from the trust in colleagues items. Finally the item belonging to social knowledge sharing “I often exchange information with colleagues about who is doing what, for example which assignments or tasks” shows a factor loading of 0.350 on domain knowledge sharing. The factor loadings of domain knowledge sharing are very high, i.e. 0.887 and 0.891, thus indicating a clean break from the social knowledge sharing item.

### 3.4.2 Reliability analysis

In addition to the factor analysis, which has shown that the construct have convergent and discriminant validity, a relaibility analysis is conducted to determine the internal reliability of each construct. The reliability of constructs is important to determine when multiple items are summated to form one

construct, internal reliability indicates that those items indeed measure the same underlying construct. The internal reliability is assessed using SPSS Statistics 17.0. By examining the Cronbach´s alpha, the item-rest correlation and alpha if item deleted for each construct an indication of this reliability is given, please refer to appendix D for an overview.

George and Mallery (2003) provide the following rules of thumb for the assessment of the Cronbach´s alpha: > 0.9 = Excellent, > 0.8 = Good, > 0.7 = Acceptable, > 0.6 = Questionable, > 0.5 = Poor, and < 0.5 Unacceptable. Alpha if item deleted values show wheter it is possible to increase the internal relability, which is especially important if the original Cronbach´s alpha is not sufficiently high. The item-total correlation is the correlation of the item designated with the summated score for all other items, a rule-of-thumb is that these values should be at least 0.40 (Gliem & Gliem, 2003).

The results show that only the Cronbach´s alpha of social knowledge sharing is questionable, i.e. 0.513. The other values range between 0.750 and 0.935 and are therefore sufficient. When reviewing the Cronbach´s alpha if item deleted values for social knowledge sharing it shows no improvements are possible, furthermore all three item-total correlations values are below the 0.4 treshold. Therefore the construct social knowledge sharing has to be removed from the theoretical model.

**Conclusion**

Factor analysis showed correct loading of items on the corresponding construct, indication the presence of convergent validity. Eventhough some cross loading items were found, these are explainable and the high values for the items belonging to the correct construct indicate clean breaks from the cross loading items. Therefore it can be stated that also discriminant validity is presence. The findings of the reliability analysis indicated that the reliability of social knowledge sharing is below permitted values without the possibility for improvement, resulting in the removal of this construct from the theoretical model. With these changes the data is ready for further analysis.

# Chapter 4 Data analysis

The research methodology for this thesis has been described in the previous chapter. This chapter will present the results of the data analysis. First the composition of the sample and individual outcomes of the constructs will be discussed. Second, the correlations of the constructs will be tested, followed by a regression analysis. After each regression analysis the hypotheses that are stated in chapter 2 will be tested.

## 4.1 Univariate analysis

To gain an initial understanding of the sample distribution the constructs examined in this thesis are analysed. The following section will discuss sample characteristics and an interpretation of the mean of the individual constructs is given, which might help to explain research findings.

### Sample description

The sample for this research containts 340 individuals, of which a total of 251 filled in the questionnaire. This is a response rate of 72.1%, which decreases nonrespondent bias to a great extend. After reviewing the data for errors and irregularities, such as giving nearly the same answer for each question or a very short fill in time, a total of 247 respondents remained. The respondents of this research were not equally divided between men (42%) and woman (58%). The age ranged from 23 to 77, with an average of 42 years old. Most respondents have a Bachelor (17,8%), Drs./MSc. (47,4%), or a PhD (21,1%) degree, wich indicates there is high level of education in the organization. The respondents are quite equally divided over the three departements; supportive staff (77), assessor (83), non-assessor (87). Most respondents have been working with the organization for three years or less (41%), 4-7 years (26%) or 8-11 years (16%) but there are seven respondents whom have been working there for over 25 years now. The respondents have an average hour employement of 32.7 hours, this ranges from 9 hours per week to 42 hours. Please refer to Appendix E for a more comprehensive overview of the demographic figures.

### Measurement construct means

For each construct its mean, minimum and maximum values and standard deviation is analysed, see table 4.1 for an overview of the figures. Furthermore, to assess possible difference between respondents caused by differentiating teleworking frequencies, the dataset is split into four groups based on the quartiles of the teleworking frequency variable. Please refer to Appendix F for the overview of these figures. In the following section a short description of the results of this analysis is given.

*Table 4.1 - Means, standard deviations, minimum/maximum values, and correlations*

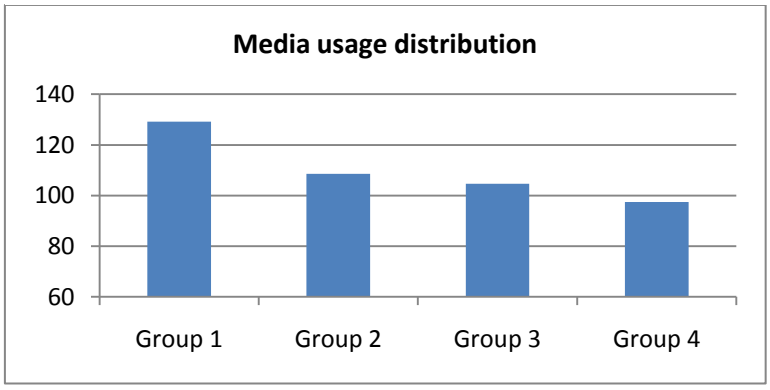
| Variable | Mean | SD | Min-max values | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Gender | | | | | | | | | | | | | | | | |
| 2. Age | 42.08 | 11.06 | 23 - 77 | -,270** | | | | | | | | | | | | |
| 3. Media usage | 110.14 | 31.54 | 37.86 - 175.74 | -.006 | -.093 | | | | | | | | | | | |
| 4. Trust in management | 3.20 | 0.66 | 1 - 5 | -,164** | .111 | -.079 | | | | | | | | | | |
| 5. Trust in colleagues | 3.64 | 0.52 | 2 - 5 | -.072 | -.081 | -.006 | ,424** | | | | | | | | | |
| 6. Trust of manager | 4.06 | 0.58 | 1 - 5 | -.093 | .120 | -.087 | ,209** | ,169** | | | | | | | | |
| 7. Relations with colleagues | 4.16 | 0.54 | 1.8 - 5 | -.012 | -.022 | .042 | ,177** | ,468** | ,306** | | | | | | | |
| 8. Relations with manager | 4.06 | 0.62 | 1 - 5 | -.108 | .099 | -.015 | ,300** | ,244** | ,554** | ,512** | | | | | | |
| 9. Telework frequency | 8.47 | 8.24 | 0 - 39 | -,145* | ,235** | -,303** | .085 | -.061 | .102 | -.088 | -.039 | | | | | |
| 10. Domain knowledge sharing | 3.89 | 0.77 | 1 - 5 | -.100 | .109 | -.007 | .073 | .115 | ,162* | ,174** | .119 | .069 | | | | |
| 11. Organizational knowledge sharing | 3.06 | 0.87 | 1 - 5 | -,197** | ,175** | -.089 | ,173** | ,138* | ,197** | .020 | .108 | ,194** | ,303** | | | |
| 12. Productivity | 3.87 | 0.44 | 2.57 - 5 | -,157* | -.005 | .033 | .039 | ,125* | ,311** | ,255** | ,138* | -.017 | ,165** | ,126* | | |
| 13. Innovativeness | 3.29 | 0.61 | 1.25 - 5 | -,223** | .084 | -,178** | ,217** | -.054 | ,239** | -.037 | .092 | ,261** | ,153* | ,352** | ,332** | |
| 14. Flexibility | 3.51 | 0.80 | 1 - 5 | -,140* | ,262** | -,199** | ,125* | .111 | ,269** | .101 | ,158* | ,407** | .055 | ,252** | ,205** | ,335** |

*Note:* * $p \leq 0{,}05$; ** $p \leq 0{,}01$; 2-tailed; *N*=247

**Independent variables**

- Media usage, which is a score for the richness of media used by respondents, has a mean of 110,14 and a standard deviation of 31.54. There is a broad range with a minimum score of 37.86 and a maximum score of 175.4. A steady decline in communication richness is observed when the teleworking frequency increases, see figure 4.1 for a depiction of this result.

*Figure 4.1 - Media usage distribution based on telework frequency quartile groups*




- Trust in management and the other independent variables are measures on a 5-point scale from strongly disagree to strongly agree. Trust in management has an average score of 3.20. This is an indication that trust in management in general is reasonable neutral.
- Trust in colleagues has an average score of 3.64, which is reasonably well compared to trust in management. Notable is the minimum score for this variable, i.e. 2.0. Which means none of the respondents are very negative about the trust they have in their colleagues.
- Trust of manager has an average score of 4.06, which is relatively high. Respondents feel they are trusted by their manager.
- Relation with colleagues is very good, with a minimum of 1.8 and an average score of 4.16 this variable has the highest score of all variables measured on a 5-point scale.
- Relation with manager is also very good. Scoring a 4.06 on average with a standard deviation of only 0.62. No notable differences are found in the different teleworking groups.

**Moderating variables**

- Domain knowledge sharing scores a 3.89 on a 5-point scale from totally disagree to totally agree, which is reasonable good. The lowest teleworking frequency group scores 3.75 and the highest group a 3.96, this is only a small difference.
- Organizational knowledge sharing scores substantially lower with a score of only 3.06, indicating respondents are very neutral about their sharing of organizational knowledge. The

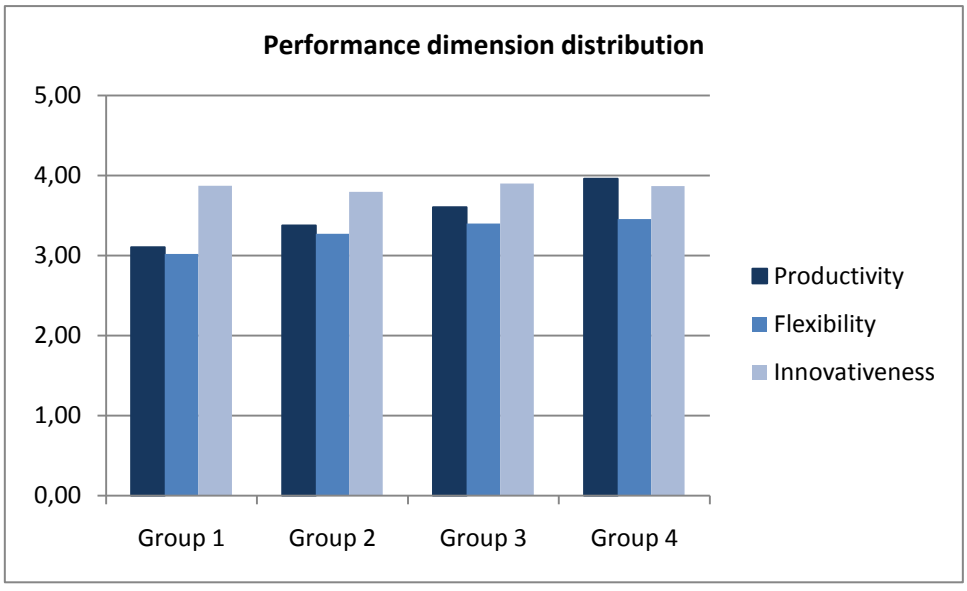
lowest telework frequency group has an even worse score of 2.72, indicating that individuals working at the office do not share organizational knowledge regularly.

- Telework frequency is a combination of contractual working hours and percentage of time spend working outside the office. An average score of 8.47 indicates that a little more than one day a week, based on a full time workweek, is spend working at home. The minimum is 0, which means there are respondents who do not telework at all, the maximum is 39. The lowest quartile has an average teleworking frequency of 30 minutes a week, the second 4.1 hours, the third 9.40 hours and the top quartile has an average of 20.71 hours.

**Dependent variables**

- Almost all respondents perceive themselves as being productive, as the minimum score for this variable is 2.75. The average of 3.87 is relatively high and the standard deviation of only 0.44 is very low. When reviewing the scores for the teleworking frequency groups, see figure 4.2, it is clear that the productivity steadily increases together with the teleworking frequency.
- The respondents perceive themselves a bit less innovative, the average score being a 3.29. The minimum score for this variable is slightly above the possible minimum score, 1.25 and 1.0 respectively. Innovativeness scores remain similar between different teleworking groups.
- Flexibility has a score of 3.51, indicating that the majority of respondents feel flexible in their work, however the standard deviation of 0.8 is quite high. The flexibility also clearly rises when teleworking frequency increases.

*Figure 4.2 - Performance dimension distribution based on telework frequency groups*



### 4.2 Correlation analysis

This thesis aims to investigate the effect knowledge sharing and telework frequency has on the relation between media usage, trust and relation and several performance dimension, i.e. productivity, innovativeness and flexibility. Table 4.1 provides an overview of the correlation figures of all variables, in the following section an evaluation of their correlations and the significance will be described.

**Direct relationships with productivity**

Trust of manager, relations with colleagues and domain knowledge sharing are positively correlated with productivity, all significant at the 1% level. Trust in colleagues, relation with manager and organizational knowledge sharing are also positively correlated with productivity but on a 5% significance level. The dummy variable for gender is negatively related to productivity, indicating that woman score lower on the dependent variable productivity. Both other dependent variables, i.e. innovativeness and flexibility, are also significantly and positively correlated with productivity.

**Direct relationships with innovativeness**

The results show that trust in management, trust of manager, telework frequency, domain knowledge sharing and organizational knowledge sharing are all positively correlated to innovativeness. Gender and media usage are both negatively correlated to innovativeness.

**Direct relationships with flexibility**

For flexibility the results show that age, trust in management, trust of manager, relation with manager, telework frequency and organizational knowledge sharing are all positively and significantly correlated to this dependent variable. Again gender is negatively correlated to flexibility, as is media usage.

**Independent variables**

The independent variables related to trust and relations are all positively and significantly correlated with each other, these correlations are expected and the height of the scores are no reason for concern. The independent variable media usage is not significantly correlated to either of those. The only independent variable with a significant correlation with a control variable is trust in management, which has a negative correlation with gender.

**Independent and moderating variables**

Results show that the independent variable telework frequency is significant and negatively correlated to media usage, also a negative and significant correlation with control variable gender is shown. A positive and significant correlation with the other control variable age is shown. Domain knowledge sharing positively correlates with the independent variables trust of manager and relation with colleagues. Organizational knowledge sharing positively and significantly correlates with the independent variables trust in management, trust in colleagues and trust of manager, this variables also positively correlates to the other two moderating variables; telework frequency and domain knowledge sharing. Finally, organizational knowledge sharing also correlates with the control variables; a significant and negative correlation occurs with gender and a significant and positive relation with age is shown.

### 4.3 Regression analysis & hypothesis testing

Multiple linear regression analysis was used to analyse how the dependent variables, i.e. productivity, innovativeness, and flexibility, are influenced by the independent and moderating variables as stated in the theoretical model. This method is used for two reasons: multiple linear regression analysis is suitable for establishing significant directional relationships, and multiple linear regression analysis is able to control for potential interdependencies by considering multiple variables simultaneously (Hair et al. 2006). Van Dalen (2009, pg. 471) states that “regression analysis is often an iterative process. Models are estimated, refined and re-estimated, until a more or less satisfying result is achieved”. An number of regression models, following the a priori knowledge developed in the previous chapters of this thesis, are tested for each of the dependent variables. Not only the direct effect of all independent variables is analyzed but also the two-way interactions of the moderators is included. After this a final regression model is developed and presented. The results of the analysis allows for testing of the hypotheses made previously.

For model validation tests for multicollinearity are conducted. Multicollinearity is a strong mutual dependence between variables in the model, whit a multicollinearity problem the separate contributions of the independent vararіables on the explanation of the model can not be determined accurately. In order to determine the presence of such a problem tolerance values and VIF values have been examined. Tolerance values less than 0,2 and VIF values higher than 5 cause invalid regression analyses (Van Dalen & De Leede, 2009). No regression models show values that cross these boundaries indicating that there are no multicollinearity problems present, please refer to appendix G for the tolerance and VIF values of every model.

Prior to performing the regression analysis all variables are standardised, without this it would not be possible to compare regression coefficients due to the different units in which the variables are measured (Van Dalen & De Leede, 2009). By calculating the z-scores for all variables (except for gender) the average becomes zero and the standard deviations become one. For the variable gender a dummy variable is introduced to evaluate the effect of gender. This variable Dummy gender has two possible outcomes; 0 is male and 1 is female. A significant negative influence can be attributed to men and a significant positive influence can be attributed to woman. A final comment before the regresion analysis will be described concerns the social knowledge sharing variable; as a result of the reliability analysis and factor analysis from the previous chapter this variable is excluded from further analysis.

### 4.3.1 Regression analysis productivity

The dependent variable productivity measures the degree of how productive an employee perceives him/herself to be. In the following section the hierarchical regression analysis will be described, based on the outcomes a final regression model is created and discussed. Second the hypotheses formulated for this dependent variables are tested to examine the direct effects of the independent variables on productivity. Third, the role of moderators is examined by graphically representing them and testing the corresponding hypotheses.

#### Hierarchical regression analysis

For the regression analysis with productivity being the dependent variable the complete theoretical model is tested in several steps, the hierarchical regression analysis creates models 1 to 4. A summary of the results of models 1 to 3 are displayed in table 4.2, please refer to appendix G for a detailed overview of all results.

In the first step the control variables age and gender are added in order to determined their influence on productivity. The model shows that in the first step age has no significant influence ($\beta$ = -.05, P = .44) but gender does ($\beta$ = -.16, P = .014).

In the second step the independent variables media usage, trust in management, trust in colleagues, trust of manager, relation with colleagues and relation with manager are added to the model. In this second model gender remains a significant variable influencing productivity ($\beta$ = -.16, P = .011). The model shows a positive significant influence for the variables trust of manager ($\beta$ = .33, P = .000) and relation with colleagues ($\beta$ = .26, P = .001). A negative and less significant influence stems from the variable relation with manager ($\beta$ = -0.18, P = .025).

In the third model the moderating variables telework frequency, domain knowledge sharing and organizational knowledge sharing are added. None of these variables have a significant influence

on the dependent variable productivity. The significant variables gender, trust of manager, relation with colleagues and relation with manager remain significant.

In the fourth model the interaction between the independent variables and the moderating variables are included. None of these interactions are significant on the 99% and 95% confidence interval but the interaction between trust in management and telework frequency is significant at the 90% confidence interval ($\beta$ = -.13, P = .093). Furthermore, the influence of relation with manager also decreases to the 90% interval ($\beta$ = -.16, P = .089) while the significance of gender, trust in manager and relation with colleagues remains intact.

*Table 4.2 Hierarchical regression analysis models with dependent variable Productivity*

| Variable | Model 1 | | Model 2 | | Model 3 | | Model 5 | |
|---|---|---|---|---|---|---|---|---|
| | Beta | T | Beta | T | Beta | T | Beta | T |
| *Control variables* | | | | | | | | |
| Dummy gender | **-0.16*** | **-2.47** | **-0.16*** | **-2.56** | **-.15*** | **-2.44** | **-.17**** | **-2.68** |
| Age | -0.05 | -.77 | -0.06 | -.90 | -.06 | -.97 | -.07 | -1.02 |
| *Independent variables* | | | | | | | | |
| Media usage | | | .03 | .55 | .02 | .37 | .02 | .36 |
| Trust in management | | | -.04 | -.53 | -.04 | -.52 | -.09 | -1.29 |
| Trust in colleagues | | | .00 | .00 | -.01 | -.17 | .00 | .01 |
| Trust of manager | | | **.33**** | **4.55** | **.32**** | **4.34** | **.33**** | **4.50** |
| Relations with colleagues | | | **.26**** | **3.34** | **.25*** | **3.21** | **.25**** | **3.18** |
| Relation with manager | | | **-.18*** | **-2.25** | **-.18*** | **-2.24** | **-.17*** | **-2.08** |
| *Moderators* | | | | | | | | |
| Telework frequency | | | | | -.05 | -.73 | -.02 | -24 |
| Domain knowledge sharing | | | | | .07 | 1.17 | .08 | 1.30 |
| Organizational knowledge sharing | | | | | .05 | .76 | .08 | 1.19 |
| *Two-way interactions* | | | | | | | | |
| TwFxTiM | | | | | | | **-.16*** | **-2.46** |
| OkSxToM | | | | | | | .11 | 1.90 |
| R Square | **.025*** | | **.169**** | | **.179**** | | **.211**** | |
| Adjusted R Square | **.017*** | | **.140**** | | **.140**** | | **.166**** | |

*Notes: 1;* Dependent variable: Productivity. *2;* * $p \leq 0{,}05$; ** $p \leq 0{,}01$; 2-tailed; *N*=247. *3;* TwF = Telework frequency, DkS = Domain knowledge sharing, OkS = Organizational knowledge sharing, TiM = Trust in management, ToM = Trust of manager, TiC = Trust in colleagues, RM = Relation with manager. RC = Relation with colleagues.

**Final regression model**

Based on the findings of regression models 1 - 4 an adjusted and final model for the dependent variable productivity is developed. This model is named model 5 and the results are displayed in table 4.2. This final model tests the variables influencing the dependent variable productivity:

*Productivity* = $\beta_0$ + $\beta_1$*Dummy gender* + $\beta_2$*Age* + $\beta_3$*Media usage* + $\beta_4$*Trust in management* + $\beta_5$*Trust in colleagues* + $\beta_6$*Trust of manager* + $\beta_7$*Relations with colleagues* + $\beta_8$*Relation with manager* + $\beta_9$*Telework frequency* + $\beta_{10}$*Domain knowledge sharing* + $\beta_{11}$*Organizational knowledge sharing* + $\beta_{12}$*Trust in management*Telework frequency* + $\beta_{13}$*Trust of manager*Organizational knowledge sharing* + $\varepsilon_i$

In model 5 the control variable gender has a significant effect on the dependent variable ($\beta$ =-.17 , P = .015). As in the previous models the independent variables trust of manager ($\beta$ =-.33 , P = .015), relation with colleagues ($\beta$ =-.26 , P = .015) and relation with manager ($\beta$ =-.18 , P = .015) have a significant influence on the dependent variable, of which the first two have a positive effect and the third has a negative effect. The moderating effects of trust in management x telework frequency and organizational knowledge sharing x trust of manager are added to the model based on the outcomes of the previous models. Trust in management x telework frequency has a significant negative influence ($\beta$ =-.16 , P = .015) on the dependent variable productivity. The second two-way interaction with organizational knowledge sharing x trust of manager has a positive influence ($\beta$ = .11, P = .058) but only on a 10% level.

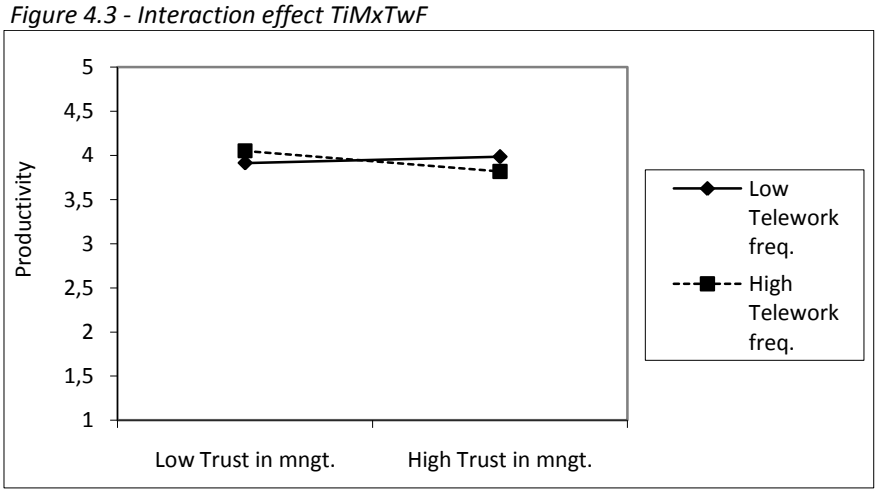
Multicollinearity is tested for the models 1 to 5, no signs of problems are detected. For the final regression model the lowest tolerance value is .532 and the highest VIF value is 1.878. The percentage of variance explained by model 5 is 21.1% and the model is significant.

**Hypothesis testing**

Although not hypothesized in this thesis it seems that gender has a significant influence on the perceived productivity, the interpretations of the dummy variable is that female employees feel less productive than male employees. The independent variables media usage, trust in management and trust in colleagues do not significantly influence the perceived productivity, therefore hypothesis H1a, H1b and H1c can be rejected. However, trust of manager constantly has a positive significant influence on the dependent variable, therefore hypothesis H1d is supported. This means that employees who perceive higher levels of trust from their manager also think they are more productive. Also, relation with colleagues has a significant and positive influence on the dependent variable, therefore hypothesis H1e is supported. Better relations with colleagues leads to an increased level of productivity. Finally the independent variable relation with manager, this variable has a negative, but less significant, influence on productivity. Indicating that in the case of a better relationship with ones managers this person feels less productive.

The moderating effects of telework percentage, domain knowledge sharing and organizational knowledge sharing are not as strong as expected. The only moderating effect supported by this regression model is trust in management x telework frequency, therefore of the hypothesis H4a - H24a only H21a is supported, the others are rejected. For the supported moderating effect there is a negative influence on the dependent variable productivity. This influence is depicted in figure 4.3. The figure shows that in the case of low telework frequency the effect of trust in management is minimal. In the case of high telework frequency however the effect is clearly visible, with a higher productivity when trust in management is low and a lower productivity when trust in management is high. A reason might be that teleworkers with a high trust in management do not feel motivated to work productively away from home because they suppose work will get done anyway, teleworkers with low trust in management might feel they have more responsibility to do the work themselves.

*Figure 4.3 - Interaction effect TiMxTwF*



### 4.3.2 Regression analysis innovativeness

Innovativeness refers to the attitude towards innovation, the dependent variable innovativeness is an indication of the extent to which an employee feels he/she is creative and comes up with new ideas or solutions. In the following section the hierarchical regression analysis will be described, based on the outcomes a final regression model is created and discussed. Second the hypotheses formulated for innovativeness are tested to examine the direct effects of the independent variables. Third, the role of moderators is examined by graphically representing them and testing the corresponding hypotheses.

**Hierarchical regression analysis**

For the regression analysis with innovativeness being the dependent variable the complete theoretical model is tested in several steps, the hierarchical regression analysis creates models 6 to 9. A summary of the results of models 6 to 8 are displayed in table 4.3, please refer to appendix G for a detailed overview of all results.

In the first step the control variables age and gender are added in order to determined their influence on the dependent variable. Gender has a significant effect on the innovativeness ($\beta$ = -.20, P = .003) while age does not have a significant effect.

In the second model the independent variables media usage, trust in management, trust in colleagues, trust of manager, relation with colleagues and relation with manager are added. The significant effect of gender remains intact. Furthermore, media usage ($\beta$ = -.15, P = .012) and trust in colleagues ($\beta$ = -.19, P = .012) have a negative significant effect on the dependent variable. Trust in management ($\beta$ = .24, P = .001) and trust of manager ($\beta$ = .24, P = .001) have a positive significant effect on innovativeness. Both variables related to relations do not have a significant effect.

In the third step the moderating variables telework frequency, domain knowledge sharing and organizational knowledge sharing are added to the model. Both telework frequency ($\beta$ = .13, P = .033) and organizational knowledge sharing ($\beta$ = .24, P = .000) have a positive significant effect on innovativeness. Domain knowledge sharing does not. Off the previously found significant variables media usage becomes significant only on the 10% level, gender becomes less significant ($\beta$ = -.13, P = .027) and the trust variables remain roughly the same.

The fourth model includes the moderation between the independent variables and the moderating variables. Three interaction effects are significant within the 95% confidence interval, i.e. trust in management x telework frequency ($\beta$ = -.18, P = .009), trust in management x domain knowledge sharing ($\beta$ = -.20, P = .003), and relation with manager x organizational knowledge sharing

($\beta$ = .22, P = .015). One interaction effect is significant only on the 10% level, i.e. trust in management x organizational knowledge sharing ($\beta$ = .12, P = .099). By introducing the moderators to the model the effect of media usage becomes even less significant ($\beta$ = -.09, P = .135), also the strength of all three trust variables decrease slightly. On the other hand the control variable age enters the 10% level ($\beta$ = -.12, P = .059) and telework frequency becomes more significant ($\beta$ = .18, P =.006).

*Table 4.3 Final regression model analysis with dependent variable Innovativeness*

| Variable | Model 6 | | Model 7 | | Model 8 | | Model 10 | |
|---|---|---|---|---|---|---|---|---|
| | Beta | T | Beta | T | Beta | T | Beta | T |
| *Control variables* | | | | | | | | |
| Dummy gender | **-.20**** | **-3.03** | **-.18**** | **-2.88** | **-.13*** | **-2.22** | **-.16**** | **-2.47** |
| Age | .03 | .49 | -.04 | -.63 | -.10 | -1.57 | -.10 | -1.79 |
| *Independent variables* | | | | | | | | |
| Media usage | | | **-.15*** | **-2.55** | -.10 | -1.71 | -.11 | -1.88 |
| Trust in management | | | **.24**** | **3.49** | **.22**** | **3.25** | **.15*** | **2.29** |
| Trust in colleagues | | | **-.19*** | **-2.53** | **-.21**** | **-2.95** | **-.17*** | **-2.58** |
| Trust of manager | | | **.24**** | **3.31** | **.18*** | **2.51** | **.20**** | **2.99** |
| Relations with colleagues | | | -.01 | -.13 | .00 | .07 | -.02 | -.25 |
| Relation with manager | | | -.09 | -1.11 | -.06 | -.81 | -.03 | -.38 |
| *Moderators* | | | | | | | | |
| Telework frequency | | | | | **.13*** | **2.14** | **.16**** | **2.62** |
| Domain knowledge sharing | | | | | .04 | .72 | .05 | .88 |
| Organizational knowledge sharing | | | | | **.24**** | **3.89** | **.22**** | **3.68** |
| *Two-way interactions* | | | | | | | | |
| TwFxTiM | | | | | | | **-.18**** | **-3.11** |
| DkSxTiM | | | | | | | **-.14*** | **-2.43** |
| OkSxTiM | | | | | | | **.14*** | **2.14** |
| OkSxRM | | | | | | | **.19**** | **3.26** |
| R Square | **.044**** | | **.175**** | | **.257**** | | **.363**** | |
| Adjusted R Square | **.036**** | | **.147**** | | **.222**** | | **.320**** | |

*Notes: 1;* Dependent variable: Innovativeness. *2;* * $p \leq 0{,}05$; ** $p \leq 0{,}01$; 2-tailed; *N*=247. *3;* TwF = Telework frequency, DkS = Domain knowledge sharing, OkS = Organizational knowledge sharing, TiM = Trust in management, ToM = Trust of manager, TiC = Trust in colleagues, RM = Relation with manager. RC = Relation with colleagues.

**Final regression model**

Based on the findings of the regression models 6 - 9 an adjusted and final model for the dependent variable innovativeness is developed. This model is named model 10 and the results are displayed in table 4.3. This final model tests the variables influencing the dependent variable innovativeness:

$$\textit{Innovativeness} = \beta_0 + \beta_1 \textit{Dummy gender} + \beta_2 \textit{Age} + \beta_3 \textit{Media usage} + \beta_4 \textit{Trust in management} + \beta_5 \textit{Trust in colleagues} + \beta_6 \textit{Trust of manager} + \beta_7 \textit{Relation with colleagues} + \beta_8 \textit{Relation with manager} + \beta_9 \textit{Telework frequency} + \beta_{10} \textit{Domain knowledge sharing} + \beta_{11} \textit{Organizational knowledge sharing} +$$

$\beta_{12}$*Trust in management*Telework frequency* + $\beta_{13}$*Trust in management*Domain knowledge sharing* + $\beta_{14}$*Trust in management*Organizational knowledge sharing* + $\beta_{15}$*Relation with manager*Organizational knowledge* sharing + $\varepsilon_i$

In model 10 the control variable gender has a significant effect on the innovativeness ($\beta$ = -.16, P = .003) while age does not. The independent variable trust in colleagues ($\beta$ = -.17, P = .012) has a significant negative effect on the dependent variable. Trust in management ($\beta$ = .15, P = .001) and trust of manager ($\beta$ = .20, P = .001) have a positive significant effect on innovativeness. The relation with colleagues and relation with manager variables do not have a significant effect on the dependent variable. The moderating effects that showed significance in the previous regression models are added to this model. The moderators with a significant negative effect on innovativeness are trust in management x telework frequency ($\beta$ = -.18, P = .002) and trust in management x domain knowledge sharing ($\beta$ = -.14, P = .016). The moderators with a significant positive effect on innovativeness are trust in management x organizational knowledge sharing ($\beta$ = .14, P = .034) and relation with manager x organizational knowledge sharing ($\beta$ = .19, P = .001).

Multicollinearity is tested for the models 6 to 10, no signs of problems are detected. For the final regression model the lowest tolerance value is .530 and the highest VIF value is 1.886. The percentage of variance explained by model 10 is 36.3% and the model is significant.

**Hypothesis testing**

The first finding concerns the control variable gender, which has a significant influence on the perceived innovativeness, the interpretations of the dummy variable is that female employees feel less innovative than male employees. Hypothesis H2a - H2f concern the influence of the independent variables on innovativeness, H2b, H2c, and H2d are supported and the others are rejected. The independent variables trust in management and trust of manager positively influence the perceived innovativeness. Indicating that higher mutual feelings of trust allow employees to behave more innovative. It might be that higher feelings of trust with management creates the opportunity to experiment and try new things. Trust in colleagues however shows a negative influence on innovativeness, maybe employees with a high trust in their colleagues feel they will do the innovation and do not feel the need to do that themselves.

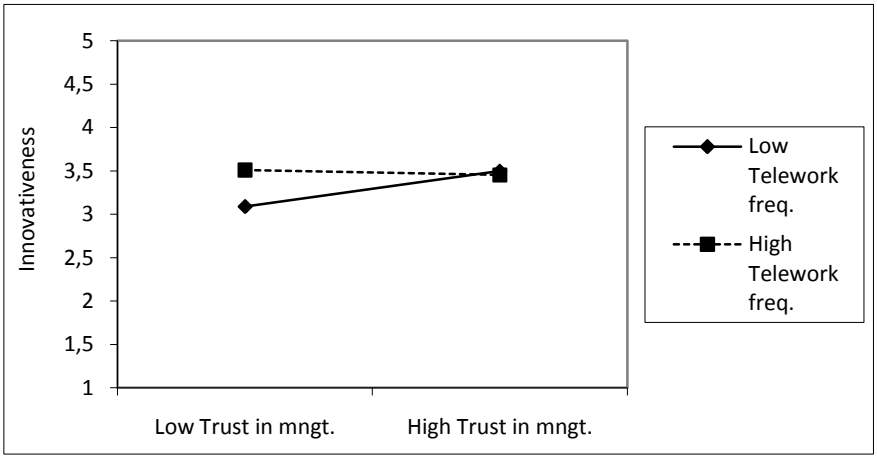
There is also a direct effect of the moderating variables telework frequency and organizational knowledge sharing on the dependent variable innovativeness, these are both positive. Indicating that

higher levels of telework frequency lead to a higher level of perceived innovativeness. One reason might be that teleworking itself is a new and innovative way of working, therefore creating this relation. Organizational knowledge sharing concerns the situation and development of the organization and its strategies, this type of knowledge is often shared when new strategies and goals are developed, therefore individuals whom share a lot of this knowledge can feel more innovative.

The moderating effects of telework percentage, domain knowledge sharing and organizational knowledge sharing on innovativeness are not as strong as expected. Only four moderating effects are supported by this regression model. These are trust in management x telework frequency, trust in management x domain knowledge sharing, trust in management x organizational knowledge sharing, and relation with manager x organizational knowledge sharing. Therefore only hypothesis H10b, H15b, H18b, and H21b are supported.

Figure 4.4 is a graphical representation of the moderating effect of telework frequency on the relation between trust in management and innovativeness. Similar to the interaction effect with productivity, a combination of low trust in management and high telework frequency cause a relatively high value for the dependent variable. However an increase in trust in management causes the innovativeness to decrease only slightly, the most obvious effect is the increase in innovativeness for employees with a low telework frequency.

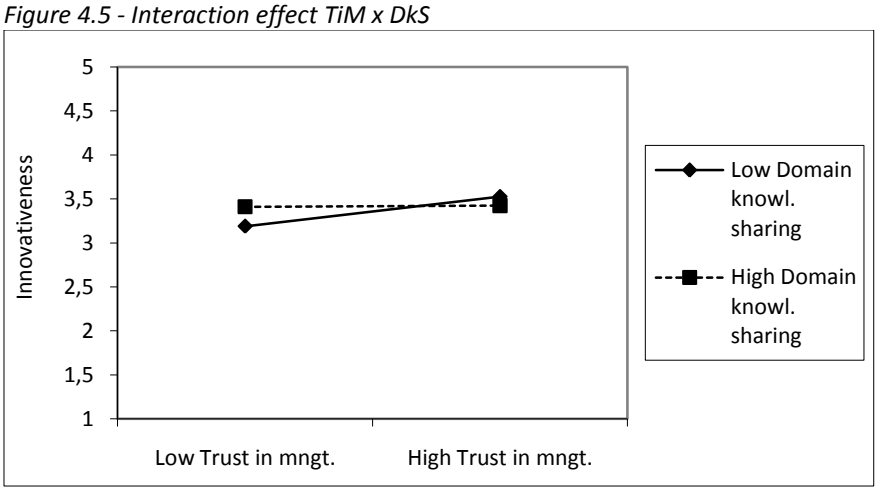
*Figure 4.4 - Interaction effect TiM x TwF*



As the regression model has shown, teleworking frequency and trust in management both positively influences innovativeness. Therefore an explanation for this effect might be that teleworking enables employees to be more innovative in general, but trust in management is a similar enabler for innovativeness when individuals do not telework.

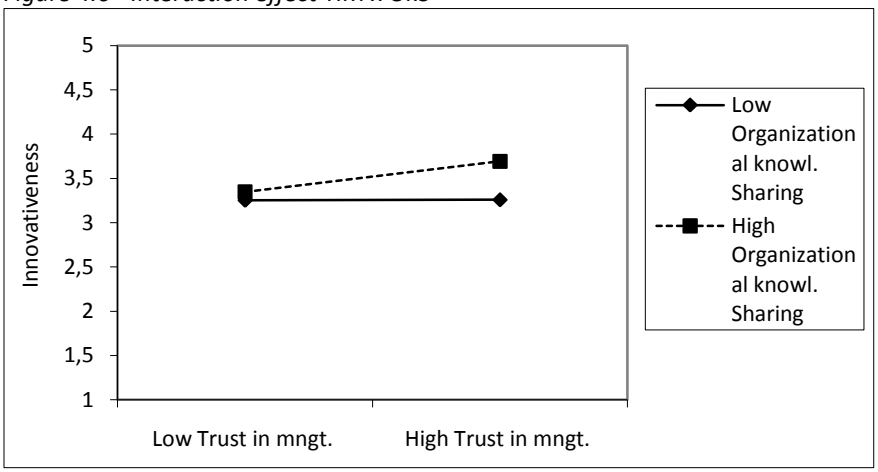
Figure 4.5 shows the interaction effect between trust in management and domain knowledge sharing. Low trust in management combined with low domain knowledge sharing caused the lowest innovativeness values. Again trust in management seems to be the enabler of innovative behavior, but only in the case of low domain knowledge sharing. This might be contributed to the nature of domain knowledge, which focuses on task specific concepts, rules and definitions. When individuals in an organization have a very similar understandings of this knowledge their work becomes more routine and according to standard patterns. Therefore not allowing for an increase in innovativeness when the trust in management rises.

*Figure 4.5 - Interaction effect TiM x DkS*



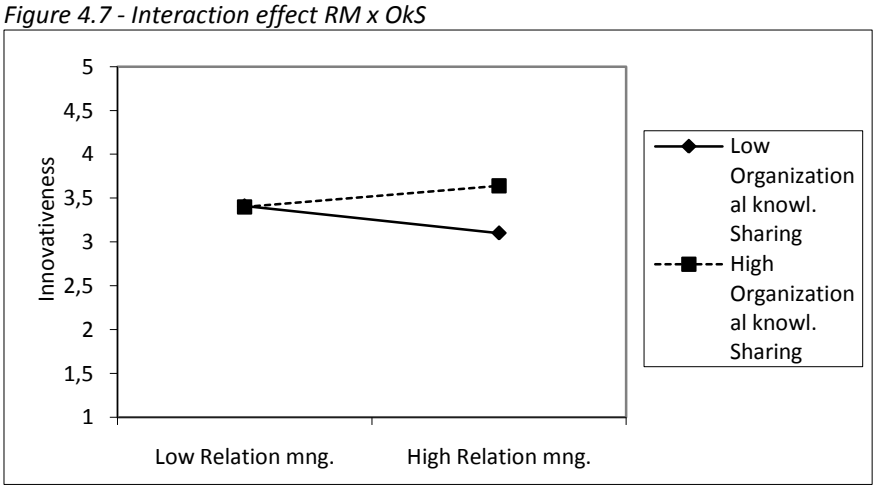

The third interaction effect shown by this regression model is depicted in figure 4.6, again trust in management is the independent variable and the relation with innovativeness is moderated by organizational knowledge sharing. The figure shows that a combination of low trust in management with both low and high organizational knowledge sharing result in almost identic values for innovativeness. However an increased trust in management only causes an increase in innovativeness when this is combined with a high level of organizational knowledge sharing. Again the nature of the type of knowledge contributes to an explanation of this effect. Organizational knowledge is often shared when new strategies and goals are developed, therefore individuals sharing a lot of this knowledge can feel more innovative as they are dealing with new developments.

*Figure 4.6 - Interaction effect TiM x OkS*




The fourth and final moderating relation in this model concerns the influence of organizational knowledge sharing on the relation between the relation with manager and the innovativeness, see figure 4.7. Again the starting point for both high and low values of organizational knowledge sharing is the same. However when the relationship with the manager is perceived as better, low organizational knowledge sharing causes lower innovativeness and more organizational knowledge sharing cause more innovativeness. It might be that individuals whom share little organization knowledge, but have a good relationship with their manager, do not feel the need to innovate because they are content with their work and are unaware of organizational change. Individuals who do share organizational knowledge and have a good relationship might see the need to innovate to meet new goals and execute new strategies and also perceive they have the freedom to do so.

*Figure 4.7 - Interaction effect RM x OkS*



### 4.3.3 Regression analysis flexibility

Flexibility refers to the perceived flexibility in location, timing and execution of work. In the following section the hierarchical regression analysis will be described, based on the outcomes a final regression model is created and discussed. Second the hypotheses formulated for flexibility are tested to examine the direct effects of the independent variables. Third, the role of moderators is examined by graphically representing them and testing the corresponding hypotheses.

**Hierarchical regression analysis**

For the regression analysis with flexibility being the dependent variable the complete theoretical model is tested in several steps. The hierarchical regression analysis creates models 11 to 14. A summary of the results of models 11 to 13 are displayed in table 4.4, please refer to appendix G for a detailed overview of all results.

In the first step the control variables age and gender are added in order to determined their influence on flexibility. Age has a significant effect on flexibility ($\beta$ = .25, P = .000) while gender does not have a significant effect.

In the second step the independent variables media usage, trust in management, trust in colleagues, trust of manager, relation with colleagues and relation with manager are added to the model. The significant effect of age remains strong ($\beta$ = .22 , P = .001). Furthermore, media usage ($\beta$ = -.16, P = .007) has a significant negative effect and trust of manager ($\beta$ = .22, P = .003) has a significant positive effect on flexibility.

In the third model the moderating variables telework frequency, domain knowledge sharing and organizational knowledge sharing are added. Both telework frequency ($\beta$ = .32, P = .000) and organizational knowledge sharing ($\beta$ = .13, P = .042) have a positive significant effect on flexibility. Domain knowledge sharing does not. The control variable age still has a significant effect on flexibility ($\beta$ = .16, P = .009) and so does trust of manager ($\beta$ = .16, P = .019). The significant effect of media usage disappears.

The fourth model includes the moderation between the independent variables and the moderating variables. Only one interaction effect is significant and has a positive effect, i.e. trust of manager x telework frequency ($\beta$ = .16, P = .043). Trust in colleagues x domain knowledge sharing has a negative effect but is only significant at the 10% level ($\beta$ = -.12, P = .087). By introducing these moderators to the model the effect of age, relation with colleagues, telework frequency and organizational knowledge sharing remain significant within the 95% confidence interval.

*Table 4.4 Final regression model analysis with dependent variable Flexibility*

| Variable | Model 11 | | Model 12 | | Model 13 | | Model 15 | |
|---|---|---|---|---|---|---|---|---|
| | Beta | T | Beta | T | Beta | T | Beta | T |
| *Control variables* | | | | | | | | |
| Dummy gender | -.07 | -1.09 | -.06 | -.92 | -.02 | -.25 | -.03 | -.44 |
| Age | **.25**** | **3.86** | **.22**** | **3.51** | **.16**** | **2.63** | **.16**** | **2.62** |
| *Independent variables* | | | | | | | | |
| Media usage | | | **-.16**** | **-2.71** | -.07 | -1.16 | -.07 | -1.14 |
| Trust in management | | | .00 | -.02 | -.03 | -.51 | -.04 | -.56 |
| Trust in colleagues | | | .09 | 1.16 | .10 | 1.36 | .10 | 1.46 |
| Trust of manager | | | **.22**** | **2.98** | **.16*** | **2.36** | **.16*** | **2.31** |
| Relations with colleagues | | | .03 | .38 | .06 | .77 | .06 | .78 |
| Relation with manager | | | -.03 | -.43 | .01 | .09 | .01 | .13 |
| *Moderators* | | | | | | | | |
| Telework frequency | | | | | **.32**** | **5.23** | **.31**** | **4.91** |
| Domain knowledge sharing | | | | | -.08 | -1.26 | -.06 | -.95 |
| Organizational knowledge sharing | | | | | **.13*** | **2.04** | **.14*** | **2.22** |
| *Two-way interactions* | | | | | | | | |
| TwFxToM | | | | | | | .07 | 1.27 |
| DkSxTiC | | | | | | | -.11 | -1.84 |
| R Square | **.077**** | | **.166**** | | **.275**** | | **.292**** | |
| Adjusted R Square | **.069**** | | **.137**** | | **.241**** | | **.252**** | |

*Notes: 1;* Dependent variable: Flexibility. *2;* * $p \leq 0{,}05$; ** $p \leq 0{,}01$; 2-tailed; *N*=247. *3;* TwF = Telework frequency, DkS = Domain knowledge sharing, OkS = Organizational knowledge sharing, TiM = Trust in management, ToM = Trust of manager, TiC = Trust in colleagues, RM = Relation with manager. RC = Relation with colleagues.

**Final regression model**

Based on the findings of the regression models 11 - 14 an adjusted and final model for the dependent variable flexibility developed. This model is named model 15 and the results are displayed in table 4.4. This final model tests the variables influencing the dependent variable flexibility:

$$\textit{Flexibility} = \beta_0 + \beta_1 \textit{Dummy gender} + \beta_2 \textit{Age} + \beta_3 \textit{Media usage} + \beta_4 \textit{Trust in management} + \beta_5 \textit{Trust in colleagues} + \beta_6 \textit{Trust of manager} + \beta_7 \textit{Relation with colleagues} + \beta_8 \textit{Relation with manager} + \beta_9 \textit{Telework frequency} + \beta_{10} \textit{Domain knowledge sharing} + \beta_{11} \textit{Organizational knowledge sharing} + \beta_{12} \textit{Trust of manager*Telework frequency} + \beta_{13} \textit{Trust in colleagues*Domain knowledge sharing} + \varepsilon_i$$

In the fifth model the control variable age has a significant positive effect on flexibility ($\beta$ = .16, P = .000), gender does not. Of the independent variables only trust of manager has a significant effect ($\beta$ = .16, P = .022), which has a positive influence on flexibility. The moderating variables telework frequency ($\beta$ = .31, P = .000) and organizational knowledge sharing ($\beta$ = .14, P = .042) also influence

the dependent variable directly. The two interaction effects that were significant in the previous regression analyses are added to the model. Both trust of management x telework frequency and trust in colleagues x domain knowledge sharing are not significant influencers of flexibility, although the latter falls within the 10% level. All previously established significant variables remain so.

Multicollinearity is tested for the models 11 to 15, no signs of problems are detected. For the final regression model the lowest tolerance value is 528 and the highest VIF value is 1.893. The percentage of variance explained by model 15 is 29.2% and the model is significant.

**Hypothesis testing**

The control variable age, although not hypothesized in chapter 2, has a positive and significant effect on the perceived flexibility by employees. This means that an increasing age results in higher flexibility. Only the independent variable trust of manager has a significant and positive effect on the flexibility. This effect is positive which means that higher feelings of received trust from ones manager leads to a higher perceived flexibility. Although media usage is significant in regression model 2, the significance of this variable strongly decreases when the moderating variables are introduced to the model. The other independent variables do not show any significance, therefore only hypothesis H3d is supported, H3a, H3b, H3c, H3e and H3f are rejected.

When the moderating variables are introduced to the model the results show there are also direct effects on the dependent variable flexibility. Telework frequency has a positive and significant effect on flexibility, which does make sense as individuals that work outside the office have more freedom to choose their working time, method and location. Organizational knowledge sharing also positively influences flexibility. Finally the results show not a single moderating effect is significant within the 95% confidence interval. Which means all hypothesis concerning the moderating effect of these variables on the relation between the independent variables and flexibility have to be rejected. These are H4c – H24c.

## Chapter 5 Discussion

This chapter will provide a conclusion and recommendation based on the results presented in chapter 4. Before proceeding with this the relevance of this thesis is touched upon once more. Developments in information technology in the last decade have greatly boosted the possibilities for individuals to work remotely, videoconferencing, collaborative workspaces, file sharing and instant messaging for example offer such possibilities. With that, a dramatic increase in teleworking behavior has been noted. Doubling from 28% of organizations offering teleworking programs in 2003 to 56% in the year 2009, and this percentage is even higher for large organizations whom, in 93% of the cases, offer teleworking programs for their employees (CBS, 2011). There is however still a lot of ambiguity concerning the outcomes of such teleworking programs, studies present contradicting results and it is often suggested that the majority of benefits goes to the teleworking employees and not the organization. Furthermore, factors such as trust and relational bond within organizations are important determinants for the actual use of such teleworking programs (Eaton, 2003).

For this reason this thesis aims to provide further insights into the determinants of three important performance dimensions; productivity and innovativeness are the dimensions that mainly benefit the organization, and flexibility reflects a teleworking benefit attributed primarily to individuals. The influences of usage of communication media, trust within the organization and relations that exist between colleagues and managers on these performance dimensions are the primary relations studied. The degree of telework, measured as telework frequency is expected to moderate these relations, as does knowledge sharing. The research question this thesis aims to answer is:

*"What is the effect of media usage, trust, and relations on the productivity, innovativeness and flexibility of teleworkers and how does knowledge sharing and telework frequency influence these relationships?"*

### 5.1 Summary of results

The construct media usage incorporates information technology developments into the study by using media richness theory. The original theory of Daft & Lengel (1986) is extended in order to include new communication media that facilitate teleworking. Media usage measures how rich the communication of individuals is, and the results show that this communication richness decreases when individuals increase their telework frequency. This effect is attributed to the fact that the rich face-to-face interactions occurring at the office are replaced mainly by less rich communication via e-mail. When organizations require the richness of communications to remain high there are technologies available that can substitute face-to-face interactions better than e-mail, such as

videoconferencing. This study however does not show that the richness of communication significantly influence the performance dimensions productivity, innovativeness and flexibility.

The influence of trust is assessed in three different manners in this study, the trust of respondents in their colleagues, their manager and the perceived trust from managers in the respondent is measured. Concerning the performance dimension productivity it is shown that only trust of manager has a significantly influence, and that this is a positive and strong effect. This means that employees who perceive higher levels of trust from their manager also perceive themselves to be more productive. Furthermore, the average score for trust of manager is relatively high which is a positive sign for CBG. For the performance dimension innovativeness all three types of trust have a significant influence. Trust in management and trust of manager both positively influence the perceived innovativeness. Indicating that mutual feelings of trust allow employees to behave more innovative, this is in line with the expectations developed during the literature review. Trust allows risk taking behavior and improvisation by individuals because they are assured they will not be overly penalized for new ideas that fail. A lack of trust might cause anxiety and self-doubt which has a negative influence on risk innovative behavior. Trust in colleagues however has a negative influence on innovativeness, results also show that on average trust between colleagues in the organization studied is very high. This support the suggestion made by Nooteboom (2006) that trust may go too far in taking a relationship for granted, which generates rigidity and lack of innovation. These results also support the theory of horizontal and vertical relationships (Wintrobe & Breton, 1986). Trust in relations of a vertical nature (superior-subordinate) are efficient types of trust and positively influence performance, in this case productivity and innovativeness. Trust in horizontal relations however is expected to be an inefficient type of trust with a negative influence. This suggestion is supported by the results concerning the negative influence of trust in colleagues on the performance dimension innovativeness. The third outcome dimension measured in this thesis is flexibility, which is an important reason why individuals want to telework. Again trust of manager has a significant and positive influence on the perceived flexibility of employees. This is relatively straightforward, when individuals feel they are trusted by their manager they experience more freedom in choosing where, when and how work activities are performed.  Overall these findings concerning trust support the idea that it is important for the success of teleworking programs that managers place trust in their employees; productivity, innovativeness and flexibility benefits from this.

Relations, or interpersonal bond or relationships, are also tested in this thesis. Again both the relations with colleagues and the relation with ones manager is measured. On average the relations in the organization are perceived by the respondents as good, with score of 4.16 and 4.06

respectively (on a scale of 1-5). This average does not change for individuals with high or low levels of telework frequency. The effect of relations on productivity is a bit contradicting as relations with colleagues has a positive influence on productivity while relations with manager has a negative influence. The former is in line with expectations developed during the literature review, good relations improve group performance, decrease misunderstandings and miscommunications, and optimal processes alignment resulting in high productivity. The latter however is contradicting this expectation. One reason might be that individuals with a good relation with their manager feel they can put in less effort than is usual or necessary. Regarding the effect of relations on the other two performance dimensions there are no significant influences in this study. Relations do not significantly affect the innovativeness of individuals in an organization or the perceived flexibility these individuals have.

A few surprising results were found when analyzing the influence of control variables on the performance dimensions. Gender seems to have a significant influence on the perceived productivity of individuals, where female employees have a negative influence on this dimension and thus feel less productive than male employees. The same holds true for the performance dimension innovativeness. Again female employees feel significantly less innovative than their male colleagues, the effect here is even stronger. Regarding the perceived flexibility it seems that age has an important influence and a positive effect. Indicating that feelings of flexibility increase as age rises.

In the current knowledge economy the transfer and management of knowledge is an important factor in all organizations. knowledge is used to solve problems, innovate with new products or services, organize the organization and formulate strategies for competing and surviving in the industry. Additionally, teleworking affects mainly knowledge workers, whom have to interpret, communicate and create knowledge. After an extensive literature review on this topic it was clear to me that a typology embracing all types of knowledge important in a modern organization was not available. Therefore, adapting information from previous literature, a new typology was developed with three types of knowledge, i.e. social knowledge, domain knowledge and organizational knowledge. Despite pre-testing the questionnaire on members of the organization studied in this thesis the social knowledge type did not pass the reliability and factor analysis. Both domain knowledge sharing and organizational knowledge sharing did however, and therefore its effects can be analyzed in this research. Correlation analysis showed that domain knowledge sharing is positively correlated to both productivity and innovativeness, organizational knowledge sharing is positively correlated to all outcome dimensions; productivity, innovativeness, and flexibility. Additionally,

organizational knowledge sharing levels are lower for individuals with a low teleworking frequency than for individuals with a high teleworking frequency.

Based on the literature the expectation was formed that knowledge sharing would be a moderating variables in this research. This only proved to be the case with the performance dimension innovativeness and the independent variable trust in management. The combination of high trust in management and high levels of organizational knowledge sharing increases the innovativeness of employees. The nature of organizational knowledge explains this finding, as organizational knowledge concerns information about strategies, goals and directions of the organization. Individuals sharing this type of knowledge may feel more innovative as they are dealing with developments concerning the organization. However the combination of trust in management and domain knowledge sharing gives a different result, in that case trust in management again enables innovativeness, but only in when domain knowledge sharing is low. The nature of this type of knowledge again provides an insight into this finding. Domain knowledge sharing focuses on task specific concepts, rules and definitions. When the knowledge base concerning this type of information is very homogenous throughout the organization individuals perform their work activities in a routine and standard manner, leaving no room for variation, improvisation and eventually innovation. These findings provide a number of clues for organizations on how to manage knowledge. First, when innovative behavior is desirable it is important to emphasize organizational knowledge and facilitate and promote the exchange of such knowledge among employees. Also, this type of knowledge is shared relatively little by employees with a low teleworking frequency. Second, it might very well be the case that an organization does not want their employees to be innovative and instead wants them to perform their tasks in a routine manner following certain rules and procedures. It is then more useful to promote and facilitate the sharing of domain knowledge.

The final moderating variable in this study is teleworking frequency. A number of findings related to teleworking frequency have already been discussed. For the univariate data analysis the data is split in four equal groups. Clear evidence is found that communication was more rich in groups with a lower teleworking frequency. Furthermore, the figures show that an increase in teleworking frequency can be coupled with an increase in productivity and innovativeness. These findings are partly supported by the regression analysis, where telework frequency has a significant positive influence on both the innovativeness and flexibility perceived by employees. Even though these effects were not hypothesized for this study, they are very interesting. Organizations or managers doubting about their telework programs can use this information to their advantage.

The effects that were expected from telework frequency were of a moderating fashion. In a number of cases this moderation is also shown in the analysis. Combining telework frequency with trust in management has an impact on the productivity of employees. High levels of telework only result in a high productivity when the trust in management is low, it might be that teleworkers with low levels of trust in management feel more responsible and obliged to work harder. The same holds true for the effect of this moderation on innovativeness. When low levels of trust in management are present a high level of telework frequency can cause more innovativeness, however when trust in management is high it makes no difference how much individuals telework. An explanation for this effect might be that teleworkers feel more free to take risks and try new approaches because they are away from their managers more often, while office workers feel less freedom to do so. When trust is high both teleworkers and office workers can act innovative.

### 5.2 Contribution to theory & management practice

Several parts of this thesis address gaps in scientific literature, which can be regarded as a contribution to theory. First, several existing theories have been used and adapted (e.g. the theory on horizontal and vertical relations is extended to include innovativeness) and a contribution in the fields of media richness and knowledge sharing is made. For the media usage construct the media richness theory is adapted and updated. When Daft & Lengel originally developed the theory in 1986 many of the current information technologies were not available. Therefore more recent literature concerning the media richness theory has been reviewed, which did not result in a satisfactory overview of current information technologies based on the media richness theory. Collecting information on all types of media allowed for the development of a complete picture and the placement of these media in the media richness continuum. Current literature also failed to provide a satisfactory knowledge sharing typology, with some being outdated (e.g. tacit-explicit) and others showing gaps in coverage (e.g. component-architectural). Again multiple information sources are combined in order to develop new theory, resulting in the development of a new knowledge sharing typology; social-, organizational-, and domain knowledge. As will be discussed in the following section more construct development and testing is required, nevertheless a foundation for this new typology has been made.

Second, this thesis contributes to the pool of scientific and empirical research on telework. Bailey & Kurland (2002) appoint small sample sizes as an existing problem in current literature on telework research. The relatively large sample size in this thesis answers to the call for larger samples. From literature there is also a call for more empirical research on the effect of trust on performance (Dirks, 1999). Another contribution made by this thesis, especially as it is proven that trust has an influence

on productivity, innovativeness and flexibility. Golden & Raghuram (2010) state that relatively little is known on the role of relational factors between individuals in work units and knowledge sharing. This thesis contributes to this by studying the moderating effect of knowledge sharing on relations between colleagues and managers.

Findings presented in the thesis also have a practical contribution for management in several ways. First, it gives managers an insight into the effect of trust and relations on individuals in the organization and their performance. The importance of managers trusting their employees, especially in teleworking environments, has been noted in literature in many occasions. The results of this thesis further support this with empirical evidence. Managers should be aware that they must show trust in their employees when teleworking is introduced in the organization. Trust benefits the individual productivity and flexibility, which are important motivators for organizations to adopt teleworking in the first place.

Second, by comparing different groups based on their teleworking frequency, more information on the effects this has on several other organizational aspects is given. The richness of communication declines when teleworking frequency rises, and individual perceived productivity and flexibility rises. This benefits managers in designing teleworking programs and making decisions on for example the level of information technology support or the frequency of face-to-face meetings.

Third, the role of knowledge sharing and the effect of different types of knowledge has gained some clarity. Organizational knowledge sharing for example, which deals with organizational strategies, its mission and its goals, influences innovativeness of individual employees. It is also shared infrequently by individuals working most of their time at the office. Domain knowledge sharing on the contrary diminished innovative behavior. This can aid managers in deciding which type of communications containing a particular type of knowledge they want to spread through the organization. For example, when innovativeness is desired it is important to motivate and facilitate the exchange of organizational knowledge.

### 5.3 Limitations

Inherent to every study there are a number of limitations that influence the generalizability of this thesis. First, the scope of the study is relatively narrow. The study is a single case study, focussing on only one organization, at one moment in time, in one industry and located in only one country. Also, even though many of the respondents already perform some work outside the office, this organization is only at the start of implementing a teleworking program. It is likely that this influences the results and that the result might differ in the case of replication of the same study.

Also, the performance dimensions measured are somewhat narrow. The organizational performance dimensions are focused only on individual productivity and innovativeness, aspects such as project success, turnover/absenteeism, stakeholder satisfaction or profitability are not included in current study. The flexibility dimension for individuals is an important benefit of teleworking, suggested to improve work-life balance and organizational commitment among others. What the effect of flexibility on these and other dimensions are is not measured or tested however.

Second, the majority of the measurements used for this study were tested extensively in previous research, a number of new or changed measurements were included however. As an experiment by the RSM New World of Work research team a number of additional items were added to the productivity measurement. This proved to cause some problems in the factor analysis, five of the items that were eventually used for the data analysis come from the original measure, and two are added based on high loadings in the factor analysis. The measures for telework frequency and media richness are also adapted for current research, although some interesting findings stem from these measurements additional testing might have been useful. Likewise, the measurements for the three types of knowledge sharing were developed specifically for this thesis. The items for social knowledge sharing unfortunately proved not sufficiently reliable to pass the internal reliability test and factor analysis. Furthermore, for organizational knowledge sharing and domain knowledge sharing only two items were used to measure the construct. Although both proved to have strong loadings in the factor analysis and a high internal reliability, two items is the bare minimum for a Likert scale construct. Ideally both constructs would have consisted of three or more items.

Third, all measurements used are self-reported, limiting the objectivity of the data. Social desirability might affect the answer given by respondents, influencing for example the productivity or innovativeness scores.

### 5.4 Future research

For future research there are a number of recommendations. First, it is important to test the newly developed and slightly adjusted measurements used for this thesis in more detail. Developing the measures on knowledge sharing can improve the value of this typology for research on knowledge transfer. Further testing of the effects of communication media richness on organizational performance might provide more information on appropriate choices regarding information technology support in teleworking programs.

Second, replicating the study in a multitude of organizations in different countries and industries will benefit the generalizability of the findings and could help to verify the current results, also increasing the total sample size would benefit generalizability.

A third recommendation for future research concerns the advancement in the teleworking program initiated by the organization, the long-term effects of teleworking might be different compared to the starting- or honeymoon-phase. By studying an organization which has had a program for many years this might provide more reliable results.

Finally, as stated previously performance includes not only productivity and innovativeness, it might be interesting to test other performance dimensions in the conceptual model. For example how project success, work-life balance or employee turnover/absenteeism are influenced by media usage, trust, relations, teleworking frequency and knowledge sharing.

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## Appendix A - Survey

**Media usage**

In which manner(s) do you mostly have contact with your colleagues/manager? (Divide the total contact with your colleagues/manager over the following ways of contact, you can only fill in complete percentages and the total has to equal 100%)

| | |
|---|---|
| Face-to-face | …… |
| Telephone | …… |
| E-mail | …… |
| Chat / Instant Messaging (e.g. Microsoft communicator) | …… |
| Sociale media or networkapplications (e.g. Twitter, LinkedIn, Yammer) | …… |
| Videoconferencing | …… |
| Virtuele projectruimte (e.g. Sharepoint) | …… |
| Other | …… |

| **Trust in management** | totally disagree - totally agree | | | | |
|---|---|---|---|---|---|
| The management is sincere in its aim to accommodate the opinions of its employees | 1 | 2 | 3 | 4 | 5 |
| The management carries out its tasks efficiently, as far as I can assess | 1 | 2 | 3 | 4 | 5 |
| I trust that the management takes sound decisions on the future of (the organisation) | 1 | 2 | 3 | 4 | 5 |
| I have every confidence that (the organisation) will always try to treat me justly | 1 | 2 | 3 | 4 | 5 |

| **Trust in colleagues** | totally disagree - totally agree | | | | |
|---|---|---|---|---|---|
| My colleagues are sincere in their aim to accommodate the opinions of their managers | 1 | 2 | 3 | 4 | 5 |
| My colleagues carry out their tasks efficiently, as far as I can assess | 1 | 2 | 3 | 4 | 5 |
| I trust that my colleagues take sound decisions on the future of (the organisation) | 1 | 2 | 3 | 4 | 5 |
| I have every confidence that my colleagues will always try to treat me justly | 1 | 2 | 3 | 4 | 5 |

| **Trust of manager** | totally disagree - totally agree | | | | |
|---|---|---|---|---|---|
| As far as I can assess my manager sees me as a dedicated employee | 1 | 2 | 3 | 4 | 5 |
| As far as I can assess my manager thinks I perform appropriately | 1 | 2 | 3 | 4 | 5 |
| As far as I can assess my manager regards me to be a reliable person | 1 | 2 | 3 | 4 | 5 |
| As far as I can assess my manager has every confidence in me | 1 | 2 | 3 | 4 | 5 |

| **Relation with manager** | totally disagree - totally agree | | | | |
|---|---|---|---|---|---|
| I can rely on my manager when I am confronted with problems at work | 1 | 2 | 3 | 4 | 5 |
| I get along well with my manager | 1 | 2 | 3 | 4 | 5 |
| My manager is friendly towards me | 1 | 2 | 3 | 4 | 5 |
| I have a good relationship with my manager | 1 | 2 | 3 | 4 | 5 |

| **Relation with colleagues** | totally disagree - totally agree | | | | |
|---|---|---|---|---|---|
| I can rely on my colleagues when I am confronted with problems at work | 1 | 2 | 3 | 4 | 5 |
| I get along well with my colleagues | 1 | 2 | 3 | 4 | 5 |
| My colleagues are friendly towards me | 1 | 2 | 3 | 4 | 5 |
| I have a good relationship with my colleagues | 1 | 2 | 3 | 4 | 5 |
| I feel isolated from my colleagues (reversed) | 1 | 2 | 3 | 4 | 5 |

**Telework frequency**

Indicate on which of the following locations, on average, you perform your work activities. (Divide the total worktime over the following locations, you can only fill in complete percentages and the total has to equal 100%).

| | |
|---|---|
| At the primary office | …… |
| At an external office or meeting point | …… |
| On the road (e.g. on the train, this excludes commuting time) | …… |
| At home | …… |

Can you indicate how your contractual number of work hours? (This concerns the contractual agreed number of hours, excluding overtime) ……

| **Domain knowledge sharing** | totally disagree - totally agree |
|---|---|
| I frequently share domain specific knowledge with colleagues or work-relationships, for example (new) rules, developments or methods | 1 2 3 4 5 |
| With colleagues or work-relationships I regularly discuss ways we can (best) apply newly acquired domain specific knowledge | 1 2 3 4 5 |

| **Organizational knowledge sharing** | totally disagree - totally agree |
|---|---|
| I often discuss with my colleagues developments that (the organization) is going through, and its potential impact of its mission and vision | 1 2 3 4 5 |
| I regularly share knowledge about the goals of (the organization) and possible ways or strategies to achieve these goals | 1 2 3 4 5 |

| **Social knowledge sharing** | totally disagree - totally agree |
|---|---|
| I often exchange information with colleagues about who is doing what, for example which assignments or tasks | 1 2 3 4 5 |
| I regularly discuss (both during as outside working hours) informal, non-work related topics with my colleagues, such as someone´s wellbeing or private activities | 1 2 3 4 5 |
| When I talk about work with colleagues, we regularly use organization-specific jargon and/or organization-specific “codes” | 1 2 3 4 5 |
| I often exchange (success)stories about work or colleagues with other colleagues | 1 2 3 4 5 |

| **Productivity** | totally disagree - totally agree |
|---|---|
| I believe that I am an effective employee | 1 2 3 4 5 |
| I am satisfied with the quality of my working results | 1 2 3 4 5 |
| I work extremely efficiently | 1 2 3 4 5 |
| I am an extremely productive employee | 1 2 3 4 5 |
| I generally do much (or large amounts of) work | 1 2 3 4 5 |
| I make sure I meet the deadlines | 1 2 3 4 5 |
| I regularly put in overtime to finish my work (reversed) | 1 2 3 4 5 |
| In my work, I regularly have moments which I regard as 'lost' (reversed) | 1 2 3 4 5 |
| My working results generally meet all relevant requirements | 1 2 3 4 5 |
| I always do my work in the appropriate manner, also if this means that I would not meet certain requirements or deadlines | 1 2 3 4 5 |
| My activities and/or the projects in which I am involved generally remain within the budget | 1 2 3 4 5 |
| My activities and/or the projects in which I am involved are generally very profitable for the organisation | 1 2 3 4 5 |
| Customers (both external as well as internal departments or groups) are always very satisfied with the work I have done | 1 2 3 4 5 |
| The projects that I am involved in are always regarded as successful | 1 2 3 4 5 |

| **Innovativeness** | totally disagree - totally agree |
|---|---|
| When a non-routine situation arises in my work, I am quite good at thinking up new ways of dealing with the situation | 1 2 3 4 5 |
| I try to use new ideas and approaches to problems | 1 2 3 4 5 |
| People can rely on me to find a new use for existing methods or existing equipment | 1 2 3 4 5 |
| I am nearly always the first of my colleagues to try out a new idea or a new method | 1 2 3 4 5 |

| **Flexibility** | totally disagree - totally agree |
|---|---|
| I have much flexibility to determine where I work | 1 2 3 4 5 |
| I have much flexibility to determine when I work (e.g. hours or times of the day) | 1 2 3 4 5 |
| I have much flexibility to determine what I do (e.g. the contents of the work or tasks to carry out) | 1 2 3 4 5 |
| I have much flexibility to determine the way in which I carry out my work | 1 2 3 4 5 |

## Appendix B - Media richness score

*Table I - Richness score of communication media*

| | Variables | | |
|---|---|---|---|
| Communication Medium | Degree of synchronization | Presence of nonverbal cues | Richness score |
| Face-to-face | 0,92 | 0,92 | **0,846** |
| Telephone | 0,64 | 0,83 | **0,531** |
| Video conference | 0,79 | 0,60 | **0,474** |
| Social media | 0,50 | 0,41 | **0,205** |
| Chat | 0,36 | 0,41 | **0,148** |
| Virtual project space | 0,30 | 0,33 | **0,099** |
| Email | 0,22 | 0,19 | **0,042** |

## Appendix C - Factor analyse

*Table II - Rotated Component Matrix of relation with manager, relation with colleagues, trust in manager, trust in colleagues, trust of manager, domain knowledge sharing, organizational knowledge sharing, social knowledge sharing, productivity, innovativeness and flexibility.*

| *Items*[1] | *Components*[2] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| *Relation with manager* | | | | | | | | | | | |
| I can rely on my manager when I am confronted with problems at work. | .189 | .005 | .239 | **.803** | .100 | .066 | -.024 | .118 | .025 | .011 | .036 |
| I get along well with my manager. | .225 | .027 | .284 | **.849** | .147 | .021 | .062 | .049 | .021 | .021 | .056 |
| My manager is friendly towards me. | **.402** | .079 | .265 | **.710** | .180 | .094 | .018 | -.073 | .060 | -.027 | .031 |
| I have a good relationship with my manager. | .234 | .010 | .264 | **.838** | .117 | .021 | .032 | .017 | -.016 | .078 | .026 |
| *Relation with colleagues* | | | | | | | | | | | |
| I can rely on my colleagues when I am confronted with problems at work. | **.665** | .138 | -.084 | .228 | .038 | .094 | -.080 | .182 | -.060 | -.077 | .134 |
| I get along well with my colleagues. | **.830** | .082 | .129 | .302 | .018 | .016 | -.078 | .082 | .078 | .086 | .007 |
| My colleagues are friendly towards me. | **.798** | .088 | .108 | .231 | .051 | .044 | -.036 | .154 | .076 | .004 | .075 |
| I have a good relationship with my colleagues. | **.826** | .083 | .065 | .259 | .032 | -.042 | -.093 | .154 | .084 | .055 | -.003 |
| I feel isolated from my colleagues (reversed & recoded) | **.644** | .142 | .196 | -.068 | .049 | -.018 | .047 | .205 | .064 | -.111 | .086 |
| *Trust in management* | | | | | | | | | | | |
| The management is sincere in its aim to accommodate the opinions of its employees. | .045 | -.041 | -.020 | .172 | **.801** | .065 | .156 | .183 | .114 | .042 | -.049 |
| The management carries out its tasks efficiently, as far as I can assess. | -.062 | .050 | .118 | .100 | **.768** | -.058 | .067 | .116 | -.009 | .139 | -.084 |
| I trust that the management takes sound decisions on the future of (the organisation). | .043 | -.035 | .029 | .017 | **.878** | .031 | .071 | .065 | .000 | .005 | .036 |
| I have every confidence that (the organisation) will always try to treat me justly. | .130 | .010 | .112 | .140 | **.789** | .053 | .024 | .181 | -.047 | -.041 | .025 |
| *Trust in colleagues* | | | | | | | | | | | |
| My colleagues are sincere in their aim to accommodate the opinions of their managers. | .205 | .104 | .089 | .050 | .309 | .128 | -.046 | **.674** | .069 | .037 | .145 |
| My colleagues carry out their tasks efficiently, as far as I can assess. | .167 | .032 | .088 | .032 | .079 | -.086 | -.063 | **.794** | .055 | .171 | -.049 |
| I trust that my colleagues take sound decisions on the future of (the organisation). | .233 | .007 | -.140 | .000 | **.414** | .103 | -.118 | **.630** | -.016 | .118 | .014 |
| I have every confidence that my colleagues will always try to treat me justly. | **.373** | .103 | .145 | .069 | .229 | .113 | -.002 | **.631** | -.040 | -.110 | .084 |
| *Trust of manager* | | | | | | | | | | | |
| As far as I can assess my manager sees me as a dedicated employee. | .099 | .163 | **.850** | .169 | .067 | .081 | .062 | .004 | .020 | .093 | .093 |
| As far as I can assess my manager thinks I perform appropriately. | .066 | .161 | **.829** | .277 | .025 | .115 | .060 | .058 | .074 | .034 | -.036 |
| As far as I can assess my manager regards me to be a reliable person. | .141 | .105 | **.881** | .214 | .081 | .099 | .058 | .057 | .008 | .051 | .114 |
| As far as I can assess my manager has every confidence in me. | .098 | .124 | **.805** | .308 | .081 | .131 | .135 | .053 | .053 | .028 | .029 |

*Table II - Continued Rotated Component Matrix of relation with manager, relation with colleagues, trust in manager, trust in colleagues, trust of manager, domain knowledge sharing, organizational knowledge sharing, social knowledge sharing, productivity, innovativeness and flexibility.*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Domain knowledge sharing* | | | | | | | | | | | |
| I frequently share domain specific knowledge with colleagues or work-relationships, for example (new) rules, developments or methods. | .102 | .026 | .052 | .031 | -.017 | .073 | .054 | .043 | **.891** | .088 | .157 |
| With colleagues or work-relationships I regularly discuss ways we can (best) apply newly acquired domain specific knowledge. | .082 | .125 | .057 | .025 | .059 | -.044 | .083 | .018 | **.887** | .172 | .077 |
| *Organizational knowledge sharing* | | | | | | | | | | | |
| I often discuss with my colleagues developments that (the organization) is going through, and its potential impact of its mission and vision. | .000 | .034 | .113 | .098 | .015 | .085 | .177 | .098 | .185 | **.821** | .136 |
| I regularly share knowledge about the goals of (the organization) and possible ways or strategies to achieve these goals. | -.045 | .044 | .048 | -.006 | .132 | .130 | .208 | .079 | .093 | **.837** | .074 |
| *Social knowledge sharing* | | | | | | | | | | | |
| I regularly discuss (both during as outside working hours) informal, non-work-related topics with my colleagues, such as someone´s wellbeing or private activities. | .174 | -.058 | -.194 | .164 | -.084 | -.102 | .109 | **.350** | .013 | -.237 | **.539** |
| When I talk about work with colleagues, we regularly use organization-specific jargon and/or organization-specific “codes”. | .073 | .097 | .191 | .083 | .008 | -.119 | -.045 | .011 | .184 | .055 | **.674** |
| I often exchange (success)stories about work or colleagues with other colleagues | .093 | -.009 | .075 | -.046 | -.032 | .100 | .122 | .009 | .063 | .312 | **.693** |
| *Productivity* | | | | | | | | | | | |
| I believe that I am an effective employee. | .188 | **.685** | .059 | .019 | .011 | .032 | .241 | .126 | -.130 | .032 | .044 |
| I am satisfied with the quality of my working results. | .119 | **.632** | .161 | .033 | .031 | -.042 | .047 | .021 | .034 | -.079 | -.052 |
| I work extremely efficiently. | .069 | **.785** | .011 | .042 | -.081 | -.002 | .101 | .000 | -.040 | -.052 | -.096 |
| I am an extremely productive employee. | .061 | **.833** | .060 | .034 | .032 | .137 | .087 | -.045 | -.042 | .073 | .145 |
| I generally do much (or large amounts of) work. | .049 | **.687** | .112 | .030 | .010 | .199 | .148 | -.202 | .129 | .039 | .281 |
| I make sure I meet the deadlines. | -.057 | **.592** | .026 | -.032 | .038 | .006 | .046 | .117 | .130 | .152 | .032 |
| My working results generally meet all relevant requirements. | .159 | **.579** | .200 | .009 | -.058 | .052 | .086 | .175 | .204 | -.065 | -.218 |
| *Innovativeness* | | | | | | | | | | | |
| When a non-routine situation arises in my work, I am quite good at thinking up new ways of dealing with the situation. | -.060 | .219 | .079 | .041 | .049 | .050 | **.671** | -.011 | .037 | -.011 | .166 |
| I try to use new ideas and approaches to problems. | -.097 | .169 | .010 | .017 | .109 | .129 | **.740** | -.043 | .056 | .198 | .011 |
| People can rely on me to find a new use for existing methods or existing equipment. | -.005 | .059 | .108 | .056 | .100 | .222 | **.705** | .027 | .016 | .167 | -.171 |
| I am nearly always the first of my colleagues to try out a new idea or a new method. | -.036 | .167 | .067 | -.043 | .041 | .058 | **.798** | -.121 | .046 | .060 | .084 |

*Table II – Continued Rotated Component Matrix of relation with manager, relation with colleagues, trust in manager, trust in colleagues, trust of manager, domain knowledge sharing, organizational knowledge sharing, social knowledge sharing, productivity, innovativeness and flexibility.*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Flexibility* | | | | | | | | | | | |
| I have much flexibility to determine where I work. | .207 | -.080 | .136 | -.092 | .084 | **.741** | .171 | -.088 | .049 | .114 | .012 |
| I have much flexibility to determine when I work (e.g. hours or times of the day). | .157 | .035 | .092 | .055 | -.021 | **.819** | .018 | -.043 | -.101 | .077 | .044 |
| I have much flexibility to determine what I do (e.g. the contents of the work or tasks to carry out). | -.121 | .144 | .054 | .154 | .004 | **.703** | .173 | .151 | -.031 | .065 | -.174 |
| I have much flexibility to determine the way in which I carry out my work. | -.149 | .155 | .092 | .052 | .048 | **.721** | .113 | .122 | .131 | -.012 | .018 |
| Eigenvalue | 8.66 | 4.44 | 3.32 | 2.99 | 2.34 | 2.11 | 1.67 | 1.34 | 1.21 | 1.15 | 1.03 |
| Percentage of experience explained | 20.14 | 10.32 | 7.71 | 6.96 | 5.45 | 4.91 | 3.89 | 3.12 | 2.80 | 2.67 | 2.40 |

*Notes: 1;* Items are translation from the respective Dutch items used in the survey, all items were kept as close to the original as possible. *2;* Extraction method: principal component analysis, rotation method: varimax with Kaiser normalization

## Appendix D - Reliability analysis

*Table III - Cronbach´s α and item-total correlation values of constructs*

| Construct | Cronbach´s α | Corrected Item-Total correlation |
|---|---|---|
| Relation with manager | 0.926 | 0.777 - 0.898 |
| Relation with colleagues | 0.872 | 0.541 - 0.818 |
| Trust in management | 0.865 | 0.672 - 0.764 |
| Trust in colleagues | 0.809 | 0.595 - 0.669 |
| Trust of manager | 0.935 | 0.828 - 0.892 |
| Domain knowledge sharing | 0.847 | 0.737 - 0.737 |
| Organizational knowledge sharing | 0.824 | 0.700 - 0.700 |
| Social knowledge sharing | 0.513 | 0.199 - 0.320 |
| Productivity | 0.838 | 0.452 - 0.750 |
| Innovativeness | 0.791 | 0.544 - 0.661 |
| Flexibility | 0.774 | 0.545 - 0.648 |

*Notes:* Social knowledge sharing values are insufficient, no improvements possible.

## Appendix E - Demographic figures

*Table IV - Demographic overview of the data sample (N= 247)*

| Demographic variable | Sample composition | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 103 | 41.7% |
| | Female | 144 | 58.3% |
| Age | 20-25 | 12 | 4.9% |
| | 26-30 | 32 | 13.0% |
| | 31-35 | 40 | 16.2% |
| | 36-40 | 31 | 12.6% |
| | 41-45 | 32 | 13.0% |
| | 46-50 | 41 | 16.6% |
| | 51-55 | 33 | 13.4% |
| | 56-60 | 16 | 6.5% |
| | 61-65 | 2 | 0.8% |
| | 66-70 | 5 | 2.0% |
| | 71-80 | 2 | 0.8% |
| Level of education | Primary education | 1 | 0.4% |
| | Secundary education | 5 | 2.0% |
| | Lower vocational | 1 | 0.4% |
| | Intermediate vocational | 20 | 8.1% |
| | Higher vocational (Bachelor) | 44 | 17.8% |
| | University (Drs. /MSc.) | 117 | 47.4% |
| | Professional degree (e.g. MBA) | 7 | 2.8% |
| | PhD | 52 | 21.1% |
| Years at CBG | 3 years or less | 102 | 41.3% |
| | 4 - 7 years | 65 | 26.3% |
| | 8 - 11 years | 40 | 16.2% |
| | 12 - 15 years | 21 | 8.5% |
| | 16 - 19 years | 3 | 1.2% |
| | 20 - 24 years | 9 | 3.6% |
| | 25 years or more | 7 | 2.8% |

## Appendix F - Means for telework groups

*Table V - Construct means for telework frequency quartile groups*

| | Quartile groups | | | |
|---|---|---|---|---|
| | Group 1 | Group 2 | Group 3 | Group 4 |
| 1. Gender (male/female) | 42%/58% | 24%/75% | 50%/50% | 51%/49% |
| 2. Age | 40.08 | 39.77 | 43.97 | 44.74 |
| 3. Media usage | 129.11 | 108.54 | 104.67 | 97.38 |
| 4. Trust in management | 3.22 | 3.11 | 3.25 | 3.24 |
| 5. Trust in colleagues | 3.75 | 3.59 | 3.64 | 3.59 |
| 6. Trust of management | 4.03 | 4.05 | 4.07 | 4.11 |
| 7. Relations with colleagues | 4.28 | 4.12 | 4.14 | 4.12 |
| 8. Relation with manager | 4.15 | 4.05 | 4.00 | 4.01 |
| 9. Telework frequency | 0.50 | 4.10 | 9.40 | 20.71 |
| 10. Domain knowledge sharing | 3.75 | 3.88 | 4.00 | 3.96 |
| 11. Organizational knowledge sharing | 2.72 | 3.12 | 3.25 | 3.15 |
| 12. Productivity | 3.10 | 3.38 | 3.61 | 3.96 |
| 13. Innovativeness | 3.87 | 3.80 | 3.90 | 3.87 |
| 14. Flexibility | 3.02 | 3.28 | 3.40 | 3.46 |
| Valid N (listwise) | 62 | 60 | 63 | 57 |

## Appendix G - Regression models

*Table VI - Regression models with dependent variable productivity*

| Model 1 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.948 | .045 | | 88.124 | .000 | | | | | |
| Dummy gender | -.148 | .060 | -.164 | -2.474 | .014 | -.150 | -.158 | -.158 | .928 | 1.078 |
| Age | -.023 | .029 | -.051 | -.772 | .441 | -.007 | -.050 | -.049 | .928 | 1.078 |
| **Model 2** | **B** | **Std. Error** | **Beta** | **t** | **Sig.** | **Zero-order** | **Partial** | **Part** | **Tolerance** | **VIF** |
| (Constant) | 3.943 | .042 | | 93.294 | .000 | | | | | |
| Dummy gender | -.145 | .057 | -.161 | -2.560 | .011 | -.150 | -.165 | -.153 | .903 | 1.108 |
| Age | -.025 | .028 | -.057 | -.902 | .368 | -.007 | -.059 | -.054 | .885 | 1.130 |
| Media usage | .015 | .028 | .033 | .551 | .582 | .033 | .036 | .033 | .970 | 1.031 |
| Trust in management | -.016 | .031 | -.037 | -.527 | .599 | .042 | -.035 | -.031 | .734 | 1.362 |
| Trust in colleagues | .000 | .033 | .000 | -.002 | .999 | .133 | .000 | .000 | .637 | 1.569 |
| Trust of manager | .147 | .032 | .328 | 4.547 | .000 | .303 | .285 | .272 | .684 | 1.463 |
| Relation with colleagues | .118 | .035 | .259 | 3.343 | .001 | .265 | .214 | .200 | .596 | 1.679 |
| Relation with manager | -.082 | .036 | -.183 | -2.249 | .025 | .128 | -.146 | -.134 | .542 | 1.846 |
| **Model 3** | **B** | **Std. Error** | **Beta** | **t** | **Sig.** | **Zero-order** | **Partial** | **Part** | **Tolerance** | **VIF** |
| (Constant) | 3.940 | .043 | | 92.516 | .000 | | | | | |
| Dummy gender | -.140 | .057 | -.155 | -2.436 | .016 | -.150 | -.159 | -.146 | .882 | 1.134 |
| Age | -.028 | .029 | -.063 | -.969 | .334 | -.007 | -.064 | -.058 | .847 | 1.181 |
| Media usage | .010 | .029 | .023 | .365 | .715 | .033 | .024 | .022 | .893 | 1.120 |
| Trust in management | -.016 | .031 | -.036 | -.520 | .603 | .042 | -.034 | -.031 | .729 | 1.372 |
| Trust in colleagues | -.006 | .034 | -.013 | -.169 | .866 | .133 | -.011 | -.010 | .627 | 1.595 |
| Trust of manager | .142 | .033 | .317 | 4.312 | .000 | .303 | .273 | .258 | .660 | 1.514 |
| Relation with colleagues | .114 | .036 | .251 | 3.209 | .002 | .265 | .207 | .192 | .583 | 1.715 |
| Relation with manager | -.082 | .037 | -.183 | -2.242 | .026 | .128 | -.146 | -.134 | .535 | 1.870 |
| Telework frequency | -.021 | .029 | -.048 | -.726 | .469 | -.017 | -.048 | -.043 | .822 | 1.217 |
| Domain knowledge sharing | .033 | .028 | .075 | 1.170 | .243 | .161 | .077 | .070 | .876 | 1.141 |
| Organizational knowledge sharing | .022 | .029 | .050 | .756 | .450 | .120 | .050 | .045 | .819 | 1.221 |

*Table VII - Regression model with dependent variable productivity*

| Model 4 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.956 | .046 | | 86.244 | .000 | | | | | |
| Dummy gender | -.154 | .059 | -.171 | -2.591 | .010 | -.150 | -.175 | -.156 | .840 | 1.190 |
| Age | -.027 | .031 | -.061 | -.880 | .380 | -.007 | -.060 | -.053 | .764 | 1.309 |
| Media usage | .008 | .030 | .019 | .280 | .779 | .033 | .019 | .017 | .828 | 1.208 |
| Trust in management | -.037 | .033 | -.084 | -1.108 | .269 | .042 | -.076 | -.067 | .639 | 1.565 |
| Trust in colleagues | .001 | .036 | .001 | .017 | .987 | .133 | .001 | .001 | .553 | 1.810 |
| Trust of manager | .150 | .037 | .336 | 4.006 | .000 | .303 | .265 | .242 | .519 | 1.928 |
| Relation with colleagues | .114 | .037 | .251 | 3.048 | .003 | .265 | .205 | .184 | .537 | 1.863 |
| Relation with manager | -.072 | .042 | -.161 | -1.708 | .089 | .128 | -.117 | -.103 | .410 | 2.438 |
| Telework frequency | .002 | .032 | .005 | .071 | .943 | -.017 | .005 | .004 | .712 | 1.404 |
| Domain knowledge sharing | .037 | .032 | .084 | 1.167 | .245 | .161 | .080 | .070 | .701 | 1.426 |
| Organizational knowledge sharing | .032 | .032 | .073 | 1.004 | .317 | .120 | .069 | .061 | .699 | 1.431 |
| TwFxMedU | .031 | .034 | .065 | .933 | .352 | .042 | .064 | .056 | .763 | 1.311 |
| TwFxTiM | -.063 | .037 | -.130 | -1.685 | .093 | -.079 | -.115 | -.102 | .617 | 1.621 |
| TwFxToM | -.017 | .040 | -.034 | -.408 | .683 | -.039 | -.028 | -.025 | .511 | 1.956 |
| TwFxTiC | -.013 | .036 | -.029 | -.353 | .724 | -.054 | -.024 | -.021 | .553 | 1.809 |
| TwFxRM | .004 | .049 | .008 | .089 | .929 | -.087 | .006 | .005 | .405 | 2.472 |
| TwFxRC | .024 | .040 | .052 | .601 | .549 | -.003 | .041 | .036 | .486 | 2.057 |
| DkSxMedU | .002 | .031 | .005 | .070 | .944 | .070 | .005 | .004 | .627 | 1.595 |
| DkSxTiM | -.038 | .033 | -.088 | -1.179 | .240 | -.036 | -.081 | -.071 | .659 | 1.518 |
| DkSxToM | .014 | .037 | .037 | .378 | .706 | .050 | .026 | .023 | .385 | 2.600 |
| DkSxTiC | .030 | .035 | .065 | .861 | .390 | .066 | .059 | .052 | .638 | 1.568 |
| DkSxRM | -.004 | .048 | -.009 | -.083 | .934 | -.005 | -.006 | -.005 | .285 | 3.507 |
| DkSxRC | -.004 | .037 | -.011 | -.115 | .909 | .029 | -.008 | -.007 | .380 | 2.634 |
| OkSxMedU | -.013 | .033 | -.026 | -.380 | .704 | .031 | -.026 | -.023 | .761 | 1.315 |
| OkSxTiM | -.006 | .037 | -.013 | -.161 | .872 | .009 | -.011 | -.010 | .596 | 1.679 |
| OkSxToM | .056 | .041 | .124 | 1.388 | .167 | .095 | .095 | .084 | .456 | 2.195 |
| OkSxTiC | -.024 | .040 | -.052 | -.594 | .553 | .049 | -.041 | -.036 | .468 | 2.138 |
| OkSxRM | -.003 | .053 | -.006 | -.064 | .949 | .069 | -.004 | -.004 | .374 | 2.674 |
| OkSxRC | .010 | .042 | .024 | .238 | .812 | .097 | .016 | .014 | .359 | 2.786 |

*Table VIII - Regression model with dependent variable productivity*

| Model 5 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.943 | .042 | | 93.131 | .000 | | | | | |
| Dummy gender | -.152 | .057 | -.168 | -2.680 | .008 | -.150 | -.175 | -.158 | .877 | 1.140 |
| Age | -.029 | .028 | -.065 | -1.020 | .309 | -.007 | -.067 | -.060 | .846 | 1.182 |
| Media usage | .010 | .028 | .022 | .360 | .719 | .033 | .024 | .021 | .892 | 1.121 |
| Trust in management | -.041 | .032 | -.092 | -1.285 | .200 | .042 | -.085 | -.076 | .678 | 1.476 |
| Trust in colleagues | .000 | .033 | .000 | .005 | .996 | .133 | .000 | .000 | .620 | 1.612 |
| Trust of manager | .146 | .032 | .326 | 4.502 | .000 | .303 | .286 | .265 | .659 | 1.518 |
| Relation with colleagues | .112 | .035 | .246 | 3.179 | .002 | .265 | .206 | .187 | .580 | 1.725 |
| Relation with manager | -.075 | .036 | -.167 | -2.075 | .039 | .128 | -.136 | -.122 | .532 | 1.878 |
| Telework frequency | -.007 | .030 | -.016 | -.238 | .812 | -.017 | -.016 | -.014 | .779 | 1.284 |
| Domain knowledge sharing | .037 | .028 | .083 | 1.300 | .195 | .161 | .086 | .076 | .858 | 1.165 |
| Organizational knowledge sharing | .035 | .029 | .078 | 1.190 | .235 | .120 | .079 | .070 | .800 | 1.251 |
| TwFxTiM | -.076 | .031 | -.156 | -2.461 | .015 | -.079 | -.161 | -.145 | .856 | 1.168 |
| OkSxToM | .052 | .027 | .115 | 1.903 | .058 | .095 | .125 | .112 | .954 | 1.049 |

*Table IX - Regression models with dependent variable innovativeness*

| Model 6 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.430 | .059 | | 57.732 | .000 | | | | | |
| Dummy gender | -.240 | .079 | -.199 | -3.031 | .003 | -.208 | -.192 | -.192 | .928 | 1.078 |
| Age | .019 | .039 | .032 | .486 | .627 | .085 | .031 | .031 | .928 | 1.078 |
| **Model 7** | **B** | **Std. Error** | **Beta** | **t** | **Sig.** | **Zero-order** | **Partial** | **Part** | **Tolerance** | **VIF** |
| (Constant) | 3.420 | .056 | | 60.635 | .000 | | | | | |
| Dummy gender | -.218 | .076 | -.181 | -2.883 | .004 | -.208 | -.186 | -.172 | .903 | 1.108 |
| Age | -.024 | .038 | -.040 | -.630 | .530 | .085 | -.041 | -.037 | .885 | 1.130 |
| Media usage | -.094 | .037 | -.154 | -2.545 | .012 | -.187 | -.164 | -.151 | .970 | 1.031 |
| Trust in management | .143 | .041 | .242 | 3.487 | .001 | .222 | .223 | .208 | .734 | 1.362 |
| Trust in colleagues | -.112 | .044 | -.189 | -2.529 | .012 | -.055 | -.163 | -.151 | .637 | 1.569 |
| Trust of manager | .143 | .043 | .239 | 3.315 | .001 | .228 | .212 | .197 | .684 | 1.463 |
| Relation with colleagues | -.006 | .047 | -.010 | -.131 | .896 | -.037 | -.009 | -.008 | .596 | 1.679 |
| Relation with manager | -.054 | .049 | -.089 | -1.105 | .270 | .078 | -.072 | -.066 | .542 | 1.846 |
| **Model 8** | **B** | **Std. Error** | **Beta** | **t** | **Sig.** | **Zero-order** | **Partial** | **Part** | **Tolerance** | **VIF** |
| (Constant) | 3.387 | .054 | | 62.433 | .000 | | | | | |
| Dummy gender | -.162 | .073 | -.134 | -2.222 | .027 | -.208 | -.145 | -.126 | .882 | 1.134 |
| Age | -.058 | .037 | -.097 | -1.572 | .117 | .085 | -.103 | -.089 | .847 | 1.181 |
| Media usage | -.063 | .037 | -.103 | -1.709 | .089 | -.187 | -.112 | -.097 | .893 | 1.120 |
| Trust in management | .128 | .039 | .216 | 3.250 | .001 | .222 | .210 | .185 | .729 | 1.372 |
| Trust in colleagues | -.126 | .043 | -.212 | -2.950 | .004 | -.055 | -.191 | -.168 | .627 | 1.595 |
| Trust of manager | .105 | .042 | .176 | 2.513 | .013 | .228 | .163 | .143 | .660 | 1.514 |
| Relation with colleagues | .003 | .045 | .005 | .066 | .947 | -.037 | .004 | .004 | .583 | 1.715 |
| Relation with manager | -.038 | .047 | -.063 | -.809 | .419 | .078 | -.053 | -.046 | .535 | 1.870 |
| Telework frequency | .080 | .037 | .134 | 2.140 | .033 | .264 | .140 | .122 | .822 | 1.217 |
| Domain knowledge sharing | .026 | .036 | .044 | .724 | .470 | .141 | .048 | .041 | .876 | 1.141 |
| Organizational knowledge sharing | .145 | .037 | .244 | 3.886 | .000 | .337 | .248 | .221 | .819 | 1.221 |

*Table X - Regression model with dependent variable innovativeness*

| Model 9 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.406 | .054 | | 62.577 | .000 | | | | | |
| Dummy gender | -.195 | .070 | -.161 | -2.767 | .006 | -.208 | -.187 | -.148 | .840 | 1.190 |
| Age | -.069 | .036 | -.116 | -1.897 | .059 | .085 | -.129 | -.101 | .764 | 1.309 |
| Media usage | -.054 | .036 | -.088 | -1.499 | .135 | -.187 | -.102 | -.080 | .828 | 1.208 |
| Trust in management | .088 | .040 | .149 | 2.223 | .027 | .222 | .151 | .119 | .639 | 1.565 |
| Trust in colleagues | -.109 | .043 | -.183 | -2.551 | .011 | -.055 | -.173 | -.136 | .553 | 1.810 |
| Trust of manager | .114 | .044 | .190 | 2.564 | .011 | .228 | .173 | .137 | .519 | 1.928 |
| Relation with colleagues | -.013 | .044 | -.021 | -.288 | .773 | -.037 | -.020 | -.015 | .537 | 1.863 |
| Relation with manager | .000 | .050 | .000 | -.001 | .999 | .078 | .000 | .000 | .410 | 2.438 |
| Telework frequency | .104 | .038 | .175 | 2.765 | .006 | .264 | .187 | .148 | .712 | 1.404 |
| Domain knowledge sharing | .012 | .038 | .020 | .314 | .754 | .141 | .022 | .017 | .701 | 1.426 |
| Organizational knowledge sharing | .119 | .038 | .200 | 3.128 | .002 | .337 | .210 | .167 | .699 | 1.431 |
| TwFxMedU | .049 | .040 | .075 | 1.222 | .223 | .066 | .084 | .065 | .763 | 1.311 |
| TwFxTiM | -.116 | .044 | -.180 | -2.641 | .009 | -.090 | -.178 | -.141 | .617 | 1.621 |
| TwFxToM | .024 | .048 | .038 | .502 | .616 | .041 | .034 | .027 | .511 | 1.956 |
| TwFxTiC | .039 | .043 | .066 | .911 | .363 | -.001 | .062 | .049 | .553 | 1.809 |
| TwFxRM | -.004 | .058 | -.006 | -.067 | .947 | -.022 | -.005 | -.004 | .405 | 2.472 |
| TwFxRC | -.010 | .048 | -.016 | -.210 | .834 | -.013 | -.014 | -.011 | .486 | 2.057 |
| DkSxMedU | .003 | .037 | .005 | .080 | .937 | .087 | .005 | .004 | .627 | 1.595 |
| DkSxTiM | -.117 | .039 | -.200 | -3.035 | .003 | -.040 | -.204 | -.162 | .659 | 1.518 |
| DkSxToM | .019 | .044 | .037 | .433 | .665 | .009 | .030 | .023 | .385 | 2.600 |
| DkSxTiC | .037 | .042 | .059 | .879 | .381 | .080 | .060 | .047 | .638 | 1.568 |
| DkSxRM | .008 | .056 | .014 | .140 | .889 | .007 | .010 | .007 | .285 | 3.507 |
| DkSxRC | -.002 | .044 | -.004 | -.042 | .967 | .013 | -.003 | -.002 | .380 | 2.634 |
| OkSxMedU | .055 | .039 | .086 | 1.408 | .160 | .134 | .096 | .075 | .761 | 1.315 |
| OkSxTiM | .072 | .043 | .115 | 1.657 | .099 | .264 | .113 | .089 | .596 | 1.679 |
| OkSxToM | -.041 | .048 | -.068 | -.853 | .395 | .099 | -.058 | -.046 | .456 | 2.195 |
| OkSxTiC | .072 | .048 | .117 | 1.502 | .135 | .261 | .103 | .080 | .468 | 2.138 |
| OkSxRM | .154 | .063 | .215 | 2.461 | .015 | .271 | .167 | .132 | .374 | 2.674 |
| OkSxRC | -.038 | .050 | -.068 | -.764 | .446 | .156 | -.052 | -.041 | .359 | 2.786 |

*Table XI - Regression model with dependent variable innovativeness*

| Model 10 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.388 | .051 | | 65.852 | .000 | | | | | |
| Dummy gender | -.188 | .069 | -.155 | -2.735 | .007 | -.208 | -.179 | -.145 | .873 | 1.145 |
| Age | -.062 | .035 | -.104 | -1.790 | .075 | .085 | -.118 | -.095 | .829 | 1.207 |
| Media usage | -.065 | .034 | -.106 | -1.882 | .061 | -.187 | -.124 | -.100 | .889 | 1.125 |
| Trust in management | .088 | .038 | .148 | 2.294 | .023 | .222 | .151 | .122 | .678 | 1.476 |
| Trust in colleagues | -.104 | .040 | -.175 | -2.578 | .011 | -.055 | -.169 | -.137 | .613 | 1.631 |
| Trust of manager | .118 | .039 | .197 | 2.992 | .003 | .228 | .195 | .159 | .654 | 1.530 |
| Relation with colleagues | -.011 | .043 | -.018 | -.251 | .802 | -.037 | -.017 | -.013 | .574 | 1.741 |
| Relation with manager | -.017 | .044 | -.028 | -.384 | .701 | .078 | -.026 | -.020 | .530 | 1.886 |
| Telework frequency | .094 | .036 | .158 | 2.620 | .009 | .264 | .172 | .139 | .772 | 1.296 |
| Domain knowledge sharing | .030 | .034 | .051 | .884 | .378 | .141 | .059 | .047 | .862 | 1.160 |
| Organizational knowledge sharing | .132 | .036 | .222 | 3.683 | .000 | .337 | .238 | .196 | .774 | 1.292 |
| TwFxTiM | -.116 | .037 | -.179 | -3.108 | .002 | -.090 | -.202 | -.165 | .852 | 1.174 |
| DkSxTiM | -.081 | .033 | -.138 | -2.429 | .016 | -.040 | -.160 | -.129 | .880 | 1.137 |
| OkSxTiM | .085 | .040 | .136 | 2.135 | .034 | .264 | .141 | .113 | .697 | 1.435 |
| OkSxRM | .138 | .042 | .193 | 3.260 | .001 | .271 | .212 | .173 | .808 | 1.238 |

*Table XII - Regression models with dependent variable flexibility*

| Model 11 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.570 | .079 | | 45.284 | .000 | | | | | |
| Dummy gender | -.115 | .105 | -.071 | -1.093 | .275 | -.138 | -.071 | -.068 | .928 | 1.078 |
| Age | .200 | .052 | .249 | 3.861 | .000 | .268 | .242 | .240 | .928 | 1.078 |

| Model 12 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.558 | .077 | | 46.474 | .000 | | | | | |
| Dummy gender | -.095 | .103 | -.058 | -.924 | .357 | -.138 | -.060 | -.055 | .903 | 1.108 |
| Age | .179 | .051 | .223 | 3.507 | .001 | .268 | .224 | .210 | .885 | 1.130 |
| Media usage | -.136 | .050 | -.165 | -2.714 | .007 | -.202 | -.175 | -.162 | .970 | 1.031 |
| Trust in management | -.001 | .056 | -.002 | -.024 | .981 | .125 | -.002 | -.001 | .734 | 1.362 |
| Trust in colleagues | .070 | .060 | .087 | 1.163 | .246 | .116 | .076 | .070 | .637 | 1.569 |
| Trust of manager | .174 | .058 | .216 | 2.981 | .003 | .265 | .192 | .178 | .684 | 1.463 |
| Relation with colleagues | .024 | .064 | .030 | .381 | .703 | .104 | .025 | .023 | .596 | 1.679 |
| Relation with manager | -.028 | .066 | -.035 | -.427 | .670 | .150 | -.028 | -.026 | .542 | 1.846 |

| Model 13 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.517 | .072 | | 48.602 | .000 | | | | | |
| Dummy gender | -.025 | .097 | -.015 | -.255 | .799 | -.138 | -.017 | -.014 | .882 | 1.134 |
| Age | .129 | .049 | .160 | 2.630 | .009 | .268 | .171 | .148 | .847 | 1.181 |
| Media usage | -.057 | .049 | -.069 | -1.163 | .246 | -.202 | -.076 | -.065 | .893 | 1.120 |
| Trust in management | -.027 | .052 | -.034 | -.513 | .609 | .125 | -.034 | -.029 | .729 | 1.372 |
| Trust in colleagues | .077 | .057 | .096 | 1.358 | .176 | .116 | .089 | .076 | .627 | 1.595 |
| Trust of manager | .132 | .056 | .163 | 2.360 | .019 | .265 | .154 | .132 | .660 | 1.514 |
| Relation with colleagues | .046 | .060 | .056 | .768 | .443 | .104 | .051 | .043 | .583 | 1.715 |
| Relation with manager | .006 | .062 | .007 | .088 | .930 | .150 | .006 | .005 | .535 | 1.870 |
| Telework frequency | .261 | .050 | .324 | 5.231 | .000 | .407 | .326 | .294 | .822 | 1.217 |
| Domain knowledge sharing | -.061 | .048 | -.075 | -1.257 | .210 | .049 | -.083 | -.071 | .876 | 1.141 |
| Organizational knowledge sharing | .102 | .050 | .127 | 2.044 | .042 | .247 | .134 | .115 | .819 | 1.221 |

*Table XIII - Regression model with dependent variable flexibility*

| Model 14 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.521 | .077 | | 45.601 | .000 | | | | | |
| Dummy gender | -.046 | .100 | -.028 | -.456 | .649 | -.138 | -.031 | -.026 | .840 | 1.190 |
| Age | .134 | .052 | .167 | 2.594 | .010 | .268 | .175 | .146 | .764 | 1.309 |
| Media usage | -.043 | .051 | -.052 | -.844 | .400 | -.202 | -.058 | -.047 | .828 | 1.208 |
| Trust in management | -.044 | .056 | -.055 | -.776 | .439 | .125 | -.053 | -.044 | .639 | 1.565 |
| Trust in colleagues | .116 | .061 | .144 | 1.910 | .057 | .116 | .130 | .107 | .553 | 1.810 |
| Trust of manager | .146 | .063 | .181 | 2.324 | .021 | .265 | .158 | .131 | .519 | 1.928 |
| Relation with colleagues | .015 | .063 | .019 | .244 | .807 | .104 | .017 | .014 | .537 | 1.863 |
| Relation with manager | .021 | .071 | .026 | .296 | .768 | .150 | .020 | .017 | .410 | 2.438 |
| Telework frequency | .246 | .054 | .306 | 4.591 | .000 | .407 | .301 | .258 | .712 | 1.404 |
| Domain knowledge sharing | -.088 | .054 | -.109 | -1.632 | .104 | .049 | -.111 | -.092 | .701 | 1.426 |
| Organizational knowledge sharing | .112 | .054 | .139 | 2.070 | .040 | .247 | .141 | .116 | .699 | 1.431 |
| TwFxMedU | .032 | .057 | .036 | .557 | .578 | -.021 | .038 | .031 | .763 | 1.311 |
| TwFxTiM | -.020 | .062 | -.023 | -.318 | .751 | .082 | -.022 | -.018 | .617 | 1.621 |
| TwFxToM | .139 | .068 | .160 | 2.040 | .043 | .166 | .139 | .115 | .511 | 1.956 |
| TwFxTiC | -.060 | .061 | -.075 | -.989 | .324 | .028 | -.068 | -.056 | .553 | 1.809 |
| TwFxRM | -.114 | .082 | -.122 | -1.386 | .167 | -.017 | -.095 | -.078 | .405 | 2.472 |
| TwFxRC | .006 | .068 | .007 | .092 | .927 | -.017 | .006 | .005 | .486 | 2.057 |
| DkSxMedU | .021 | .053 | .028 | .395 | .693 | .069 | .027 | .022 | .627 | 1.595 |
| DkSxTiM | -.016 | .055 | -.021 | -.300 | .765 | .007 | -.021 | -.017 | .659 | 1.518 |
| DkSxToM | -.091 | .062 | -.133 | -1.467 | .144 | -.085 | -.100 | -.082 | .385 | 2.600 |
| DkSxTiC | -.101 | .059 | -.121 | -1.717 | .087 | -.073 | -.117 | -.096 | .638 | 1.568 |
| DkSxRM | .052 | .080 | .068 | .648 | .518 | -.079 | .044 | .036 | .285 | 3.507 |
| DkSxRC | .003 | .062 | .005 | .053 | .958 | -.096 | .004 | .003 | .380 | 2.634 |
| OkSxMedU | .026 | .056 | .030 | .462 | .644 | .037 | .032 | .026 | .761 | 1.315 |
| OkSxTiM | -.012 | .062 | -.014 | -.189 | .850 | .160 | -.013 | -.011 | .596 | 1.679 |
| OkSxToM | .042 | .069 | .051 | .610 | .542 | .070 | .042 | .034 | .456 | 2.195 |
| OkSxTiC | .082 | .068 | .099 | 1.204 | .230 | .130 | .082 | .068 | .468 | 2.138 |
| OkSxRM | .036 | .089 | .037 | .405 | .686 | .079 | .028 | .023 | .374 | 2.674 |
| OkSxRC | -.042 | .071 | -.056 | -.595 | .552 | .061 | -.041 | -.033 | .359 | 2.786 |

*Table XIV - Regression model with dependent variable flexibility*

| Model 15 | B | Std. Error | Beta | t | Sig. | Zero-order | Partial | Part | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|
| (Constant) | 3.530 | .073 | | 48.642 | .000 | | | | | |
| Dummy gender | -.043 | .097 | -.026 | -.439 | .661 | -.138 | -.029 | -.024 | .876 | 1.142 |
| Age | .127 | .049 | .158 | 2.615 | .010 | .268 | .171 | .146 | .846 | 1.183 |
| Media usage | -.055 | .049 | -.067 | -1.135 | .257 | -.202 | -.075 | -.063 | .890 | 1.123 |
| Trust in management | -.029 | .052 | -.037 | -.557 | .578 | .125 | -.037 | -.031 | .723 | 1.383 |
| Trust in colleagues | .084 | .057 | .104 | 1.464 | .145 | .116 | .096 | .082 | .615 | 1.626 |
| Trust of manager | .128 | .055 | .159 | 2.312 | .022 | .265 | .151 | .129 | .659 | 1.517 |
| Relation with colleagues | .047 | .060 | .057 | .780 | .436 | .104 | .052 | .043 | .583 | 1.715 |
| Relation with manager | .008 | .062 | .010 | .125 | .900 | .150 | .008 | .007 | .528 | 1.893 |
| Telework frequency | .246 | .050 | .306 | 4.913 | .000 | .407 | .309 | .274 | .802 | 1.247 |
| Domain knowledge sharing | -.047 | .049 | -.058 | -.952 | .342 | .049 | -.063 | -.053 | .841 | 1.189 |
| Organizational knowledge sharing | .111 | .050 | .138 | 2.220 | .027 | .247 | .145 | .124 | .807 | 1.239 |
| TwFxToM | .065 | .051 | .075 | 1.268 | .206 | .166 | .084 | .071 | .898 | 1.114 |
| DkSxTiC | -.089 | .048 | -.106 | -1.839 | .067 | -.073 | -.121 | -.102 | .938 | 1.066 |