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The importance of developing intellectual capital for innovative organizations:

Contributions from a HRM-perspective

1. Supervisor: Prof. Dr. Jan Kees Looise
2. Supervisor: Dr. Martijn van Velzen

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School of Management and Governance
OOHR

Author: Felix Zschockelt (s0116319)
Institution: University of Twente
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4 ½ years ago I bought a card with a statement from Johann Wolfgang von Goethe. It says:

"Erfolgreich zu sein setzt zwei Dinge voraus: Klare Ziele und den brennenden Wunsch, sie zu erreichen."

This statement guided me through 4 years of study and hopefully this final master thesis will end with the aimed and desired result.

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Abstract

This study, as far as known, provides the first integrative attempt to explore the role of intellectual capital (IC) in the relationship between human resource management (HRM) and two types of innovation (radical and incremental). An exploratory survey design with qualitative and quantitative data was used for investigating the topic in eight companies from the industrial and the service sector in the region of Twente, the Netherlands. The respondents were mostly HR directors.

Findings showed that there is no clear cut picture in what configurations of IC can be related to the two types of innovation. However, there is some support for relationships between certain HR-practices and intellectual capital, between single sub-components of the different IC configurations and different innovation types and also between single HR practices and the innovation types. Besides the elaboration of the diverse picture found on the relationship between HRM, IC and innovation this study addresses to methodological and conceptual limitations of IC which should be taken into account in future research.

1. General Introduction

Today's business environment is often described in terms of uncertainty and rapid change due to globalization, the rise of information technology (IT), the accelerating pace of technology development and more informed and demanding customers (John, Cannon & Pouder, 2001) to name just a few. Therefore, organizations operating in an environment in which the only certainty is uncertainty are required to frequently adopt and change (George & Jones, 2008). Today, speed and flexibility are more important than efficiency control (Rastogi, 2003). One way to respond to a frequently changing and challenging business environment is to innovate (Shipton, West, Dawson, Birdi & Patterson, 2006). Very broadly, innovation can be defined as "the intentional introduction and application within an organization of ideas, processes, products or procedures, new to the unit of adoption, designed to significantly benefit the organization or wider society"(West & Farr, 1990).

Organizations which are constantly innovating in the form of new business processes or products are likely to sustain and develop competitive advantage (Tidd, Bessant & Pavitt, 2005; Lopez-Cabrales, Pèrez-Luño & Valle Cabrera, 2009). Managing innovation has become as in many other research areas an extensive topic in human resource management (HRM) where different scholars argue that people, not products, are an innovative company's major asset and that people must be seen as a "directly productive force' rather than" an element of a production system' (Gutpa & Singhal, 1993¸ Shipton et al., 2006). The resource based view states that organizations with resources which are valuable, inimitable, rare and non-substitutable are likely to sustain and develop competitive advantage (Barney, 1991). Because employees, their capabilities and social bonds with others in the organization are more difficult to imitate for competitors than existing technologies or products, HRM should be viewed as a central and also strategic part in managing and determining innovation (De Leede & Looise, 2005).

Various researchers tried to find out and explain what HRM can contribute in the management of innovation (De Leede & Looise, 2005; Ramamoorthy, Flood, Slattery & Sardessai, 2005; Searle & Ball, 2003; Jimenez-Jimenez & Sanz-Valle, 2008). Whereas these scholars direct to the relationship between different HR-practices or HR-systems and innovation there is also another stream of research. This course argues that intellectual capital (IC) is positively related to innovation. They also additionally argue that IC could play a mediating or moderating role in the relationship between HRM & innovation (Darroch & Mcnaughton, 2002; Subramaniam &

Youndt, 2005; McElroy, 2002). IC gained the attention in the academic world due to the shift from the mass production economy to a more knowledge based economy which highlights the creation, development and retention of knowledge by employees (Bontis, 2001; Carson, Ranzijn, Winefield & Marsden, 2004; Tan, Plowman & Hancock, 2008). The word capital actually refers to the idea of creating value in response to an investment made.

Even if the conceptualization of IC seems to be a wide and never ending process until now and it has been defined in many ways, most researchers agree now on the definition that IC can be viewed as "the holistic or meta-level capability of an enterprise to co-ordinate, orchestrate, and deploy its knowledge resources toward creating value in pursuit of its future vision" (Rastogi, 2003). Nahapiet and Ghoshal (1998) argue that IC defined as "the knowledge and knowing capability of a social collectively" provide organizations with a valuable resource and potential for action and development. Usually, it is subdivided into three parts which are respectively human capital, social capital and organizational capital (Bontis, 1998, Edvinsson & Malone, 1997; Youndt, Subramaniam & Snell, 2004; Subramaniam & Youndt, 2005). This study will focus in detail on the aspects of human capital (Ross, Ross, Dragonetti and Edvinsson, 1997) and organizational social capital (Leana & Van Buren, 1999). Very broadly defined (detailed definitions of the concepts included in the research model will be given later on), human capital (HC) can be described as including knowledge, skills, attitudes and intellectual agility of employees (Ross et al., 1997). Organizational social capital (OSC) is seen as „a resource reflecting the character of social relations within the organization"(Leana & VanBuren, 1999).

Even if many scholars claim that IC will be positively related to enhance success, competitive advantage, innovation and financial performance (Brennan & Connell, 2000; Tan et. al, 2008) there is not much written about which HR-practices, HR systems or general business practices are likely to develop or maintain certain levels of IC with can improve the development of certain types of innovation (Chatzkel, 2006; Isaac, Herremans & Kline, 2009; Youndt et al., 2004). Subramaniam and Youndt (2005) found that different concepts of IC (organizational, social or human) were related to different concepts of innovative capability (e.g. organizational capital was positively related to incremental innovative capability whereas human capital interacted with social capital to positively radical innovative capability). But they did not attend to the way in which organizations can build up IC with respect to the need to increase innovative capability. Are there different individual HR-practices or HR-systems that might increase different parts of IC and innovation? Do some sub-forms of IC mediate the

relationship between HRM and different types of innovation? This makes it necessary to focus on the relationship between various routines (e.g. training & development, performance appraisal & job design) and resources of HRM (knowledge, expertise, employee attitudes) to create IC. HR practices used until now may no longer be aligned with the need to develop IC and there may be a need to adjust traditional forms of HR-practices (Lengnick-Hall & Lengnick-Hall, 2003). In times of globalization and rapid changes in work and employment relationships, organizations must understand how to create, develop and retain different types of knowledge or parts of IC.

The following study is going to examine the role of human and organizational social capital (an adjusted form of social capital) in the relationship between human resource practices (human resource planning, career management, performance appraisal and reward systems) and two types of innovation (radical & incremental innovation). More precisely, what is the relationship of human and organizational social capital with the two different types of innovation and how can both capital forms be established by human resource management practices. Therefore the central research question of this article can be stated as follows:

What is the relationship between intellectual capital (human and organizational social capital and different types of innovation and what types of HRM practices can be related to develop IC in order to facilitate innovation?

In order to answer the research question different sub-questions were formulated. First of all, it is important to review the most relevant literature on IC, its emergence, conceptualization and research findings. Based on this, arguments will be given for the use of a certain conceptualization of IC and its components used for the purpose of this study will be introduced. Having done this, it will be argued in how far different configurations of both aspects of IC, namely human and organizational social capital, could be related to different types of innovation. At the end it will be argued what different configurations of human resource practices could develop the different IC-configurations in order to facilitate different kinds of innovation. Figure 1 gives an overview of the research model. The precise sub-questions are therefore formulated in the following way:

- What is intellectual capital and what is its relevance?
- What different types of innovation are commonly used in present researches?
- Which different IC configurations can be related to different types of innovation?
- Which different configurations of HRM-practices can be related to different IC configurations?

1.1 Relevance

Given the current economic downturn many organizations are trying to compensate financial losses with the termination of employment contracts or through work-reduction schemes (Germis, 2008; NRC Handelsblad, 2008). Most of the companies even take a time out in recruitment and are relying on developing competences within the organization. Because an economic crisis also offers opportunities and not only disadvantages, organizations should now focus on using their existent competences and develop them in a way that they will leave the crisis with new strengths. Research in the area of sustainable advantage already suggested that the an organizations' knowledge, how the knowledge is used and how fast it can be used to create new knowledge can achieve a competitive advantage and also creates sustainability of competitive advantage, (Marti, 2001; Bollinger & Smith, 2001). Additionally, organizations which do not achieve a certain type of innovation in the long run are doomed to fail in the competition with other business rivals (Looise & Van Riemsdijk, 2004). Therefore, it is necessary to investigate how the workforce of organizations can be developed, managed, retained and stimulated to develop new or improve existing products or processes.

This research gives insights into the methods of how e.g. employees' skills, knowledge and relationships within organizations could be effectively managed in order to facilitate incremental and radical innovation. Optimally, this research should convince managers of the usefulness and actual relevance of IC.

More detailed, this study could offer three different insights to organizations. Organizations may gain insight in the relationship between two capital forms (human and organizational social capital) and the different types of innovation (radical vs. incremental). Second, they may gain insight in what types of human resource management practices are related to the two sub-components of IC. Third, findings of this research can be used in order to address the actual appropriateness of the present HR-management system and probably necessary adjustments. Research on innovation shows that many organizations strive for innovation but they often experience problems to achieve it. If organizations know which HR-practices apt to stimulate a certain type of innovation, the external fit between the organizational strategy and human resource policies could be improved (Baron & Kreps, 1999). Further, research argues that ambidextrous organizations, those which accomplish simultaneous exploitation and exploration, are more successfully than organizations which are only pursuing one type of innovation (O'Reilly & Tushman, 2004). Knowing which different configurations of IC and

HRM practices lead either to radical or incremental innovation may contribute to the progression in studies on ambidextrous organizations.

Beside the origin of the knowledge based economy as a driver for increasing attention to IC, the OECD (Organization for economic co-operation and development) calls for increased research and business attention on IC as well (Petty & Guthrie, 2000). Present research is still struggling with clear and definite conceptualizations which lacks empirical support because it was rather practice based. Whereas former research was based on the measurement of IC and different researchers linked IC to financial as well as innovative performance (Wu, Lin & Hsu, 2007; Subramaniam & Youndt, 2005) the fundamental question remains in which way organizations can create and develop IC to achieve these organizational outcomes. Because IC is seen as a strategic tool in the academic world to achieve a competitive edge in economic terms and innovation, research must focus on its development in order to apply these creation and development methods in practical situations.

Empirical studies on IC, as an example this research, even if it is not initially focused on the evaluation of different conceptualizations, can at the end contribute to different conceptualizations and can evaluate its actual appropriateness. This in turn will also advance the research on conceptualization and measurement because other researchers can base their future studies on current findings. Finally, this study contributes to both research fields of human resource management and intellectual capital in that, as far as known, no research could be found, which integrated the three fields of human resource practices, intellectual capital and innovation.

2. Theoretical Background

2.1 The rise of intellectual capital

The term intellectual capital (IC) has gained much attention in research and practical business due to the rise of the new "knowledge" economy which is reflected in the displacement of the mass production based economy by an economy based on information and knowledge (Rastogi, 2000). Whereas the recognition that people are valuable and of high importance to organizations is not new and traces back to 17th century when William Petty argued that the reasons for the wealth of a company lie in the values of workers, Stewart (1997) in a very famous cover story from the fortune magazine can be seen as the root for the increasing use of the term intellectual capital. His broad definition considered IC as "the sum of knowledge, information, intellectual property and experience held by everybody in a company, put to use to create a competitive edge and, ergo, wealth" (Stewart, 1997; Carson et al., 2004).

Generally, various research periods and research paths within the topic of IC can be found. Whereas the first period is grounded in the mid-1990's where the focus was primarily on raising awareness of the importance of IC and practical reports of IC in the relationship with firm value, the second period, since the end of the nineties, basically focused on measurement issues and how to report the value of intellectual capital (Petty & Guthrie, 2000; Carson et al., 2004). The third strand at this moment is trying to find a basic conceptualization out of the confusing range of various definitions of IC on which future research can be based.

Within these different periods different research paths evolved. The first path (so called strategy angle) focuses on the creation, development and use of IC to improve firm value without much attention to human resource management. The second path (so called measurement angle) focuses on new reporting mechanisms for IC which would enable non financial and qualitative items of IC to be measured in addition to traditional, quantifiable and financial data from a company's balance sheet (Petty & Guthrie, 2000). The famous balance score card from Kaplan and Norton can be considered as one example (Carson et al., 2004).

This study will concentrate on the strategy research path of IC. The focus is on the role of IC (human and organizational social capital) in the relationship between human resource management and different innovation types (radical & incremental). Therefore, the accent is not on a critical and empirical investigation of recent IC conceptualizations and to develop new ones. It is rather a focus on a frequently agreed conceptualization and its relationship with different HR practices in order to foster innovation.

In the following section a short introduction will be given about different definitions used to conceptualize intellectual capital which will ultimately lead to the conceptualization used in this research context. In addition, definitions of different types of innovation and HR practices will be given and arguments will be stated to what extend and how these different concepts can be linked to each other. Finally, this will result in propositions which will be empirically investigated.

2.2 Various conceptualizations of intellectual Capital

Screening the intellectual capital literature shows that theory about IC as a concept evolved from actual business practice rather than from a theoretical based approach (Petty & Guthrie, 2000). The sole reliance on traditional financial accounting practices was more and more seen as inappropriate to assess the overall value of a firm because they lacked the ability to highlight the value of intangible assets (Rastogi, 2003; Bontis, 2001). The raise of the knowledge economy makes it necessary to develop methods which highlight both values of tangible and more intangible assets. This becomes obvious in the fact that there is a wide divergence between market and book values of successful firms across a wide range of industries (Edvinsson, 1997; Rastogi, 2003). For example, Coca Cola, Intel and Wal-Mart had much higher market values than their actual book value (Fortune 2000, from Rastogi, 2003). IC is often seen as a proxy of the difference between market value and book value of a certain firm.

In 1994, the organization Skandia AFS was one of the first ones which approached the challenge to develop and implement a measurement of intellectual capital (Skandia Navigator) and integrated it in their annual report. They define intellectual capital as "the possession of knowledge, applied experience, organizational technology, customer relationships and professional skills" that provides Skandia AFS with a competitive edge in the market' resulting from the summation of human and structural capital (see Edvinsson, 1997).

Based on the efforts and partial success of Skandia more and more researchers tried to find a representative definition of IC. Whereas no overall agreement is found on a clear definition and on the different components included in IC there seems to be the general acceptance that IC is no one-dimensional construct but rather resides at various levels such as the individual, network and organizational level (Ross et al., 1997; Rastogi, 2003; Youndt et al., 2004).

Ross et al. (1997) see intellectual capital as a language for thinking, talking and doing something about the drivers of companies' future earnings. It includes relationships with customers and partners, innovation efforts, company infrastructure and the knowledge and skills of organizational members. They subdivide IC into two components which are human capital and structural capital. The OECD (1999) defines IC as the economic value of two kinds of capitals a company possesses which are respectively organizational ("structural") capital and human capital. This categorization is actually in line with the definition mentioned by Ross et al. (1997). In these two definitions human capital refers to the human resources within the organization (e.g. staff resources), structural capital refers to resources external to the organization (e.g. customers and suppliers) but also to internal resources as software systems, distribution networks and data bases.

Others researchers, like Youndt et al. (2004) add social capital to the typical two forms of human and organizational capital in their definition of intellectual capital. They define IC as "being the sum of all knowledge an organization is able to leverage in the process of conducting business to gain competitive advantage". Nahapiet and Ghoshal (1998) argue that social capital is a facilitator rather than a part of intellectual capital and define IC as "the sum of actual and potential resources embedded within, available through and derived from the network of relationships possessed by an individual or social unit". In their considerations human capital simply refers to individual employee's knowledge, skills and abilities whereas social capital is something that does reside neither at the individual nor at the organizational level because it is an intermediary form of intellectual knowledge in groups and networks of people. Organizational capital is seen as institutionalized knowledge and codified experience stored in databases, routines, patents, manuals, structures and the like.
Reflecting on the different opinions by various intellectual capital scholars, it can be seen that they see IC as being a strategic tool which can be used to improve the value organizations.

Even if they state different sub-elements of IC, it must be stressed that these different sub-elements are highly interrelated and that a disaggregation must be seen as erroneous (Rastogi, 2003). The principle of Gestalt psychology "the whole is more than the sum of all its subparts" describes IC probably best and different parts are said to require unique investment and management (Subramaniam & Youndt, 2005).

2.3 The research model of the study

The initial idea for the research model (see: Fig. 1) of intellectual capital is based on the articles from Tsai and Ghoshal (1998) who investigated the effect of intra-firm networks on product innovation, Leana and Van Buren (1999) who introduced the new concept of organizational social capital and Kang and Snell (2009) who argue that different kinds of intellectual capital configurations can be linked to exploitation and exploration. This research addresses their implications to extend the studies in order to focus on different types of innovation and also different types of capitals. Therefore, the research model here will include HR practices based on four dimensions from Gupta and Singhal (1993), human and organizational social capital and two types of innovation. The concept of social capital is modified in a minor way in comparison to common models of social capital in that it rather focus on the internal relationships and interactions between members within a specific company. This is what Leana & VanBuren (1999) call organizational social capital. The focus will not be on relationships with customers or other external agents such as inter-firm networks which fall in the category of social capital defined by various authors as e.g. Ross et al. (1997) and Edvinsson (1997).

Before a detailed definition about the components of intellectual capital and the focused human resource practices will be given, the different concepts of innovation will be introduced in the following section.

2.4 Innovation

Very broadly, innovation can be defined as "the intentional introduction and application within an organization of ideas, processes, products or procedures, new to the unit of adoption, designed to significantly benefit the organization or wider society" (West & Farr, 1990). During the 1950's innovation was seen as discrete event resulting from knowledge development by single and rather isolated researchers. Today, this image changed and innovation is viewed as a result of a process which's success rests upon the interaction and exchange of knowledge involving a range of diverse actors in situations of interdependence (Landry, Amara & Lamari, 2000; Chesbrough, 2003). Innovation is considered to be a highly relevant outcome variable for organizations because innovative organizations are likely to gain competitive advantage (Tidd, et al., 2005). The shortened product life cycle makes it necessary for organizations to frequently develop completely new products and/or processes or to improve existing ones so that they stay ahead of competitors who try to imitate. In fact, as Schumpeter said, innovation is a process of "creative destruction" in which organizations will

continuously seek for new ideas which will destroy old rules and will establish new ones (Tidd et al., 2005). To create new and better products or processes, organizations have to reallocate their resources and combine old with new resources in new ways (Tsai & Ghoshal, 1998). Innovation requires diverse resource inputs and combinative practices which makes resource exchange and cooperation as a requirement for innovation.

Different and numerous types of innovation can be found in the literature and researchers have different ways of distinguishing between these types. One distinction of frequently cited types exists between e.g. product and process innovation (Tidd et al., 2005). Product innovation includes changes in the things (products/services) which an organization offers (Boer & During, 2001; Tidd et al., 2005) whereas process innovation includes changes in the ways in which products or services are created and delivered. E.g. a new car design might be a product innovation, whereas the change in the manufacturing process to produce this new design in characterized as a process innovation. Product and process innovations can again be subdivided in the degree of novelty they involve. This is the classical dichotomy of radical versus incremental innovation. Radical innovation is considered with fundamental and revolutionary changes which require a clear departure from existing practices of how things get done and also fundamental adjustments to existing technology or the acquisition of new technology. Incremental innovation on the other hand contains minor improvements or just simple changes in how things get done over a long time. There are also just minor adjustments in the existing technology (Dewar & Dutton, 1986; O' Reilly & Tushman, 2004).

The basic difference between those two forms of innovation is the degree of knowledge and skills embedded in these innovations. Whereas it is argued that incremental innovation is related to specialized, in depth knowledge and skills in one particular domain of employees, radical innovation is associated with more broad, general and multi-type knowledge and skills of employees which can be used across domains (Hall & Soskice, 2004; Kang & Snell, 2009).

The possession of in depth knowledge and high specific skill levels leads an organization to a narrower, in depth search for well defined and clear solutions pertinent to existing knowledge domains which in turn can be related to more exploitation and incremental types of innovation. In contrast, broad and general knowledge combined with multi-type knowledge leads an organization to a broad and generalized search to expand current knowledge domains into new and unfamiliar areas which in turn can be related to more exploration. Exploratory learning refers to the generation of new ideas through the search for alternative viewpoints and perspectives (Shipton, 2006). This is likely to happen when employees are exposed to different

internal and external parties of the organization. Exploratory learning can be related to more radical types of innovation (Kang & Snell, 2009).

Recent research on innovative organizations found out that more and more organizations are trying to achieve both radical and incremental innovations but struggle to manage both of them simultaneously due to the complex management requirements. Successful organizations which achieve both radical and incremental innovation are called ambidextrous organizations because they have a special form of organizational structure (O´Reilly & Tushman, 2004). Based on the distinctions made above this research will concentrate on the classical distinction between:

1) Radical innovation
2) Incremental innovation

These different types of innovation are likely to require diverse intellectual capital configurations. In the following section, the research model of intellectual capital will be outlined. It will be argued how two different configurations of human capital (generalist vs. specialist) and organizational social capital (entrepreneurial vs. cooperative) can be linked to incremental and radical innovations.

2.5. Intellectual capital

In the context of this study, human capital (HC) can be described as including the knowledge, skills, attitudes and intellectual agility of employees (Ross et al., 1997). Various other scholars include additional concepts such as education and psychometric assessments (Edvinsson & Malone, 1997, Schultz, 1961). Human capital can be seen as a primary tool for an organization to learn by influencing the ability to acquire new knowledge (Kang & Snell, 2009) The focus here will be on competences, attitudes and intellectual agility because competences belong to the most frequently cited components of human capital (Ross et al., 1997; Martın-de-Castro, Navas-Lopez, Lopez-Saez & Alama-Salazar, 2006) and intellectual agility seems to be important with respect to innovation which will be explained in more detail in a later section. Employee's competences are seen as something what individuals are able to do or act within a company. It therefore includes the knowledge and skills. Knowledge is something that has to be learned and cannot be innate. Here, it refers to the technical and academic knowledge which can be related to the level of education of a person. Skills, in contrast refer to the practical application of knowledge.

Different researchers argue that employees should be able to work in teams and to network in order to facilitate knowledge sharing within the organization. If human capital (especially the knowledge component) is not networked, shared or channeled through relationships (organizational social capital), it bestows little benefits to the organizations in forms of innovation. Therefore, social skills are a crucial ingredient next to the more work relevant skills to develop a range of innovative capabilities (Carson et al., 2004; Subramaniam & Youndt, 2005). Leana and van Buren (1999) argue that social skills can be seen as an individual or collective characteristic. Based on this indistinctiveness, social skills will be seen as an individual characteristic in this research context. Talking about work relevant skills, the technical skills of employees can be more general or highly specific. Hall and Soskice (2004), on a more institutional or national level of analysis, argued that different skill profiles are related to different kind of innovations. Incremental types of innovation are more likely to be found in coordinated market economies (e.g. Germany & The Netherlands) where employees have highly firm or industry specific skills whereas radical types of innovation are often found in more liberal market economies (e.g. USA & UK) where employees have a broader skill profile.

Schuler and Jackson (1987) more generally, in comparison to Hall and Soskice (2004) state that organizations pursuing an innovative strategy should allow employees to develop skills which can also be used in other functions in the organization. Existing general knowledge can be used to develop completely new products or processes or to improve existing ones. Different studies already highlighted that employees who were better educated have more extensive work experience and invest more time and resources in honing their skills and are more able to contribute to organizational well being than those who are not educated and invest time and resources (Dakhli & DeClercq, 2004).

But whereas the statement that employees need to overcome a minimum threshold of skills and knowledge seems logic, the question remains what kinds of skills and knowledge can be related to certain types of innovation. In line with Hall and Soskice (2004), Kang and Snell (2009) argue that domain specific knowledge and skills can be related to the more effective acquisition and assimilation of new, in depth knowledge within a narrow range of parameters. This can be connected to exploitation and incremental types of innovation (O'Reilly & Tushman, 2004). On the other hand, generalist human capital with its multiple knowledge domains tends to have more various mental models and less cognitive conflict which makes possible a varied

interpretation of problems and situations. Broad knowledge also enables discovery, comprehension, combination and application of new knowledge from different domains. This all can be related to more explorative learning and explorative organizations are related to more radical innovations (O'Reilly & Tushman, 2004). Investment in education may reflect higher potential ability to create or improve new knowledge and skills and highlights that knowledge and skills of employees are important basic requirements for generating new and creative ideas. But knowledge and skills alone cannot explain the contribution of knowledge to innovation.

Attitudes are a vital part of HC (Ross et al., 1997) because employees with certain knowledge and skills do not always act in alignment with organizational goals (George & Jones, 2008). Rather, the accomplishment of organizational goals or objects also depends on employees' willingness and motivation to use their skills and knowledge and share them. Innovations require diverse research or project teams. Employees working in an innovative organization should therefore favour and also be willing to work in teams (Shipton et al., 2006). Even if there is no clear opinion about the effectiveness of team work in general, with respect to innovation, team work is said to be an important requirement (Jimenez-Jimenez & Sanz-Valle, 2008; Laursen & Foss, 2003). Effective team work is associated with better organizational performance but especially with creative and innovative ideas (Tidd, et al., 2005). Based on the distinction between more general and more specific knowledge and skills, one can argue there can and will be two different types of attitudes linked to the different skill and knowledge types. Specialists are said to be less likely to share knowledge in comparison to generalists (Kang & Snell, 2009). That highlights a crucial drawback for innovative firms in managing diversely educated employees. Even if scholars argue that knowledge sharing can be related to innovation in general (Sáenz, Aramburu & Rivera, 2009), it can be argued that a combination of general knowledge and skills with a more positive knowledge sharing attitude can be more related to radical innovation. Vice versa, a combination of specific knowledge and skills with a lower level of knowledge sharing attitude can be more related to incremental innovation. Additionally, because team-work is crucial for innovation in general, it could be argued that specialists may not see team work that important in comparison to generalists because specialists are less likely to share knowledge. And teamwork is obviously associated with combining and using different sources of knowledge and skills.

Finally, because exploration and radical innovation demand fundamental and revolutionary changes which include a clear departure from existing practices (Dewar & Dutton, 1986; O' Reilly & Tushman, 2004), employees and the organization in general need to take risks.

Therefore, employees should possess an “error embracing” attitude because radical innovation projects may be highly ambiguous and it takes long times to see the outcome effects of these projects. This is in line with Gupta and Singhal (1993) who state that innovation in general needs a sense of risk taking. Many organizations often do not take risks to launch new products or implement new processes because they do not see the initial potential of these new ideas or they decide that they do not fit to the current way of doing business (“not invented here”-syndrome, see: Tidd et al, 2005, page 469). If employees or the organizations do not take these risks, possible innovations will be forgone. The argumentation of what type of risk attitude can be linked to more incremental innovations seems to be complicated. As Gupta and Singhal (1993) and Tidd et al. (2005) state, a certain level of risk taking should be anchored in the organization. But in comparison to radical innovations, incremental innovations may be related to a more rule following and “error avoiding” attitude of employees. Employees who follow strict working guidelines and rules may have standardized processes of how work will be done. These standardizations and rules may bias problem solving activities because employees may use decisions that have previously been found to be useful. The reliance on previously used methods and decisions may lead to smaller, minor changes in products or process which are associated with incremental innovations (Kang & Snell, 2009).

The fourth sub-component of human capital is called intellectual agility. It refers to the ability to transfer knowledge from one situation to another, to use different sources of information, to link it together and the ability to improve both knowledge and company output through innovation and adaptation (Ross et al., 1997). This obviously seems to be a crucial aspect because people working in an environment where cooperation and information sharing between different actors is necessary will not work effective if they do not have the ability to combine and use different information or knowledge. More specific in terms of incremental and radical innovation, the ability to combine different sources of knowledge or information, the sharing of it and the ability to improve it seem to more relevant for radical than for incremental innovation. That does not imply that intellectual agility is not relevant for incremental ability but it seems to be even more significant for radical types of innovation for the following reasons. The general skill and knowledge characteristics associated with radical innovation imply that generalists possess and make use of more different sources of internal and external knowledge than specialists. To develop a radical new process or product, these different sources or knowledge domains have to be combined in order to achieve coherence. Vice versa, it may be the case that this ability may be to a lesser extent important for incremental types of

innovation than for radical types of innovation. In fact, Kang and Snell (2009) argue that specialists may be less likely to master knowledge across different domains in comparison to more generalists.

To sum up, two different configurations of human capital could be linked to two different types of innovation. *Generalist human capital* including general skill and knowledge, with team work orientation, knowledge sharing and error embracing attitudes and the ability to combine different external sources of information for successful generation of new ideas can be linked to exploration and radical innovations.
Specialist human capital including deep and embedded skills and knowledge in one particular domain, a lesser extend of team work orientation, reluctance to share knowledge, a more "error avoiding" attitude and the difficulty to master knowledge across different domains may be related to exploitation and incremental innovation.

It is important to notice that the different forms of intellectual capital will not be characterized as "strong" or "weak" but one should rather talk about "appropriateness" of the different capital forms. For example, a certain form of HC could include highly educated, skilled and knowledgeable people but this might not have an impact on certain types of innovation due to some other reasons. This does not say that this particular form of HC is weak. One should rather say that it is inappropriate with respect to achieve certain types of innovation.

Whereas human capital of an organization might develop single creative ideas, the actual implementation of new products, processes or services is most of the time dependent on more than one person (Mumford, 2000). This brings us immediately to the next relevant concept of intellectual capital which is called (organizational) social capital (Leana & Van Buren, 1999). Many researchers use the term social capital interchangeably with relational capital. Whereas relational capital is sometimes seen as something that exists between an organization, its customers and suppliers (Ross et al., 1997) other researchers also address the relationships between employees within a single organization (Nahapiet & Ghoshal, 1998; Subramaniam & Youndt, 2005; Leana & Van Buren, 1999). Social capital can act as a channel of knowledge exchange and combination within the organization. In this study, the emphasis will be on what Leana & Van Buren (1999) call organizational social capital (OSC). OSC is defined as "a resource reflecting the character of social relations within the organization".

Organizational social capital is important because the knowledge and resources embedded in these relationships do not lie within one single employee. Much knowledge and resources from individuals will be shared in a social context. This makes it an advantage for the organization because knowledge will not easily get lost and it is also unlikely that one person posses all organizational knowledge (Bourdieu, 1983). But on the other hand, it can also highlight a fundamental challenge for organizations. In order to develop OSC, information and knowledge has to be shared in a social context. Not all employees are always willing to share their knowledge. Additionally, a company which ensures that its own employees are embedded in networks of relationships that are difficult for competitors to observe, understand and imitate can contribute to sustained competitive advantage (Adler & Kwon, 2002).

Leana and Van Buren (1999) state that OSC has two sub-components which are associability and trust. The inclusion of these two components reflects the affective (relational) and cognitive dimensions of social capital but neglects a third, also common, structural component (Kang & Snell, 2009; Tsai & Ghoshal, 1998; Adler & Kwon, 2002). At the end, an additional third factor will be introduced which represents the structural component of social capital and will address the configuration of different relationships within an organization.

"Associability is the willingness and ability to subordinate individual goals and associated action to collective goals and actions" (Leana & Van Buren, 1999). This is a necessary requirement for a group to function effectively. Employees must be willing to agree and able to act on collective goals. This is a crucial point because the sole existence of relationships and interactions in an organization does not imply that individuals really work together in order to achieve collective goals. It is a well known fact that every individual has its own preferences and goals at work (George & Jones, 2008). Kang and Snell (2009) argue that employees with specialized knowledge may tend to act on their own interests at the expense of the interests of the whole. If individuals rely too much on their own preferences and goals they might exhibit detrimental behavior which will have a negative impact on the group or organization. The willingness to agree on collective goals must be combined with the ability to achieve these goals in a collective way through collective action. Work must be divided in a suitable and effective way and it must also be coordinated accurately in order to achieve the collective goals (Leana & van Buren, 1999). It is said that if employees have the same perceptions about what and how work must get done, possible misunderstandings can be avoided and there are more opportunities to exchange ideas and resources. If people agree on matters of how things or work must get done the whole organization is likely to work more efficient regarding to

cooperative behavior. Collective goals can be seen as a “bonding mechanism” which facilitates interaction and information sharing within the company. This in turn is also said to allow firms to engage more into knowledge acquisition (Li, 2005).

The second component of organizational social capital, included here, is considered to be trust (Leana & Van Buren, 1999). When someone says “You can trust me”, we usually don’t trust people immediately. It takes a long time to develop trust which makes it really difficult to find ways or practices with which organizations can enable trust. But yet, trust is necessary for people to work together. Trust can be defined as “an expectation or belief that one can rely upon another person’s action and words”, and/or that the person has good intentions towards oneself (Dirks and Ferrin, 2001). Leana and Van Buren (1999) distinguish between different types of trust within an organization.

The first subdivision can be made between resilient and fragile trust. Fragile trust is said to be “based on perceptions of the immediate likelihood of rewards”. Fragile trust transactions are often controlled by formal and contractual means. On the other side, resilient trust seems not to be evaluated on the likelihood of rewards but is rather based on the experience with the other party and the belief about their moral integrity of that party. In comparison to contractual means, transactions are here more controlled by norms and values of the relationship parties.

A second distinction can be made between dyadic or generalized trust. Dyadic trust can be defined as trust between parties which have direct knowledge about each other. Generalized trust relies to a lesser extent on direct knowledge about the other party but more on affiliation and reputation that rests with norms and behaviors that are generalized from others.

A lot of research has been done on the effects of trust in organizational settings. It can be developed or existent between various actors (e.g. between employees, groups, departments or between employees and the whole organization). Generally, trust has been linked to various outcomes such as more support from colleagues, positive work attitudes, higher levels of cooperation, improved communication, organizational citizenship behavior, lesser extend of rigid control mechanisms and other forms of workplace behavior and superior levels of performance. Trust is said to create the conditions in which theses outcomes are more likely to occur (Li, 2005; Dirks & Ferrin, 2001). But the most important outcome of trust seems to be the willingness to share knowledge. Tsai & Ghoshal (1998) already showed that people are more likely to cooperate effectively and share information if they trust each other. This is crucial with regard to the skill and knowledge profile of employees. It is said that specialists

are less likely to share their knowledge than generalists (Kang & Snell, 2009) which makes it obvious that practices should be created to facilitate trust with specialists.
Most literature about innovation mentions the autonomy and freedom necessary for employees when working on innovative projects (Jiménez-Jiménez & Sanz-Valle, 2008; Shipton et al., 2006; Gupta & Singhal, 1993). Therefore, if organizations manage to develop trust they reduce the necessity to monitor. This autonomy and rather loose control mechanisms are likely to be related to innovation. Tight monitoring and control mechanisms are said the reduce creativity whereas freedom and autonomy enhance creativity (Dakhli & DeClercq, 2004).

The third part included in the organizational social capital concept is the configuration of relationships and represents the structural dimension of internal social relationships (Adler & Kwon, 2002). The configuration of relationships can influence the opportunity, the actual amount and the quality of getting access to knowledge from other parties (Kang & Snell, 2009). Two common and frequently used patterns exist to describe relationships within an organization. The first pattern includes the strength of ties which reflects the tightness of the members (mostly indicated by the frequency of interactions). The second pattern comprises of the network density which mirrors the overall redundancy of connections in the network (mostly indicated by who interacts with whom) (Kang, Morris & Snell, 2007). Relationships can be more tightly coupled with strong and intense network connections or more loosely connected with weak and non redundant relationships (Ancona, Bresman & Kaeufer, 2002). These two configurations of relationships can be related to different types of innovation as will be argued in the following.

Having defined the 3 subcomponents, it is argued that 2 different configurations of OSC can be related to the different types of innovation. For reasons of simplicity, these two configurations will be labeled as *entrepreneurial OSC* and *cooperative OSC* (Kang & Snell, 2009). To summarize, organizational social capital in this study includes associability, trust and the configuration of relationships. OSC is said to contribute to the overall effectiveness of groups and organizations by reducing transaction costs, especially search, information, bargaining and decision cost. In general, the overall proposition of social capital theory with respect to innovation states that social capital helps to reduce breach of duty, fosters reliable information to be volunteered, cause agreements to be honored (creates legitimacy necessary for individual revolutionary ideas) and enable employees to share tacit knowledge (Shipton et al., 2006). Related to this point, one can state that social capital can also, next to volunteering reliable

information, enhance a person's or group's acquirement of external knowledge (Wu et al., 2007) which is important for "outside the box" thinking. Tsai & Ghoshal note that social interaction within organizations may allow innovators to cross formal lines and levels to find what they need. But social capital allows not only the reliance on prevailing knowledge but also the redefinition of the evolving body of this knowledge. Whereas Leana and Van Buren (1999) argue that social capital can also be barrier for innovation because long-term relationships, ways of operating as well as strong norms and specific roles may resist change, different characteristics of OSC can be related to different types of innovation.

More specific, exploitation is said to be enhanced by *cooperative OSC* which is configured by a tightly coupled system with strong and dense network connections, generalized trust based on membership and a rule following culture or strict reliance on more formal rules which reinforce efficient coordination. Strong and dense relationships are a favorable condition for sharing redundant but highly specialized knowledge because the high frequency of contacts enables employees to get access to idiosyncratic knowledge in particular domains (Kang, Morris & Snell, 2007; Ancona, Bresman & Kaeufer, 2002). Generalized trust enables employees to rely on and to cooperate with each other even if they do not have direct personal experience with each other. This is a valuable characteristic because exploitation, the deepening and refining of knowledge in certain domains, requires interdependent parties to cooperate as cohesive groups. Overall, the cooperative OSC configuration is argued to support efficient acquisition and integration of specialized, in depth knowledge, which facilitated exploitation and incremental types of innovation (Kang & Snell, 2009).

The second configuration which is labeled *entrepreneurial OSC* is more related to exploration. It is characterized by weak and non-redundant relational networks as well as resilient dyadic trust that is developed through personal experience. There is likely to be more reliance on collectively agreed goals and actions than on formal rules and employees have the opportunity and autonomy to define both the way work is organized and done.
Strong and dense social relations may reduce the ability of employees to explore various knowledge domains and to acquire more general and knowledge because strong and dense social relations may lead employees to a more narrow view with a lack of a more general "helicopter view" (Kang & Snell, 2009). More weak and non-redundant relationships may allow employees to be less embedded in relationships, thereby giving them the flexibility required to expand, acquire and absorb novel and diverse knowledge domains (Kang, Morris &

Snell, 2007; Ancona, Bresman & Kaeufer, 2002). Dyadic trust in turn requires less effort to build as well as limited commitment and therefore enables employees to develop weaker relationships that enable employees the access to more general knowledge from multiple domains and sources. Therefore, if organizations want to explore new ideas or solutions, dyadic trust allows the access to various but rather general sources of knowledge. Interesting to note, Hall and Soskice (2004) argue that a focus on more collective goals and action would rather lead to more incremental types if innovation. The reason therefore is that a more stakeholder model of corporate structure would cost time and effort to achieve agreement. In their opinion, the shareholder model of corporate structure can be linked to more radical innovations because formal rules and the power of top down decision making will be more likely to enable the organization to make direct radical changes. Table 1 summarizes the highlighted relationships between the different configurations and different innovation types. Based on the argumentation above the first four propositions can be stated as followed:

Proposition 1: Generalist HC is positively related to radical innovation.
Proposition 2: Specialist HC is positively related to incremental innovation.
Proposition 3: Entrepreneurial OSC is positively related to radical innovation.
Proposition 4: Cooperative OSC is positively related to incremental innovation.

2.6 Human resource management and IC

Today, many researchers (Darroch & Mcnaughton, 2002; Subramaniam & Youndt, 2005; Isaac et al, 2009; Petty & Guthrie, 2000) state that management of IC is important but until now there is no agreement on whose responsibility it is. Managing IC was basically addressed by a general management or financial accounting perspective (Boudreau & Ramstad, 1997) and focused on upper management layers and professionals. But because most of the employees working in organizations are not considered to be professionals and upper management (Isaac et al., 2009) and there are also other disciplines than financial accounting and general management theory, this study will investigate what and how HRM can contribute to manage IC also at lower organizational levels.

As different scholars (Youndt et al., 2004; Ross et al., 1997; Kang & Snell, 2009) already stated, each different aspect of IC requires special kinds of investments and no practice is likely to support the creation and development of all capital forms equally. Whereas, former traditional HRM was mainly active in developing human capital by formal activities of HRM,

today, HRM must also be more informal and facilitate relationships between individuals (Lengnick-Hall & Lengnick-Hall, 2003). Human resource management can be defined as "all management decisions and activities that affect the nature of the relationship between the organization and its employees" (Beer, 1984). Within their famous article about managing human resources for innovation and creativity Gupta and Singhal (1993) conceptualize HR-strategies that foster employees' innovation and creativity along the following four dimensions:

1) *Human Resource Planning*
2) *Career Management*
3) *Performance Appraisal*
4) *Reward Systems*

In the following section the four dimensions of Gupta and Singhal (1993) will be linked to the two different configurations of HC (generalist vs. specialist), OSC (entrepreneurial vs. cooperative) and innovation (radical vs. incremental). In the research model section, it is already argued that two different configurations of HC and OSC can be linked to either incremental or radical forms of innovation. Based on this, it will be argued that there may also be differences in HR-practices in order to create and develop the different configurations of the two capital forms.

Basically, organizations pursuing an innovative strategy are said to need the right skill mix of individuals with as well technical and social skills and the right skill levels (Schuler & Jackson, 1987; Gupta & Singhal, 1993; Jiménez-Jiménez & Sanz-Valle, 2008; Shipton et al., 2006). Once having the necessary employees they have to be rewarded in a way that will vary from more traditional performance appraisal systems which focus on quality or quantity. Performance appraisals should be design in a way that they motivate employees to take risks, pursue innovations to create profitable ventures, generate and adopt new ideas and do not create a "not invented here" attitude. Schuler and Jackson (1987) argue that performance appraisal should focus on the long-term and group-based achievements. But the question also remains whether the appraisal should be done by an immediate supervisor, by group members in form of peer feedback or by some kind of 360 degree feedback? Once performance is appraised, employees should be rewarded in a way that they keep on searching for new ideas and solutions and in a way that organizational goals can be achieved. Reward can be both monetary and non-monetary and it is said that traditional salary increases are not always the best way to stimulate innovative behavior (Gupta & Singhal, 1993). Reward systems should be

designed in a way that they provide employees with various kinds of freedom (more time, space or budget to work on own projects), autonomy, financial rewards, promotion or awards. Finally, careers should be managed in a way that they empower employees and provide them with continuous education and an innovative vision from senior management (Tidd et al, 2004; Gupta & Singhal, 1993). In the following section, more detailed arguments will be given in what way the four dimensions by Gupta & Singhal (1993) can contribute to the development of the different configurations of HC and OSC.

2.7. Human resource planning

2.7.1 Internal career focus vs. external career focus

The labor market structure shifted from an internal focus (with life-long employment in organizations until the 1980's) to a more external labor market orientation (more emphasis on employability). The main reasons were the increasing flexibility demands on organizations (Cappelli, 2008). The present economic recession may require a rethinking of HR practices and may develop a new trend to a more internal focus of developing employees again. It is no secret that many organizations have currently less open vacancies due to declining product or service demands and in order to save costs. This does not mean that organizations will not keep their eyes open for talents but the focus will be more on saving costs to survive the crisis. And frequently shown, organizations use the termination of employees to do this. But as long as possible, organizations should try, and many actually do, to keep employees in the organization with the additional support of different work reduction schemes supported by the government to reduce costs. Therefore, it can be argued that organizations should try to keep their employees as long as possible and rely more on an internal labor focus during the time of recession (NRC Handelsblad, 2008). This may enable successful development of new competences and maintenance of already existing ones to gain competitive advantage. Giving employees the opportunity to grow within the organization may have various advantages such as psychological well being, increased and highly skilled competences, higher levels of trust towards the organization and strong relationships between employees (Spector, 2004). In fact, those organizations that are able to retain their employees during the crisis and educate them further may gain all these benefits from it in comparison to competitors who do not. They keep already experienced and qualitative employees in the organization and save recruitment costs which would have been necessary if they would have laid off their employees and would have needed employees if product and service demands would have increased after the crisis. Because organizations also have to be flexible during the time of a recession, it can be argued

that those organizations who keep the rate of employee fluctuation (laying off employees when not needed and recruiting employees in times of demand) at a minimum, would gain more advantage than those who have a high rate of employee fluctuation. It seems logic that organizations with a high rate of fluctuation may have difficulties of creating or keeping a good organizational climate and may also have difficulties with the effectiveness of individual, teams and the whole organization.

Internal career opportunities are likely to affect company relevant and specialized knowledge, the development of more dense and strong internal networks, generalized trust and more reliance on formal rules in comparison to agreed collective goals and actions (associability) over time. The basic argumentation lying behind this point is that employees are co-located over their careers, share the same organizational membership and are therefore more likely to develop more frequent and dense relationships due to the time they have to do it. Because the network is characterized as dense, people are likely to trust each other based on their generalization from others. These dense relationships facilitate cooperation and efficient acquisition and integration of in depth knowledge which is associated with exploitation. On the negative side, these dense relationships may have the side effect of a more in-group function, what may hinder the development of new and diverse social relationships (Kang & Snell, 2009; Capelli & Crocker-Hefter, 1996).

The reliance of a more market based employment system with a focus on external staffing would rather develop weak social ties among employees which require resilient and/or dyadic trust. These weak ties facilitate the flexibility required to expand, acquire and absorb new knowledge which is associated with rather exploration that exploitation. Based on the arguments above the next propositions can be formulated as followed:

Proposition 5: Human resource planning with an internal labor focus is positively related to cooperative OSC.

Proposition 6: Human resource planning with a market based focus is positively related to entrepreneurial OSC.

2.7.2 Career Management

2.7.2.1 Training and development programs

Another way how organizations can promote their HC and OSC in order to meet market demands lies in the manner how they foster, develop and utilize their talents (Oldham &

Cummings, 1996). Bartlett (2001) maintains that training "can be viewed as a management practice that can be controlled or managed to elicit a desired set of unwritten, reciprocal attitudes and behaviors, including job involvement, motivation, and organizational commitment" and may thus also be likely to affect the two different capital types and the different types of innovation. Tansky and Cohen (2001) maintain that training and development opportunities can be viewed from a social exchange perspective. In turn for training and development opportunities, employees might consciously or unconsciously give something back to the organization. This may be in form of commitment (Barlett, 2001), organizational citizenship behavior or creative ideas. In fact, with regard to the employability concept, which accentuates the current responsibility of employees to stay employable, employees may perceive training opportunities not only as a requirement but also as a sort of implicit reward (Tansky & Cohen, 2001). If organizations offer training opportunities, employees may be more satisfied with employee development which in turn could influence innovation.

As Laursen & Foss (2003) claim, not only training for talents but for the whole workforce is expected to be a driver of higher success. Educated employees will also have enough or more capabilities to perform their roles and tasks effectively and are able to create new knowledge in a quicker and more elaborated way (Lado and Wilson, 1994; Tansky & Cohen, 2001). This is argued to be a basic requirement with respect to innovation because having the necessary basic skills is supposed to be a facilitating factor of innovation (Shipton, 2005). Research on the link of training practices and innovation suggests that training and development practices should include group training instead of individual training, on the job training rather than class-room education, broad skill education instead of specific skill education and a high frequency of long-term education programs (Laursen & Foss, 2003; Jiménez- Jiménez & Sanz-Valle, 2008, Schuler & Jackson, 1987; Shipton, 2006). If appropriately implemented, these characteristics could have an effect on innovation via the different forms of intellectual capital.

These authors did not distinguish between incremental and radical innovation but rather investigated innovation in terms of product, process and administrative innovation. A clear link between training program configuration and incremental as well as radical innovation is lacking. In relation to the two distinct configurations of HC and OSC different configurations of training and development programs can be related to these different configurations. The associated HR outcomes (different capital configurations) can be related to different types of innovation.

The first distinction can be made between skill based developments vs. function based developments which can be related to the different skill levels of human capital. In order to develop more firm specific and specialized knowledge, organizations need to develop training activities which focus intensively on the improvement of current job or function related skills (Guthrie, 2001). Focusing also on team based training it can be argued that team based training with an emphasizes on highly specific job related skills will be designed in a more in-group fashion with participants from similar functions or similar department (homogeneous) because knowledge and skills learned here can only be used within this certain department. It can be argued that networks or relationships within the organization would be denser as they already are because employees get to know each other even more.

On the other hand, general knowledge can be developed by general skill based development programs (e.g. cross training and training for interpersonal skill improvements) which emphasizes future demands and goes beyond the current job requirements. Cross training includes team based training with employees from various functions or departments (heterogeneous) including the education of knowledge and skills that can be used across different departments and functions. This type of training is said to increase the opportunity to have access to and to stimulate the experience of a wide variety of tasks (Kang, Morris & Snell, 2007). Training events including different employees from different departments may be by nature based on the improvement of more general skills and knowledge because the teaching of highly specialized knowledge and skills may not be suitable to all the departments. Due to the interaction during training events, employees may also get to know other employees from other departments. From them they may develop more weak networks which are important to have access to various sources of external general knowledge.

Shipton et al. (2006) argue that basic class-room education is no longer a universal tool for success. The importance of a team based application of training to develop knowledge and skills necessary for innovation is highlighted in various studies (Jimenez-Jimenez & Sanz-Valle, 2008; Laursen & Foss, 2003) and research has shown that the best development for employees occurs on the job. Team-based training, not necessarily with its own team, rather than individual training will be likely to enhance different parts of human capital (competences: learn from other people; intellectual agility: use information from other people and integrate it in problem solving) and organizational social capital (development of weak or strong ties, trust and associability) (Hollenbeck, DeRue & Guzzo, 2004). In fact, team based

training is said to outperform individual training in that team-based training results in better recall and team performance relative individual training (Liang, Moreland and Argote, 1995). Further, it is said that exposure to different viewpoints will make employees question the correctness of their own personal goals, ideas and problem solving approaches. By this, they are more likely to adopt and change their individual goals and methods in order to adjust to the more collectively accepted goals and methods (Lengnick-Hall & Lengnick-Hall, 2003).

To summarize, training and development programs can be developed in different ways to develop different configurations of human capital (generalist vs. specialist) and organizational social capital (entrepreneurial vs. cooperative). These configurations in turn can be related to either radical or incremental types of innovations. General development programs based on cross team training with team members from different department (heterogeneous) may be more related the development of general skill levels, team work skills and attitudes, the ability to use, combine and integrate various sources of external knowledge and weak networks. This configuration in turn can be related to radical types of innovations. Specialized and functional training programs based on team work with team members from one department may be related to the development of highly specialized skills and knowledge, the ability to use and combine more internal, in-depth knowledge sources and more strong and dense networks. This configuration can be related to more incremental types of innovations. The argumentation above shows that human and organizational social capital offer interesting research opportunities with regard to innovation.

Proposition 7: The availability of general skill based training programs is positively related to generalist HC.
Proposition 8: The availability of function based training program is positively related to specialist HC.
Proposition 9: Heterogeneous team based training is positively related to entrepreneurial OSC.
Proposition 10: Homogeneous team based training is positively related to cooperative OSC.

2.7.2.2 Job Design

How the actual work is designed will also be likely to contribute to the development of intellectual capital and innovation. George and Jones (2008) define job design as “the process of linking specific tasks to jobs and deciding what techniques, equipment and procedures should be used to perform those tasks”. In order to foster innovation, different scholars

(Jiménez-Jiménez & Sanz-Valle, 2008; Gupta & Singhal, 1993) agree that HR practices should enable employees to have enough time to develop new ideas, have flexibility in job definition, job enrichment, job rotation, autonomy, participation and involvement in decision making and fluent communication.

Job rotation can be seen as an opportunity to develop and advance human and organizational social capital. Job rotation can be defined as assigning employees to different jobs on a regular basis (George & Jones, 2008). Innovative companies often encourage employees to take different assignments or work for different departments. Job rotation includes basically more horizontal movement with comparable responsibilities and requirements as in comparison to vertical movements. Job rotation is supposed to be related to the acquirement of different points of views, new general and broad knowledge as well as skills but also new contacts with different and new people.

But the link from job rotation to innovation might be more obvious than the link from job rotation to human and organizational social capital. E.g. job rotation between core employee (categorized as unique and high level of human capital; Lepak & Snell, 1999) might be more related to exploitation because it can strengthen the network ties and facilitate in depth knowledge transfer (Kang, Morris & Snell, 2007). But clearly, the opportunity for organizations to rotate core employees may be limited because the current knowledge and skills within these employees is highly specialized and may not be useful in many other functions or departments. In case of job rotation there may be more rotation with one field of specialization or hierarchical movements within that field. These rotations within specialized areas or more hierarchical movements allow access to more specialized knowledge or may stimulate employees to invest in particular knowledge domains. Additional in depth knowledge is necessary in order to get promoted and vertical promotion will also assist in the acquirement of more in depth knowledge.

In order to develop generalist human capital, job rotation between general employees who posses more common skills and knowledge useful for other functions and departments might be a well suitable tool to stimulate the access and creation of new general knowledge and skills. These flexible work structures would promote the exchange of different knowledge and skill domains from different functions and practices which will lead to a more exploratory learning approach.

Whereas one could argue that job rotation might create social bonds and ties it is questionable if the frequent rotation enables employees to develop the same types of trust. Frequent rotation

to different teams might allow different employees from different departments to get to know each other. The rotation of general employees might be more associated with the development of dyadic trust and weak and redundant networks. Access to various different knowledge and skill domains may stimulate employees to network with other employees to get access to other valuable knowledge domains. In contrast, the rotation of core employees strengthens the relational networks since they stay in one area of specialization. This can associated with the development of more generalized trust because some relationships may be based on membership so that people who not frequently interact with each other also trust each other because they generalize the trust from other strong relationships. Specialists may trust employees from their own field more on a general basis.

Laursen and Foss (2003) state that innovative behavior can be improved by decentralization. In that sense, problem solving rights are delegated to the shop floor level. Decentralization or the level of autonomy allows better discovery of local knowledge because employees at the shop floor level actually have the knowledge and insight to make adaptations or improvements. Therefore, employees should be empowered, up to a certain point, to frequently make necessary decisions, adoptions or improvements not only about the design or function of products but also about the way they perform their job, make decisions and set their own performance goals (Kang & Snell, 2009). Innovation may be like a trial and error process in which the fittest product will survive for some time. Above this, generating a new innovative idea and implementing it in a new product or process may take a long time (George, 1988). This makes it necessary that employees are allowed to take risks, experiment, use different approaches and make certain decisions on their own. It seems to be of great importance that this is clear for every single employee (Gupta & Singhal, 1993). Tight monitoring would rather have a negative impact on employee's creativity (Dakhli & DeClercq, 2004). Employee's empowerment can be used as a tool to stimulate risk taking and the perception that mistakes in development processes are a natural by product. As Gupta & Singhal (1993) argue, employee's self esteem can be enhanced by giving them the authority to solve problems or make decisions if their given authority fits with work demands. Employees high in self esteem and with a high amount of empowerment are said to be more creative and innovative than employees without these attitudes and characteristics. Laursen and Foss (2003) and Gupta and Singhal (1993) also highlight the importance to give employees the time and also money to develop new ideas. Based on this argumentation, different aspects of job design can be related to different configurations of HC and OSC. Therefore, the following propositions can be stated:

Proposition 11: Job rotation of core employees is positively related to cooperative OSC.

Proposition 12: Job rotation of general employees is positively related to entrepreneurial OSC.

Proposition 13: Autonomy is positively related to entrepreneurial OSC.

2.7.3 Performance appraisal and reward systems

In order to improve and maintain employees' job performance and job skills, it is necessary to appraise employees' performance (Spector, 2004). Performance appraisal can be defined as "a continuous process of identifying, measuring and developing the performance of individuals and teams and aligning performance with the strategic goals of the organization" (Aguinis, 2009). Optimally, it should correctly appraise employees' performance, give feedback and should be combined with the possibility for coaching in order to improve performance and also with rewards for good performance of employees. Feedback during the appraisal process leads to the recognition of detrimental performance gaps which probably could be solved in order to increase performances at the individual, group or organizational level (Shipton, 2006). If appraisal would not be coupled on feedback, coaching or training opportunities, employees may be likely to feel helpless and de-motivated which could result in even lower performance.

Whereas different studies have shown that performance appraisal can increase productivity and quality (Aguinis, 2009) it is also important to investigate the impact on intellectual capital and innovation. As stated above, it becomes clear that performance appraisal is likely to increase the human capital (through detecting performance gaps and improving knowledge and skills) which in turn could foster different types of innovation. In general, performance appraisal can be subdivided into separate categories such as individual vs. collective, short-term vs. long-term and result vs. process appraisal.

These different forms of appraisal may be linked to different configurations of HC and OSC in the following ways. Performance appraisals that focus on collective achievements may be more likely to enhance and also more suitable for strong and dense ties of networks within the organization as well as generalized trust (cooperative OSC). But social loafing (one or more employees do not work as hard as others but may get the same performance appraisal) may be the drawback of collective performance appraisal (Spector, 2004).

Individual performance appraisal in turn is more associated to stimulate employees to focus on their own performance which can have negative effects on the overall goal of the team or

organization as well but also discouraging social loafing. Individual appraisal could stimulate employees to build various weaker relationships to get access to different knowledge domains in turn to increase the possibility of good performance. These various relationships would be based on dyadic trust (entrepreneurial OSC). Therefore, the most positive effect may be achieved if individual performance appraisal targets on the acquisition of new ideas and knowledge (pay for knowledge).

Other questions according to performance appraisal arise whether it should be short or long-term oriented and process or result oriented. Because innovation in general is seen as a process which takes a long time one could argue that performance appraisal based on a long-term orientation would be more advantageous than a short term orientation for all types of innovation. But because incremental innovations are associated with small, non revolutionary changes it can be argued that incremental innovations could be more related to short-term appraisal with more appraisals than once a year. Short-term appraisals may be suited for an "error avoidance" (specialist HC) attitude because people performance is frequently appraised and suggestions for further improvement could be given. Indicators for radical innovations may not be seen early enough that frequent performance appraisals would make sense. Therefore, radical innovations may be more related to long-term appraisals (generalist HC). These long-term appraisal would give employees the necessary room and empowerment for explorations and also stimulate an "error embracing" attitude because employees would not be monitored as frequently as employees who are appraised on a short-term basis.

With respect to process or result oriented appraisal, one could argue that result oriented appraisal would fit more to radical innovation, because employees are judged by the final result and not by the way how they invented or implemented it. On the other hand, a process orientated appraisal can also be related to innovativeness but to the more incremental types of innovation because the focus is on how thing were achieved and improved. In fact, process orientated appraisal focusing on the development of small, non-revolutionary change must have to be combined with short term appraisal because the detection of these small and frequent changes may need frequent appraisal. Contrariwise, result oriented appraisal may give employees the necessary room for exploration.

As already stated performance appraisal most of the time is combined with reward systems (Laursen & Foss, 2003). Based on employee's appraisal, employees should become rewarded to stimulated positive work attitudes and further positive work performance. Various

opportunities exist to reward employees, e.g. giving them a promotion, pay for performance, giving them a bonus or a higher salary. Organizations most of the time use a combination of monetary and non- monetary compensations (Gupta & Singhal, 1993).

For example, seniority based compensation (fixed bonuses, gain sharing or profit sharing) and internal promotion (job enrichment) may stimulate employees to stay in the organization and therefore also the creation of strong and dense ties with colleagues (Kang & Snell, 2009). Strong and dense ties require a long time to be developed.

In contrast to seniority based compensation, performance based compensation (e.g. individual incentives to learn new knowledge) and more horizontal promotion opportunities (job enlargement) could stimulate employees to build various relationships to get access to and also learn new knowledge and ideas. Based on the above mentioned arguments, it seems plausible that individual, long-term and result based appraisal in combination with individual performance incentive to learn new knowledge and ideas as well as horizontal promotion opportunities could be related to radical innovation. In turn, collective, short-term and process oriented appraisal in combination with seniority based compensation and vertical promotion opportunities could be linked to incremental innovations.

Proposition 14: Collective, short-term and process oriented appraisal in combination with seniority based compensation and vertical promotion opportunities are positively related to specialist HC and cooperative OSC.

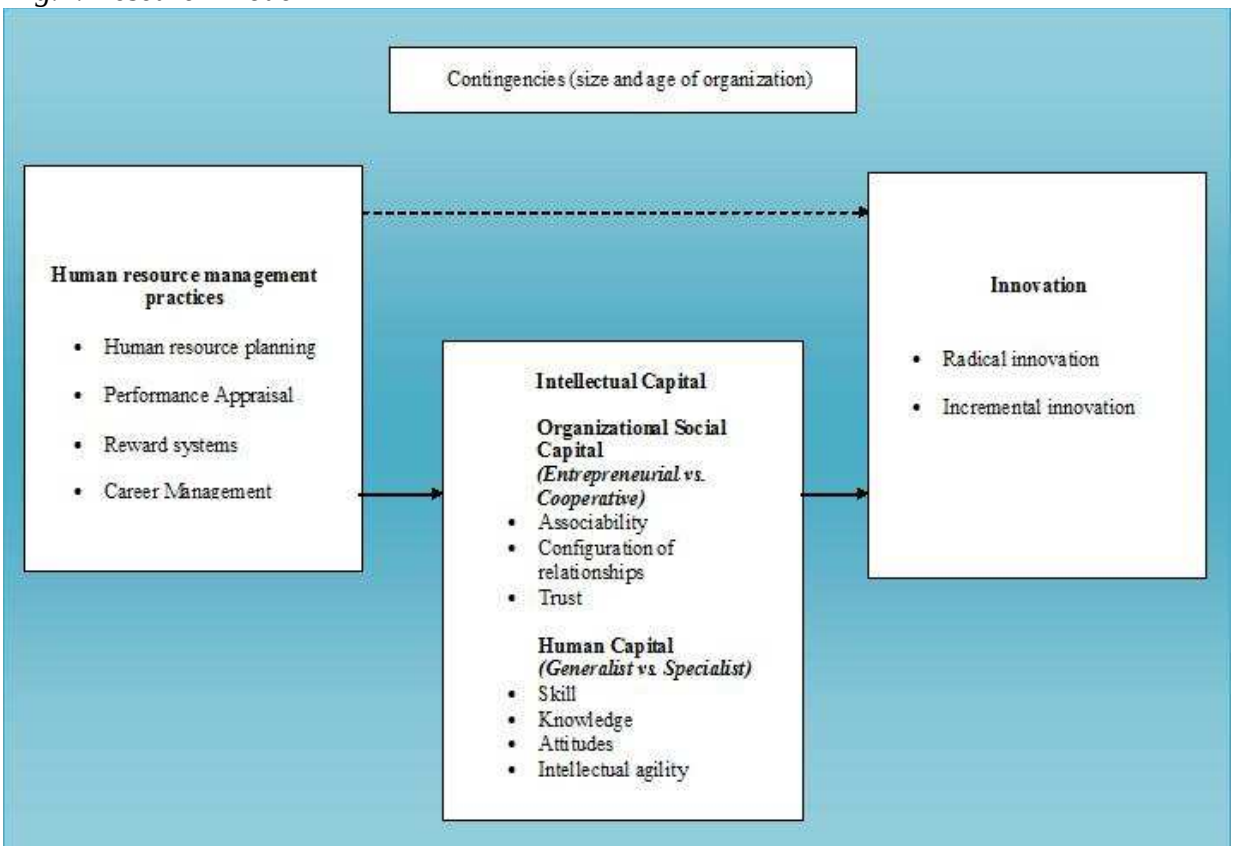
Proposition 15: Individual, long-term and result based appraisal in combination with individual performance incentive as well as horizontal promotion opportunities are positively generalist HC and entrepreneurial OSC.

Table 1 summarizes the main propositions in this research and figure 1 illustrates the research model including all focused research variables.

Table 1: Theoretically proposed relationships

Human Resource Practices	Intellectual capital	Innovation
	Generalist HC Entrepreneurial OSC	Radical innovation
	Specialist HC Cooperative OSC	Incremental innovation
Specific Training	Specialist HC	
General Training	Generalist HC	
Market based human resource planning Heterogeneous Training Job rotation between different areas of specialization Autonomy	Entrepreneurial OSC	
Internal labor focused human resource planning Homogeneous Training Job rotation within one area of specialization	Cooperative OSC	
Process appraisal Group appraisal Short term appraisal Seniority based compensation	Specialist HC Cooperative OSC	
Individual appraisal Long term appraisal Result based appraisal Performance based compensation	Generalist HC Entrepreneurial OSC	

Fig.1: Research Model



3. Methodology

3.1 Unit of analysis

The main purpose of this study was to set the first stage for an integrative model of the concepts human resource management, intellectual capital and innovation. Based on this, the study had an exploratory nature. In order to collect data, a criterion-based selection was used (LeCompte & Preisse, 1993). Eight organizations (one medium -sized organizations, all the others are larger than 250 employees) in the Twente region, located in the eastern part of the Netherlands were selected for data collection. In selecting the units for this study I used as a criterion the *need* for innovation, rather than merely innovative organizations. For this purpose the organizations were selected from two different economic sectors (manufacturing and service industries). The respondents were mainly chosen from within Human Resource departments. Most of them were HR directors, one was the general director. Out of eight companies, six were profit organizations and two were non-profit organizations. In addition to industry, organizational size in terms of number of employees differed as well ranging from 150 to 3500. Organizations were sent an e-mail with a briefing about the content, relevance and procedure of the study. If the organization confirmed interest in participation appointments

were made to conduct a first semi-structured interview with the HR-director of a certain company. Before the actual interviews took place, an introduction about the topic was sent to the interviewee to give them the necessary preparation for the interview (Creswell, 2003). Interviews were carried out in the period July-August 2009.

3.2 Method and instrument

A triangulating research approach was used, combining qualitative and quantitative methods. Face-to-face interviews were followed by a questionnaire (see appendix). Here, the reasoning was that the interviews were supposed to give a broad understanding about the views and insights of participants regarding the research variables. Besides, it could give them better understanding of the concepts and whole research for further ensuring clarity of questions when filling out questionnaires. In addition, it is believed that two different types of methods can compensate the weak sides of each kind of research (Cooper & Schindler, 2008).

The duration of each interview was approximately 60 minutes. Twenty-four items were included in the interview protocol. Interviews were semi-structured. Due to the international background of the researchers interviewees were asked beforehand if the interviews could be done in English even if the interviewees were not native English speakers. All of the participants agreed. Nevertheless, interviewees were allowed to use their native language if problems with explanations arose during the interview. Each interview was recorded with the permission of respondents and transcribed. The detailed transcriptions were sent to all companies for their confirmation or comments to eliminate misunderstanding and was used for data analysis. Open questions were designed in a way that general attitudes and insights were caught towards each variable. Considering the suggestions by Waldman et al. (1998), reliability was assured by using interview protocol in a way that questions were asked in the same sequence to all respondents. First, participants were asked if they recognized the existence of certain variables in the company and were asked to describe main features of them. Other questions referred whether companies set priorities on certain characteristics. Then, they were asked to describe the value of those variables and if they experienced a need to improve them in the future.

Interviews were followed up with detailed questionnaires handed out to the interviewee. Participants were given the freedom to fill them out in collaboration with other employees but had to notice that. Four out of six companies used additional colleagues (out of these only one was not an HR-employee) to answer the questionnaire. Based on the guidelines from DeVellis

(2003) and Yin (2002) and the theoretical conceptualization elaborated in the theoretical background section a first pool of questions was developed. Through frequent discussion with academics active in the focused research fields some of the questions were critically evaluated and adjusted to fit the purpose of this study. The questionnaire was based on a five point Likert scale with 1 for totally disagree to 5 with totally agree. There was also the opportunity to denote when a questions was not applicable by indicating the number 0. A limited number of open ended questions were also included. Questions included constructs adopted from previous researches and were specifically structured for this research.

The questionnaire was structured in a way to measure the existence of IC constructs, two types of innovation (explorative and exploitative) and HR practices (Human resource planning, career management, performance appraisal and reward systems). For the assessment of our outcome variable the questions were posed to ask the percentage of revenue coming from completely new products and the percentage of revenue coming from improved products. Participants were also asked to indicate to what extent they recognize minor or major improvements in the core business of the organization. For measuring IC constructs, questions where designed based on Ross et al. (1997), Subramaniam & Youndt (2005), Leana & Van Buren (1999), and Kang & Snell (2009. The questions measuring HR practices and pre-conditions were constructed specifically for this research. In addition to interviews, annual reports, organizational charts and company websites were used. Before presenting the results, it should be mentioned that in-depth interviews were held with representatives from eight organizations whereas the questionnaire was filled out and returned by six of these eight organizations.

3.3 Analysis

Transcription protocols for each interview were written to become a clear overview of what has been said according to the different research variables. A cross case analysis was done for the 8 interviews. Quantitative data from the questionnaire was intended to be analyzed with SPSS. However, a first reliability analysis showed very low reliability for especially the OSC variable and not sufficient reliability for other parts which revealed problems for statistical data analysis. Therefore, data from the questionnaire was analyzed by coding the responses. Hence a five point Likert scale was used, questions above 3 were used as an indicator for the presence of a certain practice or concept. Logically, questions below 3 were used as an indicator for the absence. Additionally, means were calculated in order to make comparisons.

4. Results

4.1 General findings

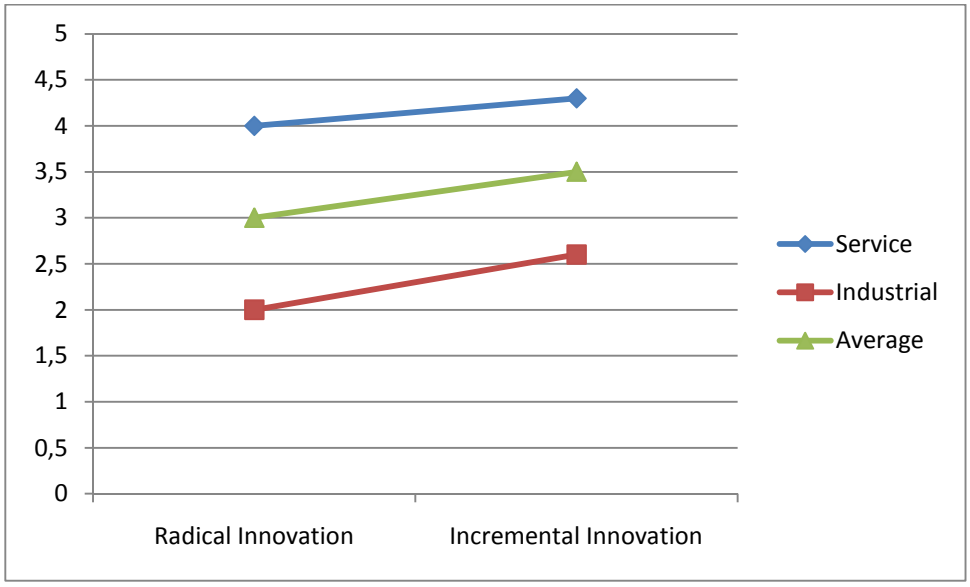
The purpose of this paper was to investigate how and if different configurations of intellectual capital and human resource management can be related to two distinct innovation types. In the following section findings on all concepts will be reported separately before arguments will be given in the discussion part whether it is possible to integrate and link them to each other.

General findings about the research showed that respondents did not have a clear understanding about all research concepts. Especially the concepts of innovation and trust were problematic even if participants at the beginning claimed that they have a clear understanding. After giving more detailed explanations to prevent misunderstandings, it was mostly found that all the research variables were recognized in all of the companies to different degrees. All of the companies for instance indicated that human resource practices, human and organizational social capital and innovation are highly important and valuable. Noticeably, all of them stated that there is always the challenge for improvement even if there is not a dramatic need for it.

4.2 Innovation

The first striking result from the interview data was that only the minority of the interviewed companies can be said to have a strategy for innovation. The majority was found not to have an R&D department. Except for one company, all participants perceived their innovative performance as good with the awareness for further need for improvement. But there was no priority for any certain type of innovation from the two mentioned ones. Companies from the service sector were found to be generally more innovative (in terms of both types of innovation) than the industrial companies. According to the two types of innovation, incremental innovation was found to be higher than radical innovation in both sectors (Fig. 2 shows average scores of each sector and the general average). Two companies (one from each sector) explicitly stated that the number of ideas suggested for improving existing products or services where higher than the ideas suggested to generate completely new products or services. However, the measurement of the innovation concept was difficult since only 2 out of 6 questionnaires gave additional information such as investments made in and revenues gained from innovative projects.

Fig. 2: Types of innovation in service and industrial sector



During the interviews, organizations were asked about problems they face during the innovation process. Common answers (summation from all companies) are congruent to the literature on innovation (e.g. Tidd, Bessant & Pavitt, 2005); they refer to different levels such as governmental level, organizational level and individual level. On the governmental level one organization stated that European restrictions and environmental aspects do have an impact on the room of maneuver for radical innovations. For example, there are certain norms and therefore limitations in the chemical components they use for the development of their products. On organizational level, the structure of the organization and its tradition can be seen as a problem for the companies. One respondent for instance indicated:

> *"I think the background of this organization is traditional […].Many employees cannot do their task without any structure […]. That kind of acting is not good for innovation."*

Structure can create boundaries for employees and the whole organization in which outside the box thinking and acting may be restricted. Moreover, there is often a lack of time, money and especially knowledge for radical innovations. Additionally, frequent interactions with customers and frequent changing demands are highlighted as a problem in the innovation process. Finally, the individual level deals with people who have to be convinced of changes in products and processes and the requirement for a more entrepreneurial attitude.

4.3 Intellectual capital

To summarize the arguments, it was claimed that *specialist HC* (specialized skills & knowledge, error avoiding attitude, low intellectual agility) and *cooperative OSC* (reliance on formal rules, generalized trust, strong and dense network connections) can be linked to *incremental innovation* while *generalist HC* (general skills & knowledge, knowledge sharing & error embracing attitudes, high intellectual agility) *and entrepreneurial OSC* (collectively agreed goals, resilient dyadic trust, weak and non redundant relational networks) are associated with radical innovation.

4.3.1 Human Capital

When talking about human capital during the interviews, most of the HR directors denoted that they have a clear picture of what skills and knowledge are available and also what skills and knowledge are needed in order to meet future demands. The improvement of HC in order to meet future market demands was seen as a constant matter by all participants. The skill and knowledge profile was judged to be dependent on the type of department employees were working in but on general, the average employee of both sectors was described as being equipped with more general skills and knowledge which can also be used in other departments and organizations. Employees from the industrial sector were found to be more generally and broadly educated in comparison to the service sector. The existence of employees with highly specific skills was also recognized but to a minor degree. For instance one participant said:

> *"We have a small number of people with very special skills. If they leave, we are in trouble."*

When talking about employee attitudes, a frequently mentioned phenomenon during the interviews was that a small number of specialists is seen to have an error avoiding attitude. Two respondents indicated:

> "*They have a tendency to make everything perfect."*

> *"The problems with engineers is that everything needs to be 100%, anything less is not good enough…sometimes I think 100% is only good enough, but it blocks certain developments, because sometimes you can only achieve improvements through trial and error process".*

This was sometimes seen as a drawback by the participants in matters of time which is in line with Kang & Snell (2009), who state that specialists may be attributed with an error avoiding attitude.

Questionnaire data showed that there were slight differences according to the sectors with the industrial sector scoring higher on risk embracing in comparison to the service sector. But still, on average there is neither a dramatic tendency towards risk avoidance nor towards risk embracing attitudes since the average scores on error avoidance is around the mean.

Whereas HR-directors in the interviews stated that teamwork and project orientation are a fundamental part of the organizations, the questionnaire data did not support this claim. Respondents from the industrial companies gave overall neutral responses on team work orientation and the service sector was found to be slightly more positive than neutral. According to the attitude of sharing knowledge a clear positive picture was found. Both segments showed a very positive knowledge sharing attitude with the industrial segment scoring marginally higher that the service segment. Table 2 and Figure 3(see appendix) summarize the findings on human capital by indicating the average scores of each sector on each sub-part of HC and the general average scores. High scores for instance on general skills & knowledge imply low scores for specific skills and knowledge at the same time.

Table 2: Human Capital sub-components between sectors

Human Capital	Service Sector	Industrial Sector	Average
General skills/knowledge	3.8	4.2	4.5
Team work orientation	3.3	3.1	3.0
Knowledge sharing attitude	3.6	3.8	4.0
Error embracing attitude	2.6	3.0	3.3
Intellectual agility	4.3	4.0	3.7

4.3.2 Organizational social capital

According to organizational social capital, all HR-directors indicated that mutual relationships between employees are seen as very important. While speaking about organizational social capital, it was obvious that HR directors did not just talk about inside but

also about outside relationships. Both were seen as equally important for the overall performance of the organization. Especially cooperation with other external institutes like universities or other business partners was recognized as a tool for knowledge creation and sharing. Whereas HR directors indicated that they have to constantly improve HC, the improvement of relationships was seen as important but there was no dramatic need to improve them. Building relationships was stimulated in all organizations rather than stifled. Organizations highlighted both formal and informal ways of building relationships. Based on the findings from the interviews and questionnaire it is somewhat difficult to give clear detailed findings on OSC. With respect to associability, it was indicated that a rule following culture was only found in one of the companies. It is important to note, that this is the same company that labeled its innovative performance as "poor". The other companies were found to collectively agree on goals even if the response is not very positive. There were no differences according the sectors. Slightly more support for a tightly coupled system with strong ties and dense networks was found in contrast to weak and non-redundant relational networks. Trust was found difficult to be judged by the respondents because trust is complicated to be measured in a subjective way. There was an obvious lack of consensus what trust really is also after the explanation of our definition. Trust was frequently associated with the satisfaction, commitment and loyalty of employees. The following extracts should highlight the lack of consensus and the various perceptions of what trust is in the eyes of the participants:

> *"It is quite difficult to say can you give a general rating of trust."*

> *"It varies from department to department. But in general I can say that personnel in this company is very committed to what they´re doing. They are very loyal. In general they are happy working for (company name). I think in general there is trust."*

> *"Once trust has been earned it is for always."*

Being aware of that, one has to be careful in interpreting the results that resilient trust was found to be more present than generalized trust. Both tightly coupled systems and resilient trust was found to be higher in the service sector. Table 3 and figure 4 and 5 in the appendix summarize the findings for cooperative OSC and entrepreneurial OSC respectively.

Table 3: Organizational social capital between sectors

OSC	Service Sector	Industrial Sector	Average
Loosely coupled system	3.3	3.5	3.4
Resilient dyadic trust	3.6	3	3.3
Collectively agreed goals	3	3.3	3.1
Tightly coupled system	4.1	3.8	4.0
Generalized trust	2.3	3	2.6
Rule following culture	2.3	2.3	2.3

To summarize the findings of HC and OSC it is difficult to give a clear picture of whether there is a definite tendency for more generalist or specialist HC and whether cooperative OSC or entrepreneurial OSC is present. It was found that most companies indicate positive scores on broad skills and knowledge, a knowledge sharing attitude, intellectual agility and more neutral responses at team work orientation and error embracing attitudes. This could cautiously be interpreted as more support for generalist human capital than specialist human capital. The picture on organizational social capital is even more confusing in that both aspects of entrepreneurial OSC (resilient trust and collectively agreed goals) and cooperative OSC (tightly coupled relations) were found. To make it even more complex, the configurations also varied between the two sectors.

4.4 Human resource practices

Some HR-practices were neither found to be explicit nor formalized. For instance, mostly job rotation and reward systems were said not to be formalized. In most of the companies there were no explicit HR practices that served solely for promoting innovation. Participants mentioned that certain practices along with their primary goal might carry the purpose to stimulate innovation such as: training and job rotation. The need for additional HR practices or improvement of existing ones varied between companies. It was frequently mentioned that there was a necessity for management training for line managers since they were the implementers of HR policies.

4.4.1 Human resource planning and career management

Training was seen as an important tool for innovation. It was striking to find out that in both sectors training focusing on improving existing job related skills was extensively higher than training focusing on developing skills beyond existing job requirements (function based vs. general skill based training). Training was also more based on interdisciplinary teams and therefore more heterogeneous than homogeneous. However, there was no preference for either kind of training configuration in the industrial sectors whereas the preference was towards heterogeneous training for the service sector. When asked (questionnaire data) whether organizations prefer internal development of their employees or hiring externals no trend could be found. Three organizations were found to prefer internal development and the other three preferred external hiring. Table 4 gives an overview of the average scores of each sector and the whole sample on each human resource planning and career management practice (see figure 6 in the appendix for visual illustration).

Table 4: Human resource planning and career management

Human Resource Practices	Service Sector	Industrial Sector	Average
Market based human resource planning	2.4	1.6	2.9
Internal labor focused human resource planning	2.6	3.6	3.1
General Training	2.6	3.6	3.2
Specific Training	4.0	4.3	4.2
Homogeneous Training	2.6	3.0	2.8
Heterogeneous Training	3.6	3.0	3.3

4.4.2 Job Design

In certain cases job rotation was interchangeably used for teamwork, involvement in projects or developmental programs, such as traineeships where employees move from one position to another during several years. On our question whether job rotation was present in the company one of our respondents replied:

"Yes, for sure; we have several project teams working on different projects. It is not always the same in group. It depends on the market, on the customer questions, on the level of qualifications and on the level of capabilities".

So since different employees were involved in project teamwork and worked on different issues this practice was resembled with job rotation. Another respondent stated:

"We do a lot of job rotation because our process is very different from year to year. We don't make the same products over the years. When one project is over everybody has to do something else".

However, it is worth mentioning that questionnaire findings showed that job rotation indicators in most of the companies were quite low both between different areas of specialization and within one area of specialization. It seems that job rotation may be more established in the industrial sector than in the service sector.

The general amount of autonomy granted to employees was found to be very high in all organizations. All participants stated that employees are given the room to create new ideas, are granted with money for working on new ideas, are allowed to decide how they perform their tasks ("within boundaries" was frequently stated during the interviews) and are not monitored needlessly. However, only one of the participants said that employees were invited to join board room meetings. Interesting to note, the service sector scored higher in each aspect of autonomy in contrast to the industrial sector. Table 5 and figure 7 (appendix) summarize the average scores of each sector and the whole sample for each HR practice regarding job design.

Table 5: Job Design

Human Resource Practices	Service Sector	Industrial Sector	Average
Job rotation within one area of specialization	2.3	3.3	2.8
Job rotation between different areas	2.3	3.6	3.0
Autonomy new ideas	4.3	3.3	3.8
Autonomy money	4.5	3.0	3.6
Autonomy work	4.0	2.6	3.3
Employee monitoring	2.0	3.0	2.5
Participation board room	3.0	2.6	2.8

4.4.3 Performance appraisal and reward systems

Performance appraisals focusing on evaluating results of the performance was clearly higher than evaluation of the process. Nevertheless, both types of appraisal (evaluating result and process) were more introduced in the service sector. There is a high preference for organizations from both sectors to appraise individuals in comparison to groups. According to the preference of short-term versus long-term appraisal there was only found to be a preference towards long term appraisal in the industrial sector whereas no preference for either type was to be found in the service sector.

An interesting finding during the interviews was that non-monetary rewards (development opportunities or career movements) were seen as an important practice. Bonuses were frequently mentioned as dangerous because they would distinguish between employees which is not a desired outcome with respect to the effectiveness of team work. As one interviewee stated:

> "I think that in general the important ones are the ones that really internally, intrinsically motivate the employee. And a reward system does not internally motivate the employees".

Questionnaire data indicated that fixed bonus systems were slightly used but profit sharing was not. There were neither incentives for an active seek for new ideas nor were there rewards for

teams. However, each organization indicated that performance and effort will be rewarded somehow. Internal promotions were slightly seen and also used as a reward. Data on performance appraisal and reward systems is summarized in table 6, figure 8 and 9 (appendix).

Table 6: Performance appraisal and reward systems

Human Resource Practices	Service Sector	Industrial Sector	Average
Process appraisal	4.0	3.3	3.6
Result based appraisal	4.6	4.0	4.3
Short term appraisal	3.3	2.0	2.6
Long term appraisal	3.3	3.3	3.3
Individual appraisal	4.3	4.0	4.1
Group appraisal	2.3	2.6	2.5
Fixed bonus	3.0	3.3	3.2
Profit sharing	2.3	3.0	2.6
Incentives for new ideas	2.3	3.3	2.8
Team reward	2.0	2.3	2.2
Reward for good effort and performance	3.0	4.0	3.5
Internal promotion	3.6	3.0	3.3

5. Discussion

The main research question of this study was to investigate the relationship between intellectual capital and different types of innovation and what types of HRM practices can be related to the development of IC in order to facilitate innovation. During the investigation certain findings came up which explain the complexity of answering the research question and the establishment of clear relationships between different configurations of HRM, IC and innovation in this study.

First of all, the small sample is a major point why clear relationships cannot be stated. Due to the restricted amount on time, only eight interviews were taken and only six from eight

questionnaires were returned which did not enable a proper statistical analysis. Therefore, the subsequent discussion can only highlight the simultaneously presences of certain practices, capital forms and types of innovation but will not be able to conclude significant positive or negative relationships. In the following, problematic issues discovered during the investigation and actual support or lack of support for certain propositions will be elaborated. Based on these findings, suggestions for further research will be stated in order to achieve future quantitative research which should allow for drawing significant or insignificant relationships.

In general, all respondents stated that innovation is important and all except for one that their innovative performance is good. However, not all companies had an innovative strategy which may imply that not all of them really intend to achieve innovations or do not see it as the primary goal. It can be argued that without specific strategy on innovation there will be no clear goal and also no adequate guidance through the organization in order to achieve good innovative performance (Schuler & Jackson, 1987). In addition, some HR-practices were not found to be explicit which is rather unusual for the size of the participating organizations.
The lack of a strategy for innovation accompanies with the fact that HR managers were often not found to fully understand the conceptualization of innovation and had no priority on certain types of innovation. Innovation may be perceived as a highly versatile concept by the participants.
Those reasons highlight that human resources may not yet be completely or not at all strategically managed with respect to innovation. It may still have a more administrative role. The fact that there is no strategic alignment with innovation and also no priority for one certain type of innovation puts this research in a position where it is difficult to relate certain capital configurations or HR practices to certain types of innovation. It is questionable in how far organizations without a clear strategy on innovation explicitly distinguish between different types of capital and attempt to stimulate them by different HR-practices in order to facilitate different forms of innovation.

Results about innovation should also be interpreted with caution because some contradictions between interview and questionnaire data were found. For instance, one company stated during the interview that they do not have an R&D department and also do not invest in radical breakthroughs. Meanwhile, their questionnaire indicated a five point score on the item measuring radical innovation and they stated that they invested a certain percentage from their annual turnover in R&D activities.

According to the relationship between HC and innovation it is hard to point out a clear relationship given the fact that more support for generalist human capital and incremental innovation was found in the majority. This differs from earlier mentioned assumptions and findings of Kang and Snell (2009) and Hall and Soskice (2004) who relate more broad skills and knowledge to exploration and specific skills and knowledge to exploitation. However, Hall and Soskice (2004) also state that industry and firm specific skills and knowledge are dominant in coordinated market economies (CME's). This research was conducted in the Netherlands which is seen as a CME. Therefore, this study does neither support the claim of Hall and Soskice (2004) in terms of more specific skills in CME's nor the claim of the relationship between broad skills and radical innovation. However, there is evidence that incremental innovation may be more dominant in contrast to radical innovation in CME's.

On the other hand, it is questionable to what extent one should rely on the fact that employees are said to posses on average more broad in comparison to specific skills and knowledge. Even if most of the organizations indicate that they have a clear picture of the existing and also required skill and knowledge configurations and some of them also defined competencies in order to educate and appraise their employees there may be great differences according the skill and knowledge profiles across departments. As one interviewee highlighted:

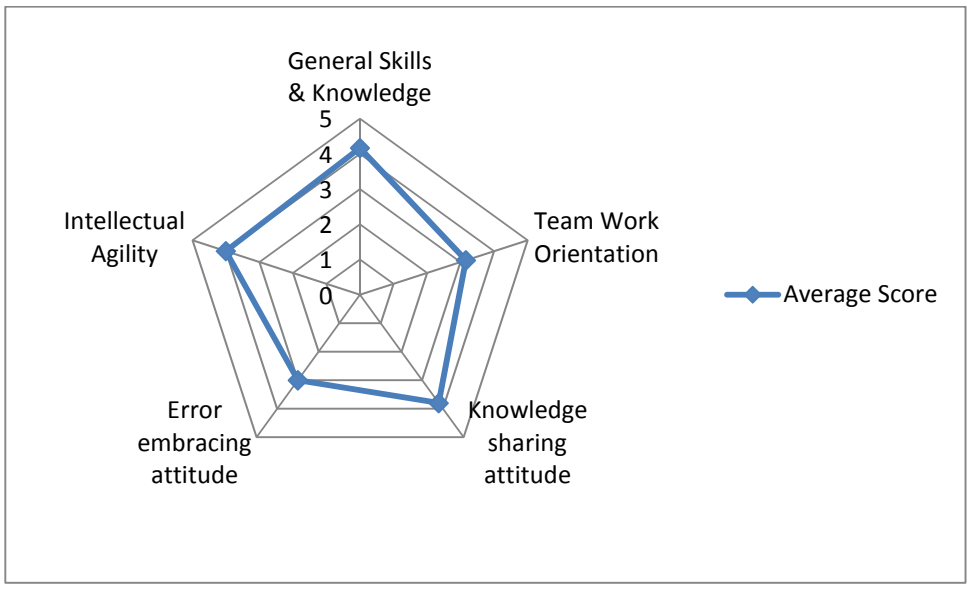
> *"In every department the accent is different, but we have more or less seven competencies. We have management competencies and operational competencies"*.

In addition, there can also be differences at an individual level within departments where there might be a certain percentage of specialists next to a certain percentage of generalists. This stresses the difficulty of assessing skill and knowledge in a subjective way by only using the perception of HR-directors. More objective data from employees themselves and the respective managers from the departments where the investigated employees are working in should be used for further research next to representatives from the HR-department.

Going more into detail within the concept of generalist HC research findings did not support the presence of all sub-parts of generalist human capital. Basically, broad skills and knowledge, a knowledge sharing attitude and intellectual agility could be found in all of the companies although team work orientation and error embracing attitudes could not be found to a large degree. These parts of generalist HC were argued to be more related to radical innovation

instead of incremental innovation. Even if there are more arguments for saying that there is in general support for generalist HC, the picture is not very clear. Whereas studies on the relationship between HRM and innovation emphasize the importance of team work and allowing employees to make mistakes (Laursen & Foss, 2003; Jiménez-Jiménez & Sanz-Valle, 2008) team work and error embracing attitudes where found to vary only around the mean. The rather neutral response gives no indication for the presence or absence of these attitudes. Nevertheless, since knowledge sharing is seen as an important prerequisite for innovation (Shipton, 2006; Sáenz, Aramburu & Rivera, 2009), the positive scores on the knowledge sharing attitude are clearly a positive finding with regard to innovation. The positive score on intellectual agility and broad knowledge and skills seem logic since people with knowledge from various domains also need the ability to combine and make use of these different knowledge sources. Figure 10 highlights the positive score on general skills and knowledge, intellectual agility and knowledge sharing and the neutral scores on team work orientation and error embracing attitude, indicating more support for generalist human capital.

Fig. 10: Generalist Human Capital



For organizational capital, no indication could be found for more cooperative OSC or entrepreneurial OSC. It is hard to state a clear trend here. Whereas the finding that organizations have more tightly coupled systems with strong ties and networks (cooperative OSC) between employees can be related to incremental innovation in this study, no indicators for generalized trust and a rule following culture (also parts of cooperative OSC) were found. Therefore, only one part of the cooperative OSC configuration goes together with the majority

of incremental innovation found. Notably, it was argued that goals which are collectively agreed are a part of entrepreneurial OSC which can be related to radical innovation. In this study, more support for collectively agreed goals in comparison to the reliance on formal rules or a more rule following culture was found. It could be argued that collectively agreed goals and action may be more a part of cooperative OSC which could then be more easily related to incremental innovation. This would be more in line with assumptions from Hall & Soskice (2004) who argue that collective decision making processes may take a long time and great effort which could hinder radical breakthroughs. The fact that outside relationships were always mentioned in the combination with inside relationships highlights that focusing only on OSC may give a restricted insight in the relationship between intellectual capital and innovation. As it was argued that more loose ties and relationships with other partners can facilitate the ability to get access to and acquire various knowledge domains, it could be argued that with respect to innovation external relationships with partners outside the organization would give even more access to other relevant knowledge sources (Kang, Morris & Snell, 2007; Ancona, Bresman & Kaeufer, 2002). As Leana and Van Buren (1998) argue, OSC could inhibit innovation in the presence of "more dense and more long-standing" ties among organizational members because the entry of new external information is less likely. In addition, Chesbrough (2003) highlights the point that organizations should make use of ideas from both the inside and the outside of the organization and which point to the importance of social capital in favor of organizational social capital.

In summary, more support for generalist human capital and no clear picture on a definite configuration of organizational social capital was found. The first and second propositions are challenged by the fact that in general more incremental innovation and general HC was found to be present. Propositions 3 and 4 remain difficult to answer due to the inconsistent findings made on OSC.

The inconsistent findings on the two capital forms are also a challenge to the investigation on what types of HR practices can develop the various capital configurations. Starting with propositions 5 and 6 which respectively stated that internal labour human resource planning is positively related to cooperative OSC and that market based human resource planning is positively related to entrepreneurial OSC, research data showed that both HR-practices were equally present and in general no preference for one practice was found. As already mentioned,

the inconsistent configurations of OSC complicated the answering of propositions 5 and 6. No evidence was found to be neither for nor against these propositions.

With regard to training there is a clear distinction on what kind of training is more extensively used. Nevertheless, these training types are not in line with the proposed relationships with the different IC configurations and different types of innovation. It was argued that function based training with a focus on developing specific skills and knowledge from one knowledge domain can be positively related to specialist HC and that general skill based training with a focus on the skills and knowledge also usable in different domains can be positively related to generalist HC. There is more support for specific training for improving existing skills rather than skills beyond their existing job requirements. The existence of training enhancing specialist human capital may show that companies may be trying to foster specialist human capital. As Lepak and Snell (2002) state, internal training and the development of inimitable core competencies are of importance to increase the specificity of human capital. Whether this is on purpose stays unknown. However, the focus on function based training is not in line with the presence of generalist HC.

Further, it was argued that heterogeneous training is positively related to entrepreneurial OCS and that homogeneous training is positively related to cooperative OSC. Research data showed that heterogeneous training is encouraged in companies but then again the inconsistent findings on OSC do not allow us to state relationship. However, the presence of heterogeneous training can be related to the dominant generalist human capital. Heterogeneous training groups are argued to give access to different knowledge sources and therefore stimulate the acquisition of more general knowledge. Conversely, this synergy doesn't theoretically foster radical innovation.

The just mentioned explanations highlight the difficulty to answer the research propositions. The only clear relationship which could be found is the link between heterogeneous training and generalist human capital. Hence, it was argued that heterogeneous training can be positive related to entrepreneurial OSC questionnaire data was insufficient. Therefore, proposition 7 stays somewhat unanswered because general skill based training was present only to a small amount. The same applies to proposition 8 because a preference for function based training was found but specialist HC was present to a very minor extent in comparison to generalist HC. Propositions 9 and 10 stay also somewhat unanswered due to the inconsistent picture on OSC.

A recent conducted study by Yang and Lin (2009), investigating the mediating role of IC in the relationship between HRM and organizational performance, denoted that training was only found to explain HC and not social and organizational capital. This finding implies that the link between training and OSC or SC may not be clear yet or that these two concepts cannot be related to each other at all.

The use of job rotation as an HR practice is very low even if all organization saw it as important for innovation. They claimed to work on an explicit job rotation system in the future. It was stated as one of the major challenges for organizations to make job rotation work efficiently and simple. Empirical data shows that there is no clear distinction between the two types whether employees are rotated between different areas of specialization or within one area of specialization. Hence nothing can be argued in relation to the different IC configurations. Propositions 11 and 12 are neither accepted nor rejected.

As stated, the overall amount of autonomy was high in all measured aspects. Whereas autonomy is a frequently mentioned prerequisite for innovation it is difficult to relate it to entrepreneurial OSC. Next to the fact that the link between autonomy and OSC cannot be established based on the lack of evidence for the different configurations there was also no clear evidence that autonomy clearly facilitated radical innovation. Another contradictory finding is that high autonomy does not seem to be related to risk embracing attitudes of human capital. The risk embracing attitude had a neutral score. One could argue that even employees are given room and time to develop new ideas and also find out how to work more efficiently this may not develop the confidence of employees to take certain risks.

According to performance appraisal there is also no clear picture on the relationships between different types of appraisal, configurations of IC and innovation. It was found that result based appraisal was preferred in contrast to process appraisal. Result based appraisal is theoretically linked to the development of more generalist human capital and in turn to radical innovation. It can be argued that there may be an empirical relationship between result based appraisal and generalist human capital but the final link to radical innovation cannot be established.

Individual appraisal which was argued to develop generalist human capital was found to be more present in contrast to group based appraisal. However, the final link to radical innovation cannot be established.

Appraisal with long term objectives was argued to develop generalist HC and in turn lead to radical innovation. Empirically, it was found that this type of appraisal can be related to the development of generalist human capital but not to the radical innovation since more incremental innovation was present. The most interesting finding from the interviews was that there was a preference for non-monetary reward systems. However, empirical data on performance appraisal and reward systems does not allow answering the probably too broad and extended propositions 14 and 15.

To sum up, this research showed evidence for frequently stated assumptions made in the literature on HRM and innovation in that autonomy, heterogeneous groups, general skill profiles and result based appraisal are important in order to facilitate innovation (Schuler & Jackson, 1987; Hall & Soskice, 2004; Jimenez-Jimenez & Sanz-Valle, 2008).
However, becoming more explicit and arguing how specifically incremental and/or radical innovation can be facilitated is a complex issue. There is no evidence for a single one sided picture that a clear cut distinction between two configurations of human and organizational social capital can be made. Actually, various sub-components of the different HC and OSC configurations were found in one and the same organization. The lack of evidence for the presence of clear cut configurations in this research does neither accept nor does it reject the assumptions made. Especially the configurations of entrepreneurial and cooperative OSC were not found to be clear cut and therefore all propositions in relation to these configurations were not able to be answered. By looking more into detail, some argued relationships for instance between single HR practices and intellectual capital, between single sub-components of the different IC configurations to different types of innovation and also from single HR practices to different types of innovation could be found. For instance heterogeneous training groups go along with generalist human capital, tightly couple systems go along with incremental innovation and specific training with incremental innovation. But there is not one single example where clearly one type of HR practice is in line with the argued type of capital and type of innovation. Therefore HRM may have sometimes a direct influence on different types of innovation and sometimes through IC.
This mixed picture indicates that the research question stays unanswered to a large extent because these mixed findings do not allow for a definite answer. The unanswered research question may imply that IC is not yet seen as a strategic concept in the investigated organizations. They may not yet be aware and may not explicitly distinguish between different IC configurations. However scholars argue that IC and the development of IC should be seen

strategically (Holton & Yamkovenko, 2008) since it is possibly the best factor to explain the relationship between HRM and performance (Yang & Lin, 2009). Nevertheless, the small amount of relationships found (Table 7) may encourage researchers to further investigate this topic and hopefully find more cohesive support for this research model in the future.

Several limitations of this study can give logic arguments why it was difficult to find support for the assumptions made by Kang and Snell (2009), Hall & Soskice, 2004 and Kang, Morris & Snell (2007) and offer suggestions for further research.

Table 7: Empirically found relationships

Human Resource Practices	**Intellectual capital**	**Innovation**
Specific training		Incremental innovation
Heterogeneous Training	Generalist HC	
Result based appraisal	Generalist HC	
Individual appraisal		Incremental innovation
Long term appraisal	Generalist HC	

6. Limitations

Several points have to be kept in mind when interpreting the results and the conclusions made. Qualitative data collection was a good start to get an overall view of the concepts and their presence in the different companies but did not allow a detailed analysis of the abstract propositions stated. The designed questionnaire could be used for detailed insights but as stated the low reliability of especially the OSC concept and other parts made a proper statistical analysis difficult. Therefore, no relationships could be tested on significance which does not allow proper conclusions. In addition, this study does not fulfill the methodologically requirements to infer causal relationships. To conclude a causal order one must prove covariation between cause and effect, the temporal precedence of the cause and the ability to control alternative explanations (Wright, Gardner, Moynihan & Allen, 2005). Data for this research was assessed at one singly time. To definitely claim or prove that HR practices influence different capital types or innovation longitudinal research is necessary. It could therefore easily be argued that the research model can be seen the other way around in that

innovation can have an influence on the different capital forms and the human resource management practices used in certain organizations. For instance, certain ideas for improvement or the actual improvement of a production process may need new skills and knowledge which are not yet available in the organization. This makes it necessary to adjust training programs or the recruitment and selection processes in order to develop certain skills and knowledge profiles.

Future research should focus on methodological issues by improving the quantitative instrument for further high quality investigation. For instance, the used questionnaire should be evaluated and improved in order to gather more quantitative data. This data could be investigated by regression analysis in order to state significant or insignificant relationships. In addition, six questionnaires are definitely too less for proper statistical analysis and do not allow generalizations. The picture may be clearer with a larger sample in combination with proper statistical analysis. Future samples should consist of organizations with an explicit strategy on innovation because it is questionable in how far organizations without a strategy on innovation really distinguish between the various types of innovation and capitals.

The measurement of innovation or innovative performance was and stays a topic on its own. At the end, a combination of interview questions and two items from the questionnaire were used to measure the two types of innovation. Only two out of six organizations gave information about investments made in innovative projects and actual returns from that. Additionally, one can add that the investigation was highly subjective with only one respondent (in some cases two) from each organization. Subjective data is said to be open to biases, preferences and perceptual distortions of assessors (Yang & Lin, 2009). Especially with respect to innovative performance, one could question the validity of the answers from only asking HR-directors. Future research may combine information from different managers such as one from HR, R&D and manufacturing to become a clearer picture on the topic of innovation. As in the theoretical part was stated, the actual implementation of new products, processes or services is most of the time dependent on more than one person (Mumford, 2000). This may also be a valid assumption for the measurement of innovative performance. If innovation is dependent on the effort of different people, there should also be different people involved in evaluating and measuring its actual achievement. The article from Gupta, Smith and Shalley (2006) also highlights that there are different needs and outcomes in different departments. For instance within organizations, a product R&D department on the one hand may have a high degree of

exploration whereas domains such as manufacturing, sales and service may simultaneously to the product R&D department have a high degree of exploitation. Therefore, the inclusion of various departments in more in depth studies focusing on the cross sectional comparison of these departments may allow more detailed information.

The low reliability of the OSC concept may challenge its use in research on the relationship between HRM and innovation. OSC only considers internal relationships which may be a limited consensus in studying the role of social relationships on innovation. Future research may consider the use of both internal and external relationship of organizations. This interest was also reflected in the interviews with organizations which equally highlighted the importance of both inside and outside relationships. Many organizations indicated that they are "network-organizations". But the low reliability could also be attributed to the different perceptions of trust (one part of OSC) and the actual complexity to measure it.

The measurement of trust was a serious challenge. Every person might have an own perception of trust. Overall, the subjective measurement of trust, skills, knowledge and attitudes is consequently a limitation of this study and findings should not be taken for granted. For future research, general managers, line managers and employees should be included for a more objective measurement of the various research aspects.

As suggested by some participants, recruitment and selection may also play an important role in the management of IC and innovation. Future research therefore should include this HR-practice for further elaboration. The value of recruitment and selection practices has recently been highlighted by Yang & Lin (2009) who found evidence that this practice had the strongest significant power in explaining human capital, social capital and organizational capital. In addition, they found that organizational capital was the strongest predictor of organizational performance which highlights that future research may include organizational capital in the conceptualization of IC in order to study the relationship of HRM, IC and innovation.

The following summation gives a short overview for future attention:

- Improvement of quantitative measurement
- Consideration of both internal and external relationships (SC)
- Larger and more heterogeneous sample for more objective data

- Use organizations with a strategy for innovation
- Proper statistical analysis for instance regression analysis
- Include recruitment & selection as HR-practice

7. Conclusion

This study was as far as known the first integrative exploratory approach to empirically study intellectual capital in relationship between HRM and innovation. By this, the study refers to the call of Petty and Guthrie (2000) for more exploratory investigations to provide more detailed data about the way intellectual capital should be measured and managed. It also contributes to the research field of HRM and innovation where it was argued that more research is necessary which connects the two domains (Looise & Van Riemsdijk (2004).

Establishing clear relationships between those three concepts could assist organizations with different management approaches for different types of innovation. However, this study highlighted that there is still a long way to go. With respect to the research question, there is no one way road to show how human resources management and intellectual capital can contribute to radical and\or incremental innovation. No clear differentiations were found between different HR configurations and IC configurations in relation with radical or incremental innovation. Nonetheless, this study set a first stage for further studies because the picture may become clearer with improved methodological issues. In fact, there are already studies which highlight the importance of intellectual capital in the relationship between HRM and organizational performance. Yang & Lin (2009) found out that IC mediates the relationship between HRM and organizational performance. Findings like this may suggest a similar role of IC in the relationship between HRM and innovation.

Finding out clear relationships for different types of innovation could advance the research field on the ambidexterity of organizations from an HR perspective. Finding out how IC can be configured in order to develop either radical or incremental innovations could advise organizations how to use different practices in order to develop different IC configuration simultaneously which might contribute to ambidexterity. Recent studies claim that ambidextrous organizations are more successful than organizations that pursue only one type of innovation. Therefore, scholars in the human resource management field should further investigate how HRM can contribute to the management of innovation and ambidextrous organizations.

Tables

Table 8: IC-configurations and their relationship to innovation

	Exploration	**Exploitation**
Human Capital		
• Skills	Generalist: multi-skilled, versatile repertoire of capabilities which can be used across domains	Specialist: deep, localized and embedded knowledge in one particular knowledge domain
• Knowledge	General knowledge; focus on gaining knowledge outside a firm's current knowledge domain.	Specialized, in depth knowledge; focus on refining and deepening a firm's current knowledge stock
• Attitudes	Knowledge sharing attitude. "Error embracing" attitude	Reluctant to share knowledge. "Error avoiding" attitude
• Intellectual agility	High necessary to combine different external sources of information for successful generation of new ideas.	Combination of different internal sources of information is important for successful generation of new ideas. Specialists may be less likely to master knowledge across different domains than generalists
Organizational social capital	Entrepreneurial relational	Cooperative relational
• Associability	Reliance on collectively agreed goals and actions.	More reliance on formal rules instead of collectively agreed goals and actions.
• Trust	Resilient dyadic trust through direct personal experience. Opportunity and autonomy to organize both the way work is organized and done.	Generalized or institutional trust based on membership. Rule following culture or strict reliance on formal rules which reinforces efficient coordination.
• Configuration of relationships	Weak and non redundant relational networks, may have the disadvantage of developing no new and diverse relationships	Strong and dense network connections

Figures

Fig. 3: Generalist HC configuration between sectors

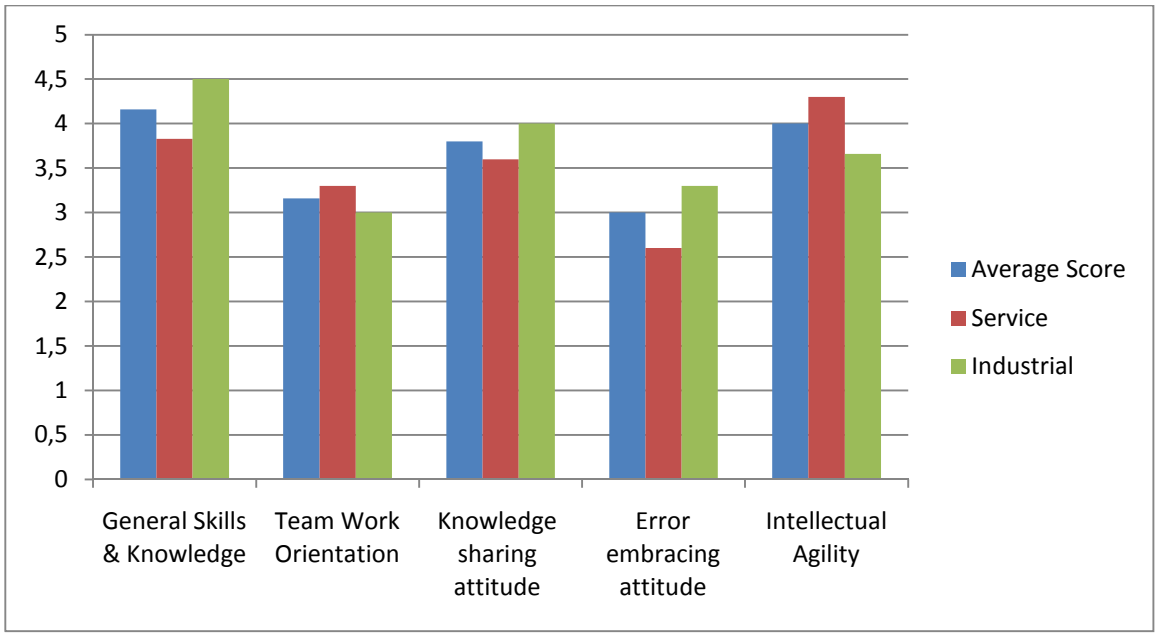


Fig. 4: Cooperative OSC

Fig. 5: Entrepreneurial OSC

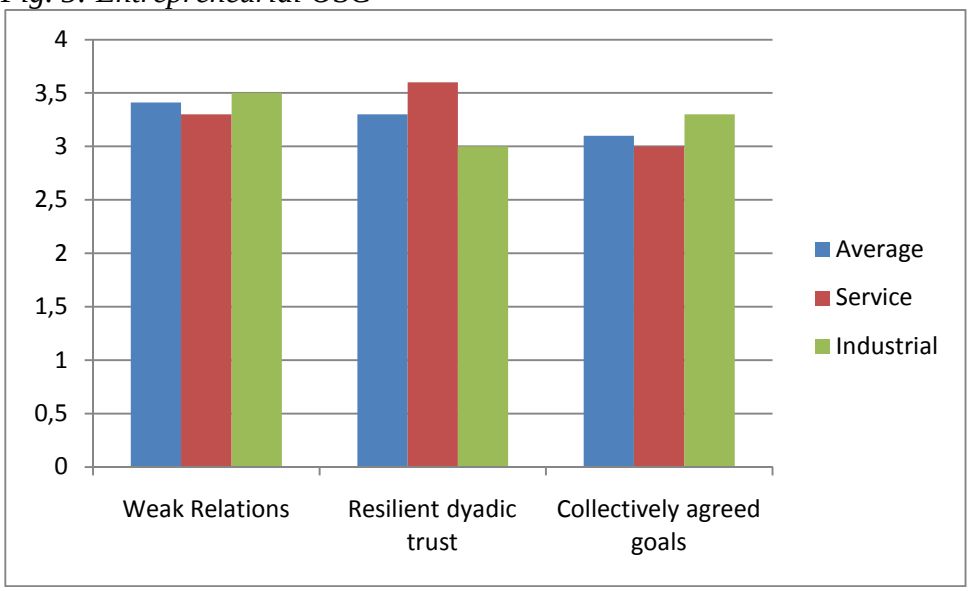


Fig. 6: Human resource planning and career management

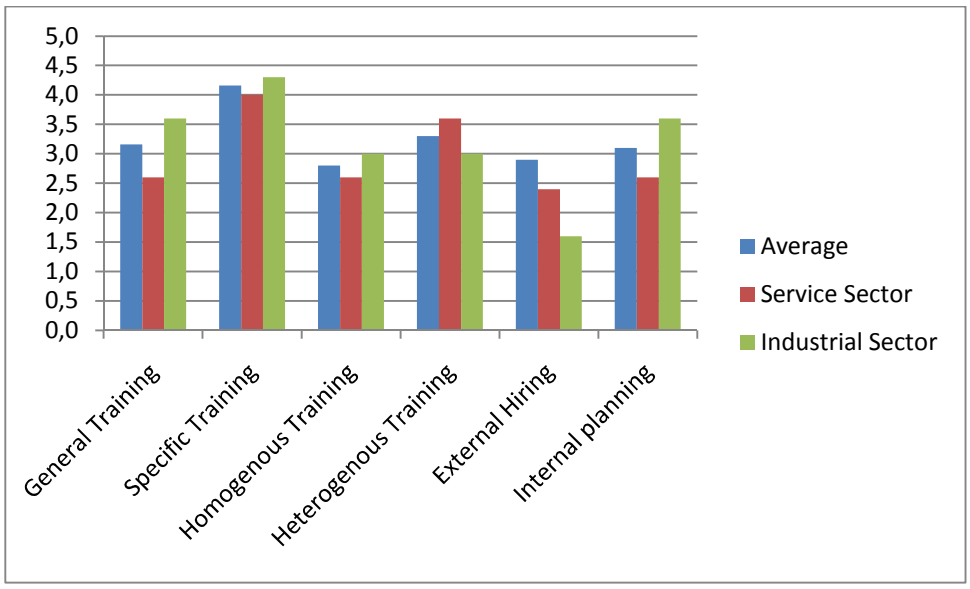


Fig. 7: Quantitative findings job design

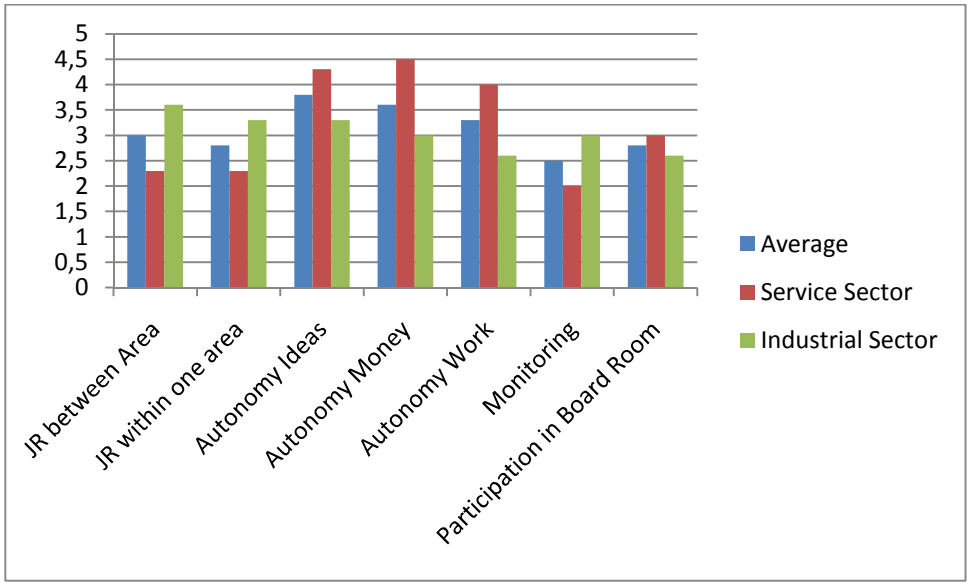


Fig. 8: Quantitative findings Appraisal

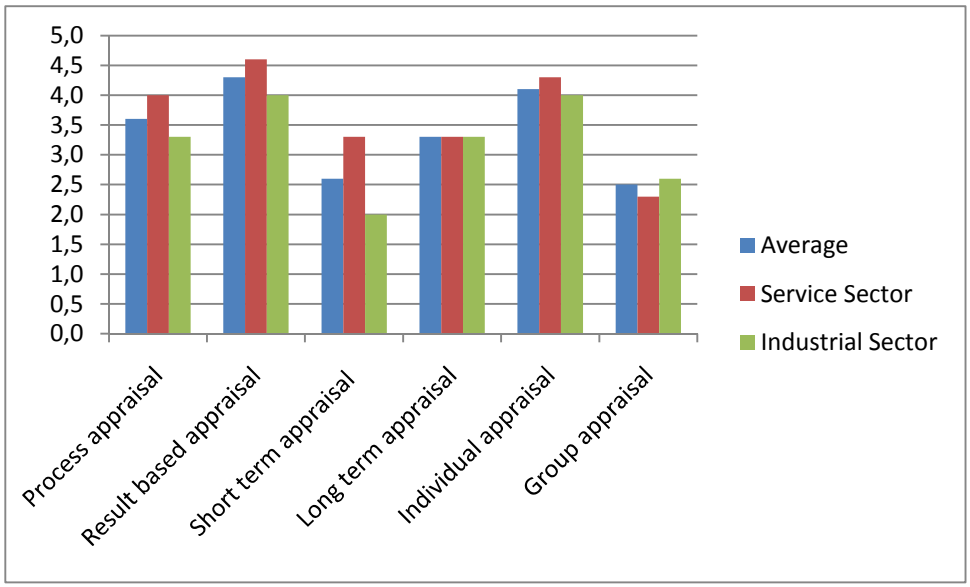
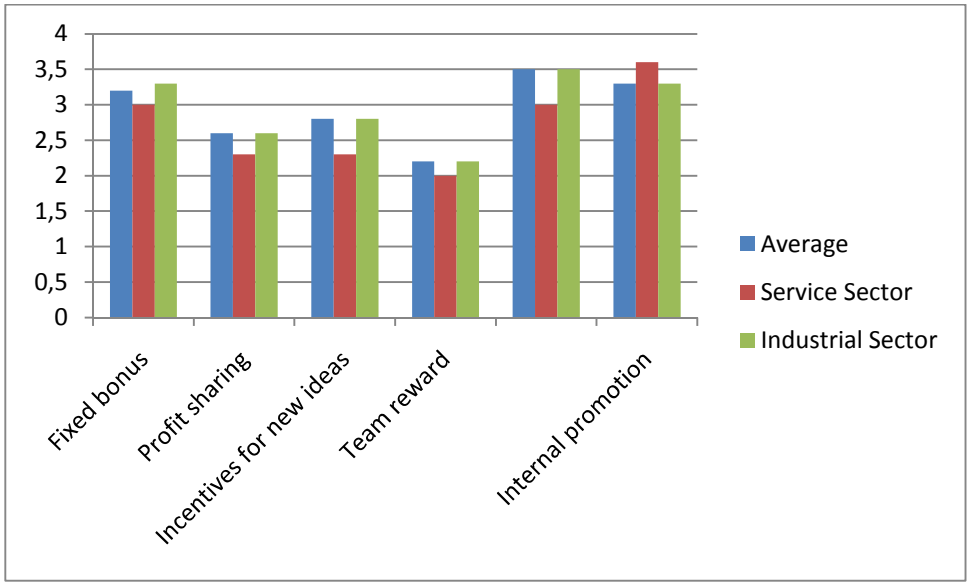


Fig. 9: Quantitative findings Reward systems



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Appendix

Interview Questions

General

How many years have you served in the company and for how long in this position?

Could you describe your role and position in the company?

When we look at the research model, do you have general remarks or ideas upfront on these topics?

Innovation

On the topic of innovative performance, how would you perceive poor performance, good performance and excellent performance? And where does this company stand now?

Do you recognize the process of minor improvements or changes in products and processes in your company? Could you give examples?

Do you recognize the process of fundamental changes in products and processes in your company? Could you give examples?

Does the company experience problems in the innovation process within the company?

Has the company set a priority on the mentioned types of innovations?

(Probe/ could be asked depending on time): How much do you invest in different innovation projects and what is the turnover resulting from these projects?

Capitals

Does the company have a clear picture what skills and knowledge are necessary in the company and what skills and knowledge are available?

In what way is building relationships inside and outside the company relevant and is this stimulated or stifled by the company?

How would you value the existence of creativity in your organization?

Do you experience a need to improve the presence of so called human capital and organizational social capital in the future?

How do you perceive (the level of) trust within the company?

Can you give us some examples or incidents that affected (the level of) trust?

Can you describe the way the company handles internal and external relationships? For

example, does team work occur, is socializing stimulated, is it common to go to seminars, are customers and suppliers invited in R&D projects.

(Probe/ could be asked depending on time): Does your company explicitly manage creativity of employees?

HR practices

What kind of human resource practices do you find in your organization and are they explicit and formalized?

How would you value all the mentioned practices for your organization?

Do you experience a need to improve their presence in the future?

Does the company have specific practices intended explicitly for increasing innovative performance?

Do you experience a need for other practices that hasn't been mentioned in the model?

Did we miss any topic or element that you find important to be included in this interview?

Questionnaire Scales

Demographics

In the following we would like to ask you to give information about:

How many employees work in this company? (in the Netherlands, if it is an international company)
…
What is the average age of employees in this company?
…
What is the average period (years) employees stay in this organization?
…

Innovation

To what extent do you agree with the following statements:

	Not applicable	Totally disagree	Disagree	Neutral	Agree	Tota Agre
4. We constantly invented new products and services that are completely new for our organization in the last 2 years.	0	1	2	3	4	5
5. We constantly introduced improvements to products and services of our production line in the last 2 years.	0	1	2	3	4	5

In the following we would like to ask you to give information about:

How much of your turnover (in percentage) do you invest in R&D activities?
……%
Out of this investment how much (in percentage) is dedicated to developing completely new products and services?
……%
Out of this investment how much (in percentage) is dedicated to improving existing products and services?
…….%
How much revenue is obtained from completely new products and services developed in the past 2 years? (can be indicated in percentage, out of total revenue of the company).
……%
How much revenue is obtained from improved existing products and services? (can be indicated in percentage, out of total revenue of the company).
……%

Human capital

To what extent do you agree with the following statements:

	Not applicable	Totally disagree	Disagree	Neutral	Agree	Tota Agre
11. Our employees have skills that can be used in other departments.	0	1	2	3	4	5
12. Our employees have skills that can be used in other organizations.	0	1	2	3	4	5

13. Our employees have skills which are not available to our competitors.	0	1	2	3	4	5
14. Our employees do not hesitate to take risks.	0	1	2	3	4	5
15. Our employees prefer to work in teams rather than alone.	0	1	2	3	4	5
16. Our employees do not hesitate to try out new ideas, even if they do not know the consequences beforehand.	0	1	2	3	4	5
17. Our employees share relevant information with other employees.	0	1	2	3	4	5
18. Our employees have the ability to combine various sources of knowledge from various departments.	0	1	2	3	4	5

Organizational social capital

To what extent do you agree with the following statements:

	Not applicable	Totally disagree	Disagree	Neutral	Agree	Tota Agre
19. In general, future action is determined by collectively agreed goals.	0	1	2	3	4	5
20. Our employees subordinate their own goals to the goals of the organization.	0	1	2	3	4	5
21. Decisions about future action are mainly based on formal rules.	0	1	2	3	4	5
22. Our employees mutually trust each other.	0	1	2	3	4	5
23. Our employees trust only each other if they know each other personally.	0	1	2	3	4	5
24. There is a high frequency of formal meetings within our organization.	0	1	2	3	4	5
25. There is a high frequency of formal meetings with members outside of our department.	0	1	2	3	4	5
26. People within our department know each other very well.	0	1	2	3	4	5
27. People within our department know most of the people from other departments.	0	1	2	3	4	5

HR practices

Training

To what extent do you agree the following statements:

	Not applicable	Totally disagree	Disagree	Neutral	Agree	Tota Agre
57. Most of our employees are participating in on-the-job trainings.	0	1	2	3	4	5
58. Most of our employees participate in classroom trainings.	0	1	2	3	4	5
59. Teamwork is an important part of all the education programs.	0	1	2	3	4	5
60. Mentoring and/or coaching on the job is common in our organization.	0	1	2	3	4	5
61. Training prepares employees with skills beyond their current job requirements.	0	1	2	3	4	5
62. Training prepares employees with further improvement of existing skills.	0	1	2	3	4	5
63. Education programs are organized in a way that employees from various departments are in one learning group.	0	1	2	3	4	5
64. Education programs are organized in a way that only employees from one department are in one learning group.	0	1	2	3	4	5
65. Internal development is preferred to external hiring.	0	1	2	3	4	5
66. Our employees are stimulated to participate in trainings for interpersonal skill development.	0	1	2	3	4	5

Please also indicate:

What is the number of hours of training received by a typical employee over the last 2 years?

…….hours

Job rotation

To what extent do you agree with the following statements:

	Not applicable	Totally disagree	Disagree	Neutral	Agree	Tota Agre
67. Our employees switch jobs between other departments.	0	1	2	3	4	5
68. Employees with highly specific skills and knowledge are rotated within the same area of specialization.	0	1	2	3	4	5
69. Our employees rotate to other areas of specialization.	0	1	2	3	4	5

Appraisal

To what extent do you agree with the following statements:

	Not applicable	Totally disagree	Disagree	Neutral	Agree	Tota Agre
70. Performance appraisals are focused on evaluating the process.	0	1	2	3	4	5
71. Performance appraisals are focused on evaluating the outcomes.	0	1	2	3	4	5
72. Performance appraisal objectives are focused on avoiding errors.	0	1	2	3	4	5
73. Performance appraisal objectives are focused on forgiving errors.	0	1	2	3	4	5
74. Performance appraisals include peer feedback.	0	1	2	3	4	5
75. Performance appraisals evaluate individual performance.	0	1	2	3	4	5
76. Performance appraisals evaluate team performance.	0	1	2	3	4	5
77. Performance appraisals focus on long term objectives.	0	1	2	3	4	5
78. Performance appraisals focus on short term objectives.	0	1	2	3	4	5
79. In performance appraisals we discuss the needs of our employees.	0	1	2	3	4	5

Rewards

To what extent do you agree with the following statements:

	Not applicable	Totally disagree	Disagree	Neutral	Agree	Tota Agre
80. Internal promotion to a higher function is frequently used to reward employees.	0	1	2	3	4	5
81. The organization has a fixed bonus system.	0	1	2	3	4	5
82. Profit sharing is part of employees reward system.	0	1	2	3	4	5
83. Rewards provide incentives for new idea suggestions.	0	1	2	3	4	5
84. Rewards are granted to teams.	0	1	2	3	4	5
85. Rewards are granted for good performance and effort.	0	1	2	3	4	5

Autonomy

To what extent do you agree with the following statements:

	Not applicable	Totally disagree	Disagree	Neutral	Agree	Tota Agre
86. Employees get the time to work out new ideas for the benefit of the organization.	0	1	2	3	4	5
87. Employees get the money to work out new ideas for the benefit of the organization.	0	1	2	3	4	5
87. Employees can make their own decision about how to perform their tasks.	0	1	2	3	4	5
88. Our employees are frequently monitored on the way how they perform their job.	0	1	2	3	4	5
89. Our employees are frequently asked to participate in board room meetings.	0	1	2	3	4	5