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To the memory of
my beloved mother and my sister Christina
who both died in the Spring of 2010

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List of abbreviations used

Asymp. Sig.	asymptotic significance
DW	Durbin Watson statistic
IA	innovation adoption
ID	industrial district
ITC	information and technology communication
KM	knowledge management
KTM	knowledge transfer mechanisms
KTM_HIR	knowledge transfer mechanisms with higher degree of information richness
KTM_LIR	knowledge transfer mechanisms with lower degree of information richness
R&D	research and development
SME	small and medium-sized enterprise
Std. Err.	standard error
Std. Dev.	standard deviation
VIF	variance inflation factor

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INTRODUCTION

Knowledge management is a well-known economic concept that is broadly discussed by both practitioners and scientists.[1] Efficient knowledge management is a crucial driver of the innovativeness of companies.[2] Knowledge management is in particular crucial in innovative contexts, such as in industrial districts. In fact, many scientists consider knowledge acquisition and innovation as the basis of industrial districts' competitiveness.[3] Over the last decades Italian industrial districts have been subject to numerous studies, representing leading examples of local manufacturing systems that have demonstrated incommensurable economic performance after the Second World War.[4] Nowadays, most Italian industrial districts, especially those operating in the textile and fashion sector, suffer from the worldwide financial crisis.[5] Today, the preservation of knowledge-based competitive advantage of Italian industrial districts through collaboration with universities and research centers,[6] as well as through investments in information and communication technology, is becoming increasingly important.[7] These strategies are fostered, among others, by fashion brands such as the Benetton Group, Diesel, Armani, Siggi Spa and New Mill Spa.[8]

Although knowledge management is of fundamental strategic importance for organizations, only a limited number of studies have investigated determinants that influence the choice of knowledge transfer mechanisms (e.g., Murray and Peyrefitte, 2007; Hong and Nguyen, 2009). Most recent contributions focusing on clusters were derived from Windsperger and Gorovaia (2010) as well as from Srećković and Windsperger (2011). These authors have investigated knowledge transfer mechanisms from the knowledge-based view and the relational governance view. Surveys that are directed at industrial districts are

[1] Birkinshaw, 2001, p. 1

[2] Du Plessis, 2007, pp. 22-23

[3] Inken/Tsang, 2005, p. 150

[4] Becattini, 1991, p. 83; Boschma, 1998, pp. 7

[5] Distretti Italiani, 2001, p. 30

[6] Intesa Sanpaolo, 2010, p. 63

[7] Intesa Sanpaolo, 2010, p. 65

[8] Intesa Sanpaolo, 2010, p. 65

underrepresented so far, hereby, almost neglecting the role of the innovative strategy of companies. Existing literature focuses basically on the usage of information and technology communication (e.g., Belussi, 2005; Gottardi, 2003). The purpose of the present paper is therefore to find answers to the following questions:

- Which determinants have an impact on the choice of knowledge transfer mechanisms in Italian industrial districts?
- If the selection of knowledge transfer media is determined by factors such as knowledge attributes, organizational trust and companies' orientation towards innovation adoption, is it possible to draw any recommendations for local managers that could lead to an amelioration of the sharing of knowledge, thus strengthening the knowledge-based competitive advantage of district players in the future?

The present paper consists of two parts, namely (1) a review of the literature and (2) an empirical study. The first part provides an overview of the four cornerstones of the present work, summarizing the main contributions in the literature on industrial districts, knowledge management, innovation and trust.

Chapter 1 is dedicated to the concept of industrial districts, paying particular attention to Italian contributions to this topic, and highlighting the importance of industrial districts for the Italian economy. Chapter 2 presents a review of the existing literature on knowledge management. Hereby, concepts, such as forms and attributes of knowledge, knowledge transfer processes and knowledge transfer mechanisms as well as general determinants that have an impact on knowledge management, are described. Chapter 3 offers a brief review of the theory of innovation, focusing primarily on Rogers' (1995, 2003) contributions to innovation diffusion and innovation adoption. Chapter 4 focuses on the concept of trust, highlighting the role trustful ties play in industrial districts as well as in knowledge transfer processes. Theoretical insights serve then as starting point for the second part of the paper. In Chapter 5, research questions and hypotheses are formulated, and data collection and the characteristics of the questionnaire on which the research was based are described. After a presentation of the statistical methods used for testing of the various hypotheses, descriptive statistics and empirical analyses follow.

1 ITALIAN INDUSTRIAL DISTRICTS

1.1 Concepts of industrial districts

The original notion of industrial districts roots back to Alfred Marshall, who after his "Wanderjahre among factories"[9] changed the common view on industrial systems by publishing two outstanding works, namely "Principles of Economics" (1920) and "Elements of Economics of Industry" (2006).[10] These books are considered cornerstones of succeeding studies after the 1870s.[11]

The scientist considers industrial districts as "localized industries" that evolve in a delineated geographic zone because of the availability of favorable climate, natural resources, infrastructure, and the existence of a local "patronage of court" that attracts external workers, fosters demand for high quality goods, and encourages continuous formation of local labor.[12] Further, the author highlights that over the years clustering leads to significant advantages[13], such as the development of subsidiary trades, the evolvement of hereditary skills, the usage of modern machinery, and the intensification of a local market of skill. Lastly, a particular atmosphere develops inside the community, representing the engine for innovativeness of the whole system. According to this, Marshall (2006) cites: "The mysteries of trade become no mysteries; but are as it were in the air, and children learn many of them unconsciously"[14] and "if one man starts a new idea, it is taken up by others and combined with suggestions of their own; and thus it becomes the source of new ideas."[15]

In Italy the concept of industrial districts attracts particular attention after the Second World War. In fact, according to Becattini (1991) and Boschma (1998), this is the moment when formerly successful Italian regions based on large-scale production suffer from inefficiency, while regions dominated by industrial districts

[9] Belussi/Caldari, 2009, p. 336

[10] First volume published in 1899

[11] Raffaelli, 2009, p. 69

[12] Marshall, 2006, pp. 151-152

[13] Marshall, 2006, pp. 152-153

[14] Marshall, 2006, p. 152

[15] Marshall, 2006, p. 153

– the so-called "third Italy" (central and northeastern) regions – demonstrate unforeseen prosperity.[16] Most important contributions to Italian industrial districts derive from Giacomo Becattini[17] – a professor of the Business University of Florence and pioneer of this model. Becattini's main contribution to Italian industrial districts is twofold. First, he analyses Marshall's notion on industrial districts, by then investigating in practice the phenomenon of Italian industrial districts in the Tuscan region.[18] His findings are illustrated, among others, in his famous works, namely "Mercato e forze locali: il distretto industriale" (1987) and "Dal 'settore' industriale al 'distretto' industriale" (1979).[19] Becattini defines industrial districts similar to Marshall. In fact, the scientist defines them as socio-economic systems, where SMEs are specialized in one single industry sector, settle down in one common place, and cooperate basically on vertical integration.[20] But, in contrast to Marshall's view, the Italian concept has a distinct socio-territorial nature. According to this, Becattini (2004) points out that "in the district – and unlike in other environments, such as the manufacturing town – the community and the firms tend, as it were, to merge."[21] Hereby, the business and personal lives are interconnected, and the "coordination and control of the normal functioning of the different production and selling phases do not follow administrative rules and are not performed by hierarchical mechanisms."[22] According to Markusen (1996), additional distinctive features of Italian industrial districts refer to the existence of (1) frequent labor exchange, (2) inter-company cooperation, enhancing risk dispersion, innovation sharing and market stabilization, (3) many workers occupied in creative and innovative activities, and (4) powerful trade associations and local authorities.[23]

After having delineated the main differences between Marshall's and Becattini's concept, the following paragraphs are dedicated to the main features of Italian

[16] Becattini, 1991, p. 83; Boschma, 1998, p. 7

[17] For further reading see Landström, 2005

[18] Sforzi, 2009, p. 327

[19] Landström, 2005, p. 235; Bianchi, 2009, p. 103

[20] Becattini, 2004, pp. 21-22

[21] Becattini, 2004, p. 19

[22] Becattini, 1991, p. 85

[23] Markusen, 1996, p. 298

industrial districts, considering in particular (1) local community, (2) local market, (3) local governance, (4) local cooperation and rivalry, (5) local labor market, and (6) local credit systems.

First, according to Becattini (2004), in Italian industrial districts the *local community* and its social dynamics directly influence manufacturing, business and political processes.[24] Italian industrial districts develop a unique culture that influences the mode in which district players share common morals, life styles and consumption models. Local authorities, considering the local identity as a crucial basis of future local development, continuously support the transfer of the districts' specific spirit.

Second, Becattini (2004), highlights that the *local market* of Italian industrial districts is not primarily dominated by global market prices.[25] Instead, competitiveness is impacted by their ability to assimilate local quality standards and transaction practices.

Third, according to Markusen (1964), *local governance* in Italian industrial districts is characterized by district-specific political circumstances.[26] Local authorities (political parties, associations and unions) are highly influential, ameliorating on regular basis local infrastructures, and supporting workers' formation and marketing activities with the aim to boost the system's further development.

Fourth, according to Markusen (1996), *local cooperation and competition* are handled in a more prudent way than in other industry systems, because collaboration and trustful interaction are directed "to share risk, stabilize markets, and share innovation."[27] Becattini (2004) further states that domestic rivalry is characterized by a strong spirit of solidarity.[28] According to him, local firms focus less on price battles rather than on balanced price systems and informal regulations that guarantee to almost all district players fair and stable earnings and expenses.

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[24] Becattini, 2004, p. 20; Sforzi, 2003, p. 158

[25] Becattini, 2004, pp. 25-26

[26] Markusen, 1996, p. 301

[27] Markusen, 1996, p. 301

[28] Becattini, 2004, pp. 27-28

Fifth, Italian industrial districts' *labor markets* have particular characteristics. They incorporate a district-specific working ethic that constantly fosters local enhancement.[29] Local workers are extremly mobile and switch between different job types.[30] According to Becattini and Musotti (2003), strong orientation towards freelancing is highly appreciated.[31] Most people with aged between 36 and 40 found their own company after having collected a lot of district-specific experience.[32] According to Becattini (2004), two forms of human resources exist, namely the so-called "impannatore pratese", on the one hand, and the "secondary industry" on the other hand.[33]

- The "impannatore pratese" is one of the most important members in the textile district of Prato.[34] He is a "pure entrepreneur" that does not employ any employees, monitoring market trends all over the world. His livelihood is his warehouse, where he hoards raw materials and final goods. His main aim is to realize so-called "product projects" that can be marketed outside district boarders.
- The second category refers to people that operate exclusively part-time or from home. This group is called "secondary industry". It is the "glue" that holds business and family together, and warrants the balance of local workforce.

Sixth, according to Becattini (2004), there are unique forms of *credit systems* in Italian industrial districts.[35] In contrast to banks in other industrial systems, domestic banks are active parts of social life. The decision whether to support a local firm does not depend exclusively on economic determinants. Honesty and trust are crucial decision factors as well. This modus operandi is not always advantageous. In fact, banks must consider more interdependencies and incidents than banks in other industry systems. They must understand that the

[29] Sforzi, 2003, p. 158

[30] Becattini, 2004, pp. 23-24

[31] Sforzi, 2003, p. 158

[32] Becattini/Musotti, 2003, pp. 278-279

[33] Becattini, 2004, p. 24

[34] For further information see: Unione Industriale Pratese, Il distretto pratese: una breve sintesi della sua evoluzione, http://www.ui.prato.it/unionedigitale/v2/areastudi/Presentazione-distretto.pdf (03/10/2011)

[35] Becattini, 2004, pp. 29, 39

underperformance of one company possibly harms the well-being of other district players or in worst case destabilize the whole system itself.

1.2 Knowledge-based classification of Italian industrial districts

According to Belussi and Pilotti (2002), it is possible to distinguish between three different learning systems, and to define according to this knowledge-based categorizations of Italian industrial districts, namely (1) “weak learning systems”, (2) “systems characterized by significant absorptive capability from the outside circuits of knowledge matched with incremental innovations” and (3) “dynamic evolutionary systems.”[36]

- *“Weak learning systems”*[37]

  In this type of industrial districts companies are relatively less inventive and have less access to new technologies compared to other district forms. In these strongly fragmentized systems, economic activity is based on craft-based manufacturing of traditional products and historically-grown knowledge. System barriers consist in limited economies of scale as well as on restricted product and process advancement. Knowledge transfer and learning is based on traditional skills and tacit knowledge accumulated by routine activities and by observation. Individuals often lack sufficient understanding of transferred knowledge inputs. Many of these districts operate in the Italian textile and clothing sector, such as, for example, the district of Murano.

- *“Systems characterized by significant absorptive capability from the outside circuits of knowledge matched with incremental innovations”*[38]

  Companies in this kind of industrial districts access knowledge intensively from external sources with the aim to improve in terms of product development and process optimization. Local firms are more innovative than enterprises in other industrial systems. In this context, learning is based on “a

[36] Belussi/Pilotti, 2002, pp. 130

[37] Belussi/Pilotti, 2002, pp. 130,132

[38] Belussi/Pilotti, 2002, pp. 130-134

passive process of copying".[39] Localized knowledge transfer is highly complex and informal. The efficiency of learning depends for a major part on local agents that are responsible for the governance of information flows inside the system. Local learning is defined as an "interactive process", as active cooperation and interaction among district players is considered as cornerstone of local development. In the fashion sector the district of Carpi and the district of Vincenza are important examples of this kind of industrial districts.

- *"Dynamic evolutionary systems"*[40]

  This system is considered as one of the most innovative forms. Companies focus on manufacturing specialization, knowledge exchange and constant investments in research and development activities. This spirit makes the development of radical innovations possible. Local innovativeness is based on "generative learning". Hereby, local agents play a fundamental role facilitating generative interaction and multiple knowledge consolidation among district firms as well as supporting all these organizational structures that are able to boost local innovative capabilities. Well known examples of this kind of system in the fashion sector are the district of Montebelluna, the district of Cadore, and the district of Matera-Altamura-Santeramo.

1.3 Competitive advantage of Italian industrial districts

First of all, according to Bertini (2000), district firms profit primarily from (1) rapid industrialization, (2) stimulation of knowledge exchange, (3) low market entry barriers, and (4) common spirit of constant development.[41]

Further, according to Becattini and Musotti (2003), the competitive advantage of Italian industrial districts is based above all on the so-called "district effect" that emerges due to (1) economies of organization, (2) economies of training, (4) economies of transaction, and (5) economies of adaption to change.[42] First, "economies of organization" are advantages that derive from localized productive

[39] Belussi/Pilotti, 2002, p. 130

[40] Belussi/Pilotti, 2002, pp. 130, 134, 135

[41] Bertini, 2000, pp.107-108

[42] Becattini/Musotti, 2003, pp. 270-272

specialization and division of labor, facilitating the production of both standardized and differentiated goods. Second, the “economies of concentration” emerge when higher order volumes of collaborating intermediate firms result in discounts of costs. Third, “economies of training” refer to lower training expenses through specialization and division of labor. Fourth, “economies of transaction costs” occur due to decreased information asymmetries inside district borders. In fact, as private and business life merges in Italian industrial districts, locals have more informal information at their disposal than non-locals. Lastly, the “economies of adaption to change” refer to the common desire of district players to support their industrial district, opening themselves towards transformation and sacrifices whenever it is required for the well-being of the whole community.

Lastly, this paper considers that further crucial sources of Italy’s competitiveness are those related to knowledge and innovation. A detailed description of the role knowledge and innovation play in the Italian industrial districts is elaborated in detail in chapters 2 and chapter 3.

1.4 Importance of industrial districts to the Italian economy

Italian population accounted for 60,340,328 inhabitants in 2010.[43] In total 156 Italian industrial districts exist.[44] The textile and fashion sector employs about 537,435 people.[45] The four leading districts, operating in the textile and clothing sectors employ more workers than international companies, such as BMW, Royal Shell or Pfizer.[46] Leading Italian fashion companies are Valentino, Armani, Versace, Gianfranco Ferré, Krizia and Benetton that base their competitive advantage on excellent design, good price-quality relation as well as on efficient and flexible distribution.[47]

Most Italian districts are located in the North, while the remaining ones are located in the Central (49) and in the South (26).[48] The geographic distribution is

[43] http://demo.istat.it/bil2010/index.html (14/07/2011)

[44] Istat, 2006, p. 29

[45] Istat, 2011, p.30

[46] Fortis/Carminati, 2009, p. 418

[47] http://www.nationsencyclopedia.com/economies/Europe/Italy.html (04/10/2011)

[48] Istat, 2006, p. 29

most intense in the regions of Marche, Veneto, and Lombardy.[49] The Southern parts of Italy are less industrialized.[50] Most of the textile and fashion companies are placed in the North, Tuscany and Campania.[51]

In 2010 exports accounted for € 63.7 billion.[52] In 2008 total export generated by Italian industrial districts amounted for € 70.2 billion, representing 20.2 per cent of Italian manufacturing system and 19.2 per cent of total export volume.[53] Italy is after China one of the leading exporting countries in the fashion and textile sector.[54] 22,000 exporting enterprises, operating in these sectors, target European, American and Japanese markets as well as emerging markets (e.g., Russia and China).[55]

[49] Sforzi, 2009, p. 340

[50] Sforzi, 2009, p. 340

[51] Confindustria, 2011

[52] Fondazione Edison, 2010, p. 2

[53] Fondazione Edison, 2010, p. 1

[54] http://mefite.ice.it/settori/Tessile.aspx?idSettore=02000000 (14/07/2011)

[55] http://mefite.ice.it/settori/Tessile.aspx?idSettore=02000000 (14/07/2011)

2 KNOWLEDGE MANAGEMENT

2.1 Theoretical background on knowledge management

Investigations on knowledge management date back to the 1960s and have their peak in the 1990s.[56] On the basis of an extensive literature review, Du Plessis (2007) defines knowledge management basically as a "planned, structured approach to manage the creation, sharing, harvesting and leveraging of knowledge as an organizational asset."[57] According to Allee (1997), knowledge management is "much more than managing the flow of information. It means nothing less than setting knowledge free to find its own paths. It means fueling the creative fire of self-questioning in organizations."[58]

Knowledge management has diverse functions. This paper focuses on those functions of knowledge management that have an impact on companies' innovative strategy. Referring to Du Plessis (2007), the aim of knowledge management is (1) the procurement of tools, organizational settings and cultures that facilitate the creation, conversion, transfer and integration of new knowledge, (2) the facilitation of access to internal and external knowledge sources, (3) the enhancement of internal and external cooperation, and (4) the facilitation of the development of skills that are required in innovative activities.[59]

2.2 Theoretical background on knowledge

2.2.1 Definition of knowledge

Knowledge, its creation and its transfer are driving forces of organizational competitiveness.[60] Since the Greek age debates emerge on the concept of knowledge, considering it as a very complex phenomenon.[61] Many scholars assume that before defining knowledge itself, it is necessary to distinguish

[56] Lehner, 2009, p. 30

[57] Du Plessis, 2007, p. 22

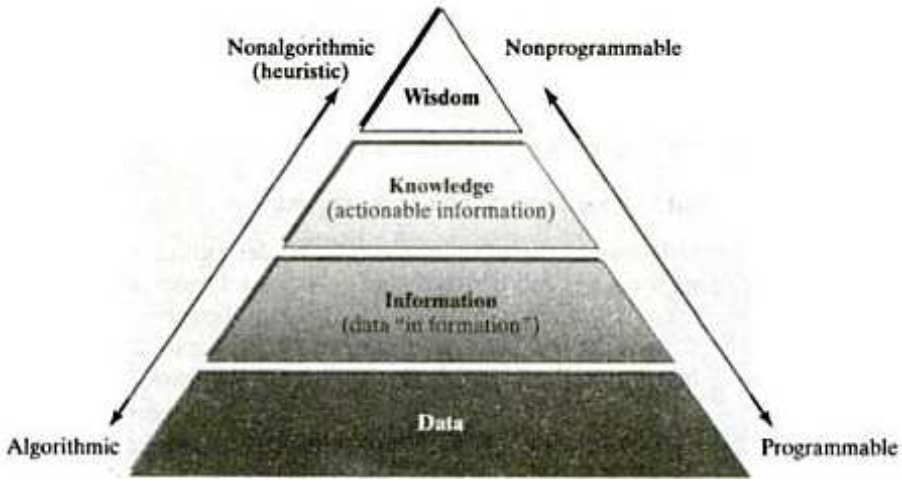
[58] Desouza/Evaristo, 2003, p. 62

[59] Du Plessis, 2007, pp. 26-28

[60] Argote/Ingram, 2000, p. 150

[61] Nonaka, 1994, p. 15

between data, information[62] and knowledge.[63] According to this, Alavi and Leidner (2001) highlight the existence of a "hierarchy from data to information to knowledge with each varying along some dimension, such as context, usefulness, or interpretability, rarely survives scrupulous evaluation."[64] Figure 1 illustrates this hierarchy.



Source: Award/Ghaziri, 2007, p. 65

Figure 1: Hierarchy of data– information –knowledge

Scientists often use two terms "knowledge" and "information" interchangeably, but in reality these two theoretical concepts have distinct meanings.[65] In fact, Nonaka (1994) highlights: "information is a flow of messages, while knowledge is created and organized by the very flow of information, anchored on the commitment and beliefs of its holder."[66]

Providing a unique definition of the term "knowledge" is rather difficult due to the vast amount of divergent definitions that have been elaborated by different research streams. One of the most original sociological definitions derives from

[62] A detailed description of the terms "data" and "information" is attached in Appendix C

[63] Roberts, 2000, p. 430; Alavi and Leidner, 2001, p. 109; Rowley, 2007, p. 164

[64] Alavi/Leidner, 2001, p. 109

[65] Nonaka, 1994, p. 15

[66] Nonaka, 1994, p. 15

Plato, who considers knowledge as a "justified true belief".[67] Instead, considering the economic notion of knowledge, organizational knowledge can be defined as given in Table 1.

Table 1: Definitions of organizational knowledge

Author	*Definition*
Davenport and Prusak (2000)	"a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and information"[68]
Alavi and Leidner (2001)	"justified belief that increases an entity's capacity for effective action"[69]
Small and Sage (2005/2006)	"a dynamic mix of individual, group, organizational and inter-organizational experiences, values, information, and expert insights. It originates in the minds of the individual knowledge worker and emerges as individual knowledge workers interact with other knowledge workers and the environment"[70]
Award and Ghaziri (2007)	"understanding gained through experience or study […] it is 'know-how' or familiarity with how to do something that enables a person to perform a specialized task. It may also be an accumulation of facts, procedural rules or heuristics"[71]

2.2.2 Dimensions and types of knowledge

As strategies of knowledge management depend on the different types of knowledge involved, it is necessary to understand the differences between the distinct forms of knowledge.[72] Overall, it is possible to differentiate between (1) the epistemological (cognitive) knowledge dimension (including tacit and explicit knowledge) and (2) the ontological (organizational) knowledge dimension (including individual and collective knowledge).

[67] Small/Sage, 2005/2006, p. 153

[68] Davenport/Prusak, 2000, p. 5

[69] Alavi/Leidner, 2001, p.109

[70] Small/Sage, 2005/2006, p. 154

[71] Award/ Ghaziri, 2004, p. 57

[72] Alavi/Leidner, 2001, p. 112

Ontological knowledge dimension

The ontological knowledge model assumes that knowledge is not linked to physical or contextual aspects of an individual; instead it presumes that reality exists separately on the cognition of humans.[73] Therefore, according to Hasler Roumois (2007), knowledge can be transferred as a "package" from one individual to the other (package model), augmented and stored (stock model) as well as bargained (object model).

According to this view, two forms of knowledge exist, namely "individual knowledge" and "social (or collective) knowledge". Individual knowledge is formed by single individuals, whereas collective knowledge is formed by more than one person through social interaction inside a firm.[74] In fact, *individual knowled*ge is defined as the total of "individuals' competencies, information, and knowledge"[75], while *collective knowledge* is considered as "accumulated knowledge of the organization stored in its rules, procedures, routines and shared norms which guide the problem-solving activities and patterns of interaction among its members."[76]

Epistemological knowledge dimension

The constructivist knowledge model defines reality as a "subjective construct" and knowledge as a "subjective cognition".[77] According to this, Polanyi (1996) points out that "we can know more than we can tell."[78] This notion is shared by Nonaka (1994), who presumes that "knowledge that can be expressed in words and numbers only represents the tip of the iceberg of the entire body of possible knowledge."[79]

[73] Hasler Roumois, 2007, p. 62

[74] Nonaka, 1994, p. 17

[75] Zander/Kogut, 1995 in Matusik/Hill, 1998, p. 683

[76] Lam, 2000, p. 491

[77] Hasler Roumois, 2007, p. 62

[78] Polanyi, 1966, p. 4

[79] Nonaka, 1994,p. 16

Following this school of thought, traditional scholars (e.g., Nonaka, 1991, 1994; Polanyi, 1996) differentiate between "explicit knowledge" and "tacit knowledge".[80] These two forms of knowing are distinctive, but mutually reliant to each other.[81]

On the one hand, *explicit or codified knowledge* refers to knowledge that is generated without any direct personal experience.[82] Transfer of codified knowledge is not difficult, because once explicit knowledge is translated into verbal codes[83] it can be easily shared among individuals.[84]

On the other hand, *tacit or implicit knowledge* is highly personal know-how that cannot be formalized or transferred easily.[85] According to Nonaka (1994), tacit knowledge incorporates two dimensions: (1) a technical dimension and (2) a cognitive dimension.[86] According to the scientist, technical knowledge is objective and context-specific knowledge. It is based on peoples' cognitions, informal know-how and capabilities. In contrast, the cognitive dimension of implicit knowledge is a result of individuals' intuitive and personal "mental models".

Combining both the cognitive (tacit-explicit) and organizational (individual-collective) dimensions of knowledge, it is further possible to differentiate between: (1) embrained knowledge (individual-explicit), (2) embodied knowledge (individual-tacit), (3) encoded knowledge (collective-explicit), and (4) embedded knowledge (collective-tacit).[87] Lastly, it is also possible to classify knowledge into (1) declarative knowledge (know-about), (2) procedural knowledge (know-how), (3) causal knowledge (know-why), (4) conditional knowledge (know-when), (5) relational knowledge (know-with), and (6) pragmatic knowledge.[88]

[80] Howells, 2002, p. 872; Alavi/Leidner, 2001, p.110

[81] Alavi/Leidner, 2001, p. 112

[82] Howells, 2002, p. 872

[83] Nonaka, 1994, p. 16

[84] Howells, 2002, p. 872

[85] Nonaka, 2007, p. 165

[86] Nonaka, 1994, p. 16

[87] Lam, 2000, pp. 492-493

[88] Alavi/Leidner, 2001, p. 113

2.2.3 Knowledge attributes

Knowledge consists of different features.[89] Zander and Kogut (1995) have identified on the basis of precedent studies (e.g., Rogers, 1962; Winter, 1987) the following knowledge characteristics: (1) codifiability, (2) teachability, (3) complexity, (4) system dependence, and (5) product observability.[90] Table 2 lists the main definitions of these knowledge attributes:

Table 2: Definitions of knowledge attributes

Knowledge attribute	*Definition*
Codifiability	"degree to which knowledge can be encoded, even if the individual operator does not have the facility to understand it"[91]
Teachability	"extent to which workers can be trained in schools or on the job; it reflects the training of individual skills"[92]
Complexity	"inherent variations in combining different kinds of competences"[93] or "large number of parts that interact in a non simple way"[94]
System dependence	"degree to which a capability is dependent on many different (groups of) experienced people for its production"[95]
Product oberservability	"degree to which capable competitors can copy the manufacturing capability, because they are able to manufacture the innovation once they have understood the functions of the product"[96]

2.3 Knowledge creation and knowledge transfer

2.3.1 Knowledge creation

Driving forces of knowledge creation are the single individuals inside companies.[97] New knowledge is the direct result of the interplay between

[89] Zander/Kogut, 1995, p. 79; Kogut/Zander, 1993, p. 627

[90] Zander/Kogut, 1995, p. 79

[91] Zander/Kogut, 1995, p. 79

[92] Zander/Kogut,1995, p. 79

[93] Zander/Kogut, 1995, p. 79

[94] Simon, 1969, p. 195

[95] Zander/Kogut, 1995, p. 79

[96] Zander/Kogut, 1995, p. 82

[97] Nonaka, 1994, p. 17

employees' know-how and abilities (human capital), firms' ability to respond to changes in marketplaces (structural capital) and clienteles' features (customer capital)[98]. Hereby, Nonaka (1991, 1994) highlights that the successful knowledge creation depends on the commitment and willingness to communicate.[99] Three different models of knowledge creation exist, namely (1) the SECI model, (2) the "Ba" model, and (3) the leadership model.[100] As the focus of the present paper is primarily directed to the knowledge transfer processes, the knowledge creation processes are not explained in detail in this chapter, but, instead, they are described in the Appendix C.

2.3.2 Knowledge transfer

First theoretical contributions on knowledge transfer date back to the 1980s with the elaboration of the information richness theory.[101] According to Argote et al. (2000), the knowledge transfer process can be defined as "the process through which one unit (e.g., individual, group, department, division) is affected by the experience of another […] Thus, organizations can learn not only directly from their own experience, but also indirectly from the experience of other organizations."[102] Knowledge can be diffused by purpose or by accident through socialization, education and learning.[103]

2.3.2.1 Types of knowledge transfer processes

Scientists distinguish between different types of knowledge transfer processes. This sub-subsection focuses on (1) the classifications of Chen and McQueen (2010), including structured and unstructured knowledge transfer processes,[104] as well as on (2) Dixon's (2000) taxonomy, focusing on serial, near, far, strategic, and expert transfer processes.[105]

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[98] Kakabadse et al., 2001, p. 144

[99] Nonaka, 1994, pp. 14, 17; Nonaka, 1991, p. 97

[100] Nonaka et al., 2000, p. 5

[101] Srećković/Windsperger, 2011, p. 319

[102] Argote et al., 2000, p. 3

[103] Roberts, 2000, p. 432

[104] Chen/McQueen, 2010, pp. 57-59

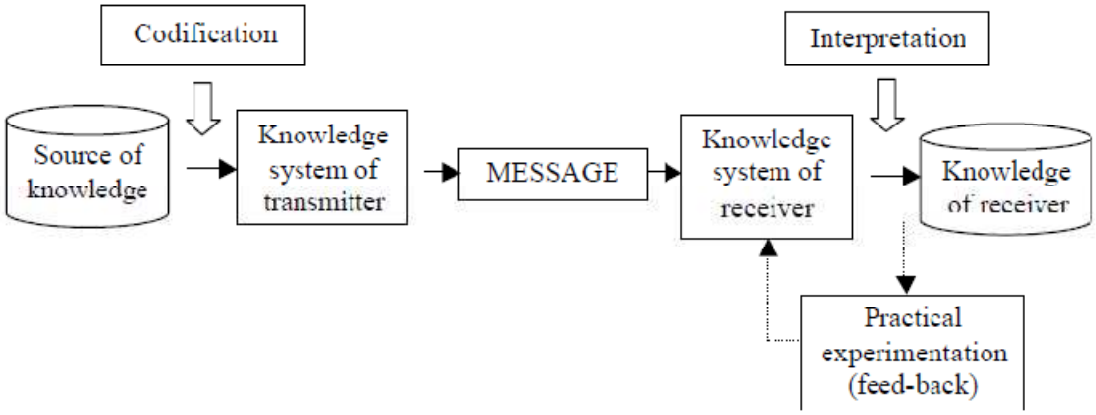
[105] Dixon, 2000, pp. 29-30

- First, when organizations decide to transfer knowledge purposely in a formal and planned manner, then one can speak of a *structured knowledge transfer process*. Whenever companies transfer knowledge spontaneously, in an informal and unplanned manner, it would be referred to as a *unstructured knowledge transfer process*. While the structured transfer process precedes along four stages[106] in a strictly sequential manner, the unstructured transfer process possibly skips from one stage to the other. In workaday life three different forms of unstructured transfer processes can take place: (1) unstructured copy, (2) unstructured adoption, and (3) unstructured fusion. “Unstructured copy” refers to copying. Efficiency of this process depends on individuals’ motivation and their access to knowledge as well as on their absorptive capacity. “Unstructured adoption" is a more advanced type of knowledge transfer, involving more implicit knowledge. Here, individuals do not have direct access to pools of knowledge, and they need to adapt available knowledge to changing environmental conditions. “Unstructured fusion” takes places when knowledge is available but inapplicable, or when useful information cannot be deduced from them. Therefore individuals need to combine new knowledge inputs with already experienced knowledge pools.
- Second, according to Dixon (2000), *serial knowledge transfer* happens when a team reuses knowledge that has been acquired through repeated completion of tasks in different settings. *Near knowledge transfer* is related to routinized knowledge, and occurs when a team uses knowledge inputs that other teams have previously collected in identical situations. *Far knowledge transfer* happens when one team adapts another team’s tacit knowledge (created during the accomplishment of different tasks) to its own activity. One refers to *strategic knowledge transfer* when individuals gain complex knowledge (in terms of temporal and spatial differences) from other persons. *Expert knowledge transfer* occurs when individuals focus on the support of more experienced individuals, benefitting from the transfer of their codified knowledge.

[106] (1) initiation stage, (2) implementation stage, (3) ramp-up stage, and (4) integration stage

2.3.2.2 Stages of knowledge transfer processes

According to the model of Garavelli and Goroglione (2000), the knowledge transfer process allows a message to be sent from a sender to a receiver. Codification, interpretation and feedback are fundamental sub-processes. Figure 2 illustrates the main steps of the first stages of knowledge transfer.



Source: Garavelli/Goroglione (2000) in Gottardi, 2003, p. 5

Figure 2: Basic stages of knowledge transfer

According to Szulanski (1996), knowledge transfer evolves along the following four sub-processes: (1) initiation stage, (2) implementation stage, the (3) ramp-up stage, and (4) integration stage.[107]

The *initiation stage (search)* starts when organizations understand that new knowledge that is required to solve an emerging problem, and when goals, viabilities, rationales, costs, and obligations of upcoming research activities are defined. In the *implementation stage (learn)* organizational members accept to share knowledge, and apply the transmitted knowledge in their daily business. This stage requires that knowledge source and knowledge receiver are linked to each other, that courses of actions are adjusted to individuals' needs, and that social relationships are established among communication partners. In the *ramp-up phase (practice)* individuals actively integrate transferred knowledge in practice. The *integration stage* takes place when implementation has been successful, and when new knowledge is integrated in existing knowledge bases.

[107] Szulanski, 1996, pp. 28-29

2.3.2.3 Positive and negative influencing factors of knowledge transfer

Argote et al. (2003) highlight three different barriers of knowledge management cited in the literature, namely the abilities and motivation of employees as well as the performance opportunities and environmental conditions of the organizations themselves.[108] First, the author highlights, among others, the positive impact of organizational learning,[109] task similarity,[110] and previous personal experience[111] on efficient knowledge transfer. Second, he underlines the power of intrinsic and extrinsic incentives that encourage company members to support knowledge transfer.[112] Extrinsic motivation consists in monetary compensation, while intrinsic motivation refers to non-monetary recompenses.[113] The right mix of these two forms of gratification is crucial in determining a strong competitive advantage through knowledge management.[114] Third, knowledge management is influenced by the environment, in which organizations are emerged. According to this, knowledge managers should invest in the establishment of a knowledge-driven organizational culture by supporting internal learning processes, by reducing physical and psychological distances among individuals, and by supporting informal networks (internal and external to the organization).[115]

Considering factors that have a negative impact on efficient knowledge management, it is further possible to distinguish between (1) individual barriers and (2) social barriers[116] or between limitations regarding to (1) people, (2) management, and (3) organizational structures.[117] On the one hand, individual barriers refer to people's indifference to share their know-how. Possible reasons for such an attitude can be: disinterest to change, lack of time, anxiety to weaken their own position, unwillingness to invest extra working hours, or constantly

[108] Argote et al., 2003, pp. 575-576

[109] Nadler et al.,2003, p. 530

[110] Darr/Kurtzberg, 2000, p. 32

[111] Cohen/Levinthal, 1990, p. 130

[112] Argote et al., 2003, p. 575; Osterloh/Frey, 2000, p.539

[113] Osterloh/Frey, 2000, p.539

[114] Osterloh/Frey, 2000, p.544

[115] Argote et al., 2003, p. 575

[116] Disterer, 2001, pp. 2-3

[117] Kakabadse et al., 2001, p.148

changing composition of employees.[118] On the other hand, social barriers occur, when organizational structures and/or processes are highly bureaucratic and inflexible or when thinking patterns of the organization are not coherent with those of the people working in it.[119]

In order to understand why tacit knowledge transfer is more complex than codified knowledge transfer, Joia and Lemos (2010), reviewing past literature, highlight, among others, the following indicators:[120]

- *Time:* The transfer of tacit knowledge requires more time than the transfer of codified knowledge because contracts need to be formalized, social interactions need to be established, and transferred knowledge needs to be reflected and experienced.
- *Common language:* Universal terminology is a precondition for a better understanding of transferred knowledge. Most individuals have difficulties to express their personal know-how because it is accumulated over time through direct personal experience.
- *Relationship network:* Another prerequisite for successful transfer of implicit knowledge refers to ability of organizations to identify knowledge that is actually lacking, and to identify those individuals that are able to procure required knowledge. In this context, according to Disterer (2003), individuals' unawareness of the value of their personal knowledge is problematic.
- *Type of training:* Efficient knowledge transfer depends also on the prioritization of training inside firms. While, according to Murray and Peyrefitte (2007), explicit knowledge can be transferred easily through formal education, tacit knowledge exchange, according to Disterer (2003), requires time-consuming programmes (e.g., coaching and mentoring sessions).
- *Transfer and storage of knowledge:* According to Joia (2007), companies need to ensure that codified knowledge is stored in databases and transferred through social interaction in order to induce efficient knowledge transfer.

[118] Disterer, 2001, p. 2; Kakabadse et al., 2001, p.148

[119] Disterer, 2001, p. 3; Kakabadse et al., 2001, p.148

[120] Joia/Lemos, 2010, pp. 413-417

2.4 Knowledge management in industrial districts

Research of industrial districts has demonstrated that efficient knowledge creation and innovation are fundamental drivers for the competitive advantage of district firms.[121] Some of the major drivers of the knowledge-based advantages of industrial districts can be summarized as follows:

2.4.1 General characteristics, favouring the creation and transfer of knowledge

Malmberg and Power (2005), referring to recent contributions in the literature, highlight that knowledge management in industrial districts is facilitated by diverse district-specific characteristics. The most important determinants are: (1) sophisticated cooperation among local firms, (2) intense local rivalry, (3) enhanced professional mobility, and (4) spillovers fostered by the mobility and tense social ties of locals.[122] According to the authors, these factors facilitate both knowledge creation and transfer, and contribute to the ability of local firms to market innovative goods. Actually, professional mobility, tight social ties and increased social interaction make knowledge transfer less complex and quicker. In particular local competition boosts the production of knowledge. In fact, consistent visibility, strong focus on continuous improvement and openness towards new technologies forces locals to constantly upgrade shared knowledge pools.

2.4.2 Public knowledge pool

In industrial districts a "localized pool of specific knowledge" which is only available for district players exists.[123] This knowledge pool incorporates mainly contextualized knowledge.[124] Contextual knowledge is defined as "socially embedded knowledge in a territory"[125] that is composed of both codified knowledge (delivered from sources outside the district) and tacit knowledge

[121] Inken/Tsang, 2005, p. 150

[122] Malmberg/Power, 2005, pp. 411-412

[123] Muscio, 2006, p. 303

[124] Carbonara, 2004 in Albino et al., 2006, p. 33

[125] Belussi/Pilotti, 2002, p. 128

(developed inside district boarders slowly over time).[126] This kind of knowledge is considered as a "collective good" rather than a "public good"[127] that is constantly improved via "local communication processes and local knowledge spillovers",[128] influencing directly manufacturing and research activities.[129] This form of knowledge is further considered as a "collective model of innovation", making additional internal research bases and external knowledge sources less important.[130]

2.4.3 Localized knowledge spillovers

As already mentioned before, industrial districts are leading examples of industrial systems, where knowledge spillovers take place.[131] In fact, Keilbach (2000) highlights that "knowledge spillovers can be considered as one of the driving forces in the formation of industrial districts."[132] Referring to Breschi and Lissoni (2001), knowledge spillovers can be considered as "'knowledge externalities bounded in space', which allow companies operating nearby key knowledge sources to introduce innovations at a faster rate than rival firms located elsewhere."[133] Knowledge spillovers contribute fundamentally to positive returns and economic development,[134] and represent a key source for innovation.[135] This notion is shared also by Carlino (2001) who highlights the importance of knowledge spillovers in the context of "exchange of ideas among individuals", when "a given company's innovation may stimulate a flood of related inventions and technical improvements by other companies."[136] The positive influence of knowledge spillovers on the innovative capabilities of districts is a result of tense social relationships between district members that enhance

[126] Belussi/Pilotti, 2002, p. 128

[127] Antonelli et al., 2008, p. 480

[128] Muscio, 2006, p. 303

[129] Muscio, 2006, p. 303

[130] Muscio, 2006, p. 303

[131] Keilbach, 2000, p. 3; Cainelli/De Liso, 2005, pp. 4-5

[132] Keilbach, 2000, p. 3

[133] Breschi /Lissoni, 2001, p. 258

[134] Keilbach, 2000, p. 3

[135] Breschi/Lissoni, 2001, p. 257

[136] Carlino, 2001, p. 7

"reciprocal trust and frequent face-to-face contacts."[137] They are a result of the particular nature of (1) local tacit knowledge, (2) local environmental characteristics, (3) local social relationships, and (4) local cooperation among private and public institutions.[138]

2.4.4 Learning in industrial districts

Especially in the case of design-focused sectors (e.g., fashion sector), both knowledge economies and learning economies play a fundamental role.[139] In fact, local innovativeness depends on two different forms of learning ("learning by R&D" and "learning by interaction").[140] Thus, the education of one district firm has an impact on the accumulation of knowledge and resulting knowledge spillovers of other district firms.[141] Unfortunately, district-specific learning processes are inappropriate for global marketplaces, where demand is less stable and less sophisticated than in industrial districts.[142]

2.4.5 Private and public drivers of knowledge production[143]

According to Belussi and Gottardi (2000), in Italian industrial districts there are both public and private drivers of knowledge production. In general, one of the main aims is to create public knowledge that can be shared and debated on regular bases exclusively among district players. On the one hand, public entities habitually sustain the creation of localized knowledge. They financially support research centers, universities and advanced training courses for local workers. On the other hand, the private sector enhances the production of knowledge by directing funds to research and development as well as by boosting internal learning (through experimentation of new technologies) and external learning (through monitoring of district members).

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[137] Breschi /Lissoni, 2001

[138] Landabaso/Rosenfeld, 2009, p. 744

[139] Becattini/Musotti, 2003, p. 270

[140] Albino et al., 2006, p. 33

[141] Cainelli/De Liso, 2005, pp. 4-5

[142] Albino et al. 2006, p. 33

[143] Belussi/Gottardi, 2000, pp. 29-31

2.5 Knowledge transfer mechanisms

The present paper uses the term knowledge transfer mechanisms in accordance with the definition of Gorovaia and Windsperger (2010), and defines knowledge transfer mechanisms as all those "organizational routines that enable the transfer of explicit and tacit knowledge."[144] The following subsection explains the main types of knowledge transfer mechanisms used in organizations and their role in knowledge transfer processes.

2.5.1 Types of knowledge transfer mechanisms

Over the last years the number of communication tools has multiplied considerably, affecting the way individuals and companies communicate with each other.[145] Overall, organizations can use different communication media. Table 3 presents a brief overview of some of the most common communication tools that can be used in knowledge transfer activities.

Table 3: Knowledge transfer mechanisms

Author	*Knowledge transfer mechanisms*
Daft and Lengel (1983)[146]	• face-to-face communication • telephone • letters and memos • documents and bulletins • computer outputs
Keeble/Wilkinson (1999)[147]	Knowledge transfer mechanisms in industrial districts: • "interfirm mobility of the labor force within the district"; • "interactions between suppliers and customers and the makers and users of capital equipment"; and • "spin-off of new firms from existing firms, universities, and public sector research laboratories"

[144] Gorovaia/Windsperger, 2010, p.5

[145] Lo/Lie, 2008, p. 146

[146] Lengel, 1983; Bodensteiner, 1970 in Daft/Lengel, 1983, p. 8

[147] Keeble/Wilkinson, 1999 in Inken/Tsang, 2005, p. 150

Table 3: Knowledge transfer mechanisms *(continued)*

Author	*Knowledge transfer mechanisms*
Büchel and Raub (2001)[148]	• videoconferences • electronic communication • tele-conferences • voice mails • faxes • formal letters
Roberts (2000)[149]	• e-mail • voice mail • teleconferencing • CAD and CAM • information databases • groupware
Argote et al. (2000)[150]	• movement of employees • transfer of technology • reproduction of routine processes • reverse engineering • scientific papers
Murray and Peyrefitte (2007)[151]	• technology assisted communication • meetings • trainings

[148] Büchel/Raub, 2001, p. 523

[149] Roberts, 2000, p. 435

[150] Argote et al., 2000, p. 3

[151] Murray/Peyrefitte, 2007, p. 115

2.5.2 Media richness and knowledge transfer mechanisms

Examinations on knowledge transfer begin with the identification of the media richness theory.[152] According to the media richness theory (e.g., Daft and Lengel, 1983, 1984, 1986; Trevino et al., 1987; Lengel and Daft, 1988; Büchel and Raub, 2001; Sheer/Chen, 2004), communication media can be classified according to their "information richness" or "media richness". The term "information richness" can be interpreted as "the potential information carrying capacity of data".[153] Based, for example, on Bodensteiner (1970), Lengel (1983) notes that every single transfer mechanism incorporates a mix of four sub-characteristics that reflect their degree of media richness.[154] According to this, it is assumed that the higher the degree of "(a) the availability of instant feedback; (b) the use of multiple cues, such as physical presence, voice inflection, body gestures, and graphic symbols, and so forth; (c) the use of natural language for conveying a broad set of concepts and ideas; and (d) the personal focus of the medium",[155] the higher is the degree of information richness.[156] Based on this assumption, the present paper classifies knowledge transfer mechanisms into: (1) knowledge transfer mechanisms with higher degree information richness (KTM_HIR) and (2) knowledge transfer mechanisms with lower degree information richness (KTM_LIR). The following paragraphs describe those knowledge transfer mechanisms that are used in the empirical survey of the present study.

Face-to-face communication[157]

According to Lengel and Daft (1984), direct personal dialogue incorporates the highest grade of information richness. This form of knowledge transfer mechanisms allows individuals to give instant feedbacks and to use non-verbal communication, reducing misunderstandings and equivocality linked to communication contents.

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[152] Gorovaia/Windsperger, 2010, p.3; Srećković/Windsperger, 2011, p. 319

[153] Daft/Lengel, 1983, p. 7

[154] Daft/Lengel, 1983, p. 7

[155] Sheer/Chen, 2004, p. 77

[156] Sheer/Chen, 2004, p. 77

[157] Daft/Lengel, 1986, p. 560

Telephone[158]

In contrast to direct and personal dialogue, communication via telephone is considered as a knowledge transfer mechanism with lower media richness. In fact, the mimic, gestures or/and other visual support cannot be used. Instead, individuals focus primarily on language contents and pitches of voice.

Written and directed documents (letters, fax, memos)[159]

Written and directed documents have a lower degree of information richness. These kinds of communication are usually directed to one or more receivers, making them more or less personal. Nevertheless, they do not have fast feedback capabilities, and non-verbal messages are not possible.

Written and formal documents (bulletins, reports, existing documents)[160]

These lean forms of communication media are anonymous and not personal at all. They can be used when receivers fully understand the main subjects of communication content.

Formal and numeric documents (computer outputs)[161]

These forms of documents have the lowest degree of media richness, lacking all previously cited features of information richness. Therefore, these communication tools are appropriate exclusively for uncomplicated and quantifiable knowledge inputs.

Formal and informal meetings[162]

Referring to Murray and Peyrefitte (2007), the level of informality determines the degree of richness of knowledge transfer mechanisms. According to this, informal meetings, including "face-to-face retreats and after-work socials"[163] are richer

[158] Daft et al., 1987, p. 359

[159] Daft et al., 1987, p. 359

[160] Daft/Lengel, 1983, pp. 9, 50

[161] Daft/Lengel, 1983, p. 9

[162] Murray/Peyrefitte, 2007, p. 116

[163] Murray/Peyrefitte, 2007, p. 116

knowledge transfer mechanisms, while informal meetings, including seminars and conferences, are leaner knowledge transfer mechanisms.

New electronic media (e-mail, electronic data interchange, databanks, videoconferences, newsgroups, chat systems, social media)

Vickery et al. (2004), studying the usage of communication channels in business to business relationships, add new forms of communication media to those cited originally by Daft and Lengel.[164] They assume that the degree of information richness of communication media depends on how much organizations know about their business partners. According to this, if companies know (or do not know) each other very well, electronic media are considered to have higher (or lower) degrees of information richness.[165]

Although internet is one of the most crucial interventions of this century, it has yet not been extensively studied as an interpersonal communication tool.[166] According to Burnett (2000), the internet facilitates the circulation of information, and enhances communication among individuals.[167] Windsperger and Gorovaia (2010) consider electronic media, in particular the intra- and internet, as knowledge transfer mechanisms with lower degree of media richness.[168] Murray and Peyrefitte (2007) agree to this assumption, and highlight that modern electronic communication and databanks can be considered as lean communication tools because they are "non-interactive, impersonal, and are good for transferring less complex knowledge such as rules, forms, and procedures."[169] In contrast, videoconferences, according to Murray and Peyrefitte (2007), are richer knowledge transfer mechanisms as they make technology-assisted face-to-face communication possible.[170] Lastly, social media are added to the survey, as they are "top of the agenda for many business executives

[164] Vickery et al., 2004, p. 1108

[165] Vickery et al., 2004, pp. 1116-1117

[166] Herring, 2002, p. 126

[167] Herring, 2002, p. 134

[168] Windsperger/Gorovaia, 2010, p. 2

[169] Murray/Peyrefitte, 2007, p. 116

[170] Murray/Peyrefitte, 2007, p. 116

today."[171] Table 4 illustrates a possible classification of social media channels in relation to media richness theory elaborated by Kaplan and Haenlein (2010).

Table 4: Social media and information richness

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

Source: Kaplan/Haenlein, 2010, p. 62

2.5.3 Choice of knowledge transfer mechanisms

Which variables impact the choice of knowledge transfer mechanisms in organizations? In general, according to Lo and Lie's (2008) literature review, the usage of communication technology depends on variables such as (1) user friendliness, (2) perceived helpfulness, (3) network externalities, (4) capacity to ease the formation of social ties, and (5) the extent to which personal messaging is possible.[172]

Furthermore, the present paper analyzes the choice of knowledge transfer mechanisms on the basis of (1) the media richness theory, (2) the knowledge-based theory, (3) the trust-based theory, and (4) the innovation adoption theory of companies.

2.5.3.1 Knowledge transfer mechanisms and media richness theory

According to Daft and Lengel (1986), the origins of information processing in organizations are uncertainty and equivocality.[173] *Uncertainty* is defined as the "absence of information" and increases when information decreases.[174] In order to overcome uncertainty, companies need to acquire information through

[171] Kaplan/Haenlein, 2010, p. 59

[172] Lo/Lie, 2008, pp. 146-147

[173] Daft/Lengel, 1986, p. 557

[174] Daft/Lengel, 1986, p. 556

"periodic reports, rules and procedures, or group meetings."[175] In contrast, *equivocality (or ambiguity)* is defined as "confusion and lack of understanding"[176] due to the "existence of multiple and conflicting interpretations about an organizational situation."[177] It occurs when "asking a yes-no question is not feasible".[178] In order to reduce ambiguity, managers facilitate mutual understanding by focusing increasingly on social interaction.[179] Managers select communication channels that fit best to the level of perceived uncertainty and ambiguity.[180] According to Daft and Lengel (1983), it is assumed that higher (or lower) levels of uncertainty and complexity require richer (or leaner) communication channels.[181] Likewise, a high (or low) degree of equivocality necessitates richer (or leaner) communication media.[182]

Further, referring to Büchel and Raub (2001), the usage of knowledge transfer mechanisms depends on (1) the perception of media and (2) the scope of media as well. The authors assume that the choice of communication media depends on the form of information-processing activities related to organizational learning processes, and that "a match between learning process and media richness and scope is necessary in order to foster learning within organizations."[183] On the one hand, referring to the concept of *media perception*, the choice of communication tools is impacted by individuals' cognitions, attitudes and codes of conduct as well as by firm-specific cultures, use patterns, and regulations.[184] On the other hand, considering the concept of *media scope*, the selection of communication technology depends on storage capacity and range of coverage of the medium.[185] In this context, the choice of media used is considered a complex

[175] Daft et al., 1987, p. 357

[176] Daft/Lengel, 1986, p. 556

[177] Daft et al., 1987, p. 357

[178] Daft/Lengel, 1986, p. 556

[179] Daft et al., 1987, p. 357

[180] Murray/Peyrefitte, 2007, p. 114

[181] Daft/Lengel, 1983, p. 13

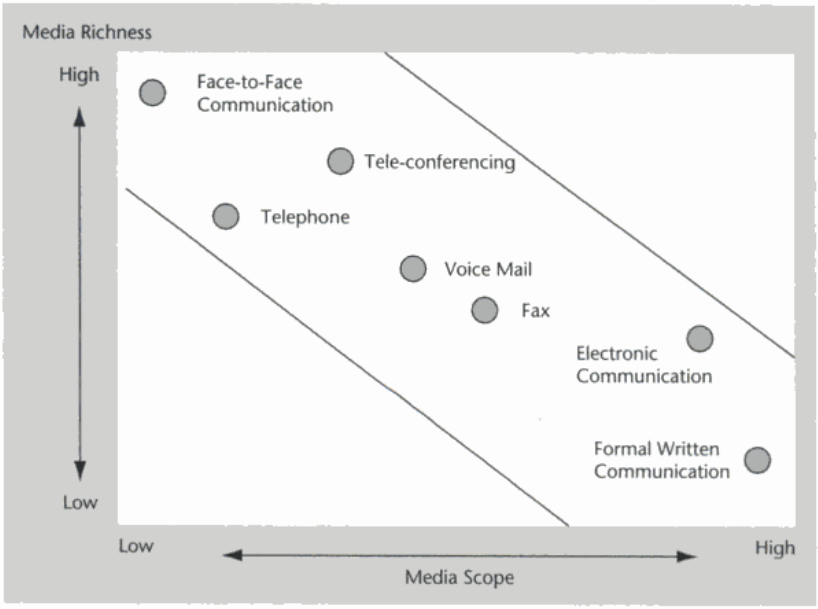
[182] Daft/Lengel, 1983, p. 51

[183] Büchel/Raub, 2001, p. 531

[184] Büchel/Raub, 2001, pp. 523-524

[185] Büchel/Raub, 2001, p. 522

issue, as no ideal communication tool exists that is able to relate both dimensions in a perfect manner.[186] In fact, Figure 3 illustrates the relation between media scope and media richness. As can be seen here, face-to-face dialogue incorporates a high level of information richness, although it is rather low in media scope. In contrast, formal written media are very strong in media choice, but rather deficient in terms of media richness.



Source: Büchel/Raub, 2001, p. 523

Figure 3: Media richness and media scope

2.5.3.2 Knowledge transfer mechanisms and knowledge types

Which knowledge transfer mechanisms are appropriate for the transfer of explicit knowledge, and which are most efficient for the transfer of tacit knowledge? Finding an answer to this question is not simple because not many scientific studies on this topic exist in the literature.[187] Interesting contributions derive for example from Hansen et al. (1999), Murray and Peyrefitte (2007), Hong and Nguyen (2009), Windsperger and Gorovaia (2010), and Srećković and Windsperger (2011).

[186] Büchel/Raub, 2001, p. 531

[187] Srećković/Windsperger, 2011, p. 320

According to Hansen et al. (1999), there are two basic knowledge management strategies that have an impact on the selection of communication technology, namely (1) the codification strategy ("people-to-documents" approach) and (2) the personalization strategy ("dialogue-between-individuals" approach).[188] Companies adopting the *codification strategy* invest in information technologies and electronic document systems that facilitate the sharing of explicit knowledge, while firms, focusing on the *personalization strategy*, prefer computers as communication tools, investing in the formation of networks that facilitate sharing of implicit knowledge.

Among others, Cavusgil et al. (2003) recently state that the efficiency of knowledge transfer depends on the degree of tacitness of knowledge. In fact, the author highlight that decreasing explicitness of knowledge makes knowledge transfer easier, while increasing tacitness of knowledge makes knowledge transfer more difficult.[189] Murray and Peyrefitte (2007) assume that media with higher degree of information richness are appropriate for know-how exchange, while media with lower degree of information richness are more appropriate for information sharing.[190] In other words, lean modes of knowledge transfer mechanisms are adopted to transfer explicit knowledge, while rich forms of knowledge transfer mechanisms are used to share tacit knowledge.[191]

2.5.3.3 Knowledge transfer mechanisms and trust

As described in section 4.3, trust has an impact on both knowledge transfer and knowledge sharing. According to Srećković and Windsperger (2011), organizational trust determines the choice of knowledge transfer media according to two approaches, namely according to (1) the substitutability view, and (2) the complementary view of trust.[192]

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[188] Hansen et al., 1999, pp. 107-109

[189] Cavusgil et al., 2003, p. 7

[190] Murray/Peyrefitte, 2007, p. 124

[191] Murray/Peyrefitte, 2007, p. 124; Windsperger/Gorovaia, 2010, p. 5; Srećković/Windsperger, 2011, p. 321

[192] Srećković/Windsperger, 2011, p. 326

- *Substitutability view of trust*[193]

  In this context, Srećković and Windsperger (2011) underline the impact of trust on knowledge transfer mechanisms on the basis of the following assumptions: On the one hand, referring to Roberts (2000), trust dilutes risks related to knowledge transfer. On the other hand, according to Yu et al. (2006), trust compensates formal forms of knowledge transfer media. Lastly, considering Lo and Lie (2008), trust reduces the degree to which formal knowledge transfer mechanisms are used. According to these findings, it is assumed that trust in clusters enhances (and reduces) the use of leaner (and richer) knowledge transfer mechanisms, while mistrust augments (and decreases) the use of richer (leaner) knowledge transfer mechanisms.

- *Complementary view of trust*[194]

  Srećković and Windsperger (2011), referring among others to Seppänen et al. (2007) and Blomquist et al. (2005), further believe that when cluster firms strongly trust each other, both rich and lean knowledge transfer mechanisms are used more intensively, because trustful relationships enhance the intensity and openness of dialogue among cluster members, and mitigate communication barriers.

2.5.3.4 Knowledge transfer mechanisms and innovation adoption

As it is described in chapter 3, Rogers (1995, 2003) defines the diffusion of innovation as a communication process in which different types of communication media are adopted.[195] In his famous book “Diffusion of innovations” the scientist describes how innovation adopter categories (ranging from earlier adopters to later adopters) accumulate knowledge about innovations, differentiating between two types of knowledge sources, namely (1) interpersonal communication channels and (2) mass media communication channels.[196] In this context, research focuses mainly on earlier adopters because they are crucial key figures

[193] Srećković/Windsperger, 2011, p. 326

[194] Srećković/Windsperger, 2011, p. 326

[195] Rogers, 1995, p. 5

[196] Rogers, 1995, p. 194

in knowledge exchange, communicating their personal experience and opinions to other community members.[197]

In general, according to Rogers (1995), it is assumed that impersonal communication tools are usually selected by earlier adopters[198] in the earlier knowledge stage[199], while interpersonal communication tools are adopted by later adopters[200] in the persuasion stage.[201]

In contrast to Rogers, who focuses primarily on agricultural sectors, Price et al. (1986) find out that interpersonal communication channels have a contrasting value for early adopters, particularly as they concern consumer goods.[202] They highlight that in this market sector earlier adopters prefer interpersonal communication modes, being more exposed to information environments, and being more conscious of innovations than later adopters.

Lee et al. (2002) assume that the "conversational mode rather than the written mode may increase the perceived usefulness of the information,"[203] and advise the use of richer communication channels in front of innovations, especially if they incorporate difficult assets of information.[204] Further, they assume that written forms of communication used by financial institutions are effective tools to induce adoption of innovations.[205]

Burdett (2003), who analyzes the usage of information and communication technology in the academic field, finds out that earlier adopters are more active and experimental users of those media, and basically prefer the most modern communication tools.[206]

Gottardi (2003), investigating communication and knowledge transfer in industrial districts, points out that network technologies are scarcely used inside industrial districts, "even considering the more dynamic districts […] communication

[197] Price et al., 1986

[198] Rogers, 1995, p. 197

[199] Rogers, 1995, p. 195

[200] Rogers, 1995, p. 197

[201] Rogers, 1995, p. 195

[202] Price et al., 1986

[203] Lee et al., 2002, p. 6

[204] Lee et al., 2002, p. 6

[205] Lee et al., 2002, p. 2

[206] Burdett, 2003, p. 91

technologies are used in a 'conservative' mode: the more diffused are those which are simple to use and do not require reorganisation of the firm's work processes and relationships."[207]

Lastly, Belussi (2005), analyzing the adoption and innovation diffusion of information communication technology in two Italian industrial districts, points out that district companies usually do not use extensively these kinds of media, and that local firms basically prefer communication via e-mail, internet and CAD-CAM, mostly neglecting videoconferences.[208]

[207] Gottardi, 2003, p.10

[208] Belussi, 2005, pp. 264-265

3 INNOVATION

3.1 Innovation diffusion and innovation adoption

Innovation diffusion is a leading topic in many different research streams, and it has been investigated, among others, in sociological, business, geographic, and communication studies.[209] The most important models were developed in the 1970s.[210] Most scientific contributions before 1962 are elaborated in Europe and in the United States.[211] In Europe research takes off in the 20th century with the contributions of Gabriel Tarde (1890), who analyses innovation diffusion on the basis the "laws of imitation".[212] During the 1960s increasing attention on this topic emerges also in developing countries.[213] Most widely used diffusion models are elaborated, among others, by Bass (1969), Fourt and Woodlock (1960) and Mansfield (1961)[214] as well as, according to Kroeber-Riel and Weinberg (2003), by Rogers (1962, 2003) and Davis (1986, 1989).[215] Past contributions add to the original notion findings on marketing factors, cultural differences, and new technologies.[216] According to Rogers (1995), *innovation diffusion* refers to all the processes "by which an innovation is communicated through certain channels over time among the members of a social system. It is a special type of communication, in that the messages are concerned with new ideas."[217] Therefore, diffusion theory analyses the diffusion of innovation in time and space, and describes the outstanding role of innovators (earliest individuals that utilize an innovation) and later adopters (individuals that adopt an innovation because they are influenced by word of mouth propaganda and imitate earlier adopters).[218]

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[209] Rogers, 1995, p. 42

[210] Meade/Islam, 2006, p.519

[211] Rogers, 2003, p. xv

[212] Rogers, 2003, pp. 39-40

[213] Rogers, 2003, p. xvi

[214] Meade/Islam, 2006, p. 520

[215] Kroeber-Riel/Weinberg, 2003, p. 677

[216] Meade/Islam, 2006, p. 520

[217] Rogers, 1995, p. 5

[218] Mahajan et al., 2000, ix

According to Rogers (1995), the fundamental elements of innovation diffusion are (1) innovation, (2) communication channels, (3) time, and (4) social systems.[219] In the following the theoretical constructs of innovation and communication channels as well as the innovation adopter categories identified by Rogers (1995, 2003) are described in detail. Concepts, such as time and social systems are described in Appendix C.

3.2 Concept of innovation

3.2.1 Definition of innovation

Literature on this topic extends over many diverse research disciplines, and incorporates various different approaches.[220] Baregh et al. (2009) highlight that about 60 distinct definitions of the term "innovation" exist.[221] One of the first definitions dates back to the 1930s. Schumpeter (1931) is the first who elaborates a description of the present concept, neglecting the usage of the word "innovation".[222] Years later the term "innovation" is cited in literature.[223] Afterwards more precise definitions of the term are elaborated in the1980s.[224]

One leading scientist of innovation theory is Everett M. Rogers – the author of the pioneer work "Diffusion of Innovations". According to him, *innovation* can be described as "an idea, or object that is perceived as new by an individual or other unit of adoption."[225] Recent definitions elaborated in the last 7 years are presented below in Table 5:

[219] Rogers, 1995, p. 10

[220] McFadzean et al., 2005, p. 353

[221] Baregh et al., 2009, p. 1325

[222] Albers/Gassmann, 2005, p. 25

[223] Albers/Gassmann, 2005, p. 25

[224] Hausschildt, 2004, p. 3 in Albers/Gassmann, 2005, p. 25

[225] Rogers, 1995, p. 11

Table 5: Recent definitions of innovation

Author	*Definition*
Salavou (2004)	„Innovation is often considered to be a vital source of strategic change, by which a firm generates positive outcomes including sustained competitive advantage […] innovation seems to incorporate the adoption or/and implementation of 'new' defined rather in subjective ways"[226]
Chen et al. (2004)	"Innovation refers to the introduction of a new combination of the essential factors of production into the production system. It involves the new product, the new technology, the new market, the new material and the new combination."[227]
Alves et al. (2005)	"Innovation can be defined as any new idea that recombines existing ideas, a scheme that challenges the present order, formula, or approach […] innovation is the core process concerned with renewing what the organisation offers and optimising the way it generates and delivers its outputs."[228]
Baregh et al. (2009)	„Innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace."[229]

3.2.2 Taxonomy of innovation

One aim of this study is to elaborate an appropriate overview of the diverse forms of innovation. In this context the literature incorporates several approaches.[230] The present paper focuses only on four taxonomies of innovation, namely on (1) a categorization based on the field of introduction of innovation, (2) a classification referring to the nature of innovation, (3) a taxonomy based on the impact of innovation, and lastly (4) a knowledge-based classification of innovation.

[226] Salavou, 2004, p. 33

[227] Chen et al., 2004, p. 205

[228] Im, 1999; Tidd, Bessant et al, 2001 in Alves et al., 2005, p. 4

[229] Baregh et al., 2009, p. 1334

[230] Rowley et al., 2011, p. 73

- *Taxonomy of innovation according to its field of introduction*

  The first categorization refers to the field of introduction of innovation, and includes concepts, such as (1) product innovation, (2) process innovation, (3) market innovation, (4) structural innovation, and (5) social innovation.[231]

  First, *product innovation* is one of the most widespread types of innovation.[232] It refers to the introduction of new and improved goods and services.[233] The "newness" of an innovation is hereby crucial.[234] Second, *process innovation* consists in improvements in manufacturing, service or organization.[235] Hereby, innovative changes refer, among others, to technological, program-specific and/or system design-specific advancements.[236] Third, *market innovation* induces ameliorations of the market mix or of the modus operandi in which consumers are targeted.[237] Fourth, *structural innovation* occurs, if a company introduces structural changes in organizational subdivisions (e.g., enhancement of working-time schedules, labor environment, and HR development).[238] Lastly, s*ocial innovation* is the result of the adoption of an innovation that leads to an amelioration of the lives and the satisfaction of individuals.[239]

- *Taxonomy of innovation based on the nature of innovation*

  The second categorization refers to the nature of innovation, and includes open and closed innovation. *Closed innovation* is the conventional concept of the 20thcentury, and refers to all those innovative strategies that are realized solely with firm-internal assets.[240] Today, this form of innovation is no longer a

[231] Stummer et al., 2010, pp.14-16; Disselkamp, 2005, p. 20

[232] Oke et al., 2007, p. 738

[233] OECD/Eurostat, 2005, p. 53; Oke/ Burke/Myers, 2007, p. 738

[234] Disselkamp, 2005, p. 21

[235] Khazanchi et al., 2007, p. 871

[236] Khazanchi et al., 2007, p. 872

[237] Johne, 1999, p. 7

[238] Disselkamp, 2005, pp. 26-27

[239] Stummer et al., 2010, pp. 16-17

[240] Fasnacht, 2009, p. 91-92

reasonable strategy because markets require more and more open forms of innovation, where companies focus on foreign resources as well.[241]

- *Taxonomy of innovation based on its impact*

  The third classification of innovation incorporates (1) radical innovation, (2) incremental innovation, (3) modular innovation, and (4) architectural innovation.[242]

  First, *radical innovation* occurs when the design or construction of a product is renewed.[243] This form of innovation can cause also significant disadvantages. In fact, radical innovation "are likely to be competence-destroying, often making existing skills and knowledge redundant".[244] Furthermore, their commercialization is rather complex.[245] Second, *incremental innovation* builds on companies' common know-how, and consists in the adjustment or extension of single parts of goods and/or product lines.[246] Third, *modular innovation* changes core modules of present offerings.[247] Lastly, *architectural innovation* rearranges the way in which single parts of goods are linked, without altering the general design of goods.[248]

- *Knowledge-based taxonomy of innovation*

  Gopalakrishnan and Bierly (2001) assume that the character of knowledge related to new products and technologies has an impact on "the sourcing decisions, the cost of implementation, and the perceived effectiveness of the innovation."[249] According to this, the authors (reviewing previous studies) identify three different forms of innovation, focusing on (1) tacit and explicit

[241] Chesbrough, 2004, p. 23

[242] Henderson/Clark, 1990, pp. 11-12

[243] Henderson/Clark, 1990, pp. 11-12

[244] Du Plessis, 2007, p. 21

[245] Du Plessis, 2007, p. 21

[246] Du Plessis, 2007, p.21

[247] Henderson/Clark, 1990, pp. 11-12

[248] Henderson/Clark, 1990, pp. 11-12

[249] Gopalakrishnan/Bierly, 2001, p. 123

knowledge, (2) systematic and autonomous knowledge, and (3) complex and simple knowledge.

Innovation and tacit/explicit knowledge[250]

Innovations based on explicit knowledge are less efficient and less competitively advantageous than innovations based on implicit knowledge. If firms' innovative strategy is based on tacit knowledge, both the transfer and adoption of knowledge is difficult because higher degrees of knowledge tacitness require the implementation of informal knowledge transfer mechanisms, the development of a common language (facilitating the understanding of new tacit knowledge inputs), as well as expensive investments in training programmes.

Innovation and systematic/autonomous knowledge[251]

Autonomous innovations are innovations that "can be developed and implemented independently from other innovations and organizational processes."[252] Systematic innovations are more expensive that autonomous innovations, because they require more investments, supporting the free circulation and integration of transferred knowledge.

Innovation and simple/complex knowledge[253]

In contrast to simple innovations, complex innovations are considered as more "original". They are created in-house, and are a result of active research activities, experiments and clienteles' acknowledgments. The more complex innovations are, the more expensive and the less imitable they become.

3.3 Innovation and knowledge management

The main functions of knowledge management (see also section 2.1) provide the basis of firms' innovation programmes, and lead to significant competitive

[250] Gopalakrishnan/Bierly, 2001, pp. 111-112

[251] Gopalakrishnan/Bierly, 2001, pp. 112-113

[252] Gopalakrishnan/Bierly, 2001, p. 112

[253] Gopalakrishnan/Bierly, 2001, pp. 114-115

advantages.[254] In this context, Du Plessis (2007), reviewing recent contributions in literature, summarizes three functions of knowledge management:[255] First, knowledge management creates competitive advantages deriving from the efficient use of knowledge and from cooperation. Second, knowledge management aims to decrease the complexity of activities related to innovation. Third, knowledge management supports the creation of both internal and external sources of knowledge, and makes them obtainable and accessible.

Therefore, it is assumed that the better managers optimize knowledge management practices, the stronger will be firms' innovative capabilities.[256] Lastly, one needs to consider that explicit knowledge plays a less crucial role in innovative processes than implicit knowledge.[257] Accordingly, the more efficient the usage of implicit knowledge, the more likely firms can benefit from innovativeness and competitiveness because innovations deriving from tacit knowledge cannot be imitated easily by competitors, and, therefore consumers are willed to pay higher prices when purchasing these products.[258]

3.4 Innovation and Italian industrial districts

Italian contributions, relating the concepts of innovation and industrial districts, investigate, among others, the innovative capabilities, the diffusion of innovation and the driving factors of innovative competitiveness in clusters.[259] Overall, scientists agree upon the role industrial districts play in the economy, considering them as beneficial systems that facilitate both the development of innovations and the adoption of innovation.[260] According to this, Carbonara (2004) highlights that district-specific "innovation mechanisms, known as 'widespread innovative capacity' or 'innovative capability without research', have been the main

[254] Du Plessis, 2007, pp. 22-23

[255] Du Plessis, 2007, pp. 22-23

[256] Cavusgil et al., 2003, p. 20

[257] Du Plessis, 2007, p. 24

[258] Cavusgil et al., 2003, p. 20

[259] Muscio, 2006, p. 291

[260] Muscio, 2006, p. 293

ingredients of the innovative capability of clusters in the early phases of their evolutionary process."[261]

But why do innovations take place easier in industrial districts than in other industry systems? Finding an answer to this question is not as easy as expected, because until now only a limited amount of studies explore the relation between innovation and localized processes.[262] Therefore, the following paragraphs describe in particular those determinants that illustrate why the concepts of industrial districts and innovation are assumed to be inter-related. Hereby, main attention is laid on the role of (1) final assemblers, (2) domestic rivalry and collaboration, (3) imitation, (4) domestic knowledge sources, and (5) local learning play in regional innovation literature.

- According to Belussi and Gottardi (2000), *final assemblers* are key players in industrial districts, and are the axis of knowledge-based division of labor.[263] The authors highlight that the local innovative strategy depends particularly on these figures because they are responsible for those parts of production that are less of routine.
- As already described in chapter 1, features of industrial districts are the division of labor and productive specialization. These particular characteristics make the right balance between prudent *competitive and cooperative behaviour* necessary.[264] Both local rivalry and collaboration have a positive impact on the innovative capabilities of local firms.[265] Further, according to Muscio (2006), collaboration facilitates the realization of joint innovation, while the monitory of rivalry boosts constant local advancement.[266]
- According to Bonomi (2001), local innovativeness in terms of incremental innovation is fostered by *imitative processes* inside industrial districts.[267] Only a small number of companies (mainly the larger-sized ones) are actually innovative leaders. Instead, the major part of local firms focuses on imitating

[261] Carbonara, 2004, p. 26

[262] Muscio, 2006, p. 292

[263] Belussi/Gottardi, 2000, p. 14

[264] Bonomi, 2001, p. 4

[265] Bonomi, 2001, p. 4

[266] Muscio, 2006, p. 303

[267] Bonomi, 2001, p. 4

innovators in order to reduce expenditures in terms of time and money. By doing so, imitators can market meliorated versions of original innovations.

- Innovation is facilitated by a *communal knowledge pool* as well. According to Muscio (2006), the usage of this knowledge base in combination with collective cooperation facilitates and boosts product innovation.[268]
- Lastly, it is assumed that the most successful industrial districts are those that focus on radical innovations.[269] According to Albino et al. (2006), there are two different forms of *learning* that district firms use to realize this kind of innovation:[270] (1) "learning by R&D" and (2) "learning by interaction". The first learning strategy requests investments in research and development programmes, and is activated exclusively by leading district companies. The second strategy is based on cooperation with external district partners, and is adopted by the most dynamic firms.

3.5 Innovativeness and determination of adopter categories

The exploration innovation diffusion requires two prerequisites, namely (1) the identification of a technique to determine innovation adopter categories, and (2) the determination of the exact absolute and relative number of adopter types.[271] One of the most important categorization is elaborated by Rogers (1995).[272] According to Rogers (2003), it is possible to classify individuals into distinct forms of innovation adopter categories according to their level of innovativeness.[273] Innovativeness is considered in this context as the "degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a social system."[274] The scientist distinguishes between (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5)

[268] Muscio, 2006, p. 303

[269] Albino et al., 2006, p. 33

[270] Albino et al., 2006, p. 33

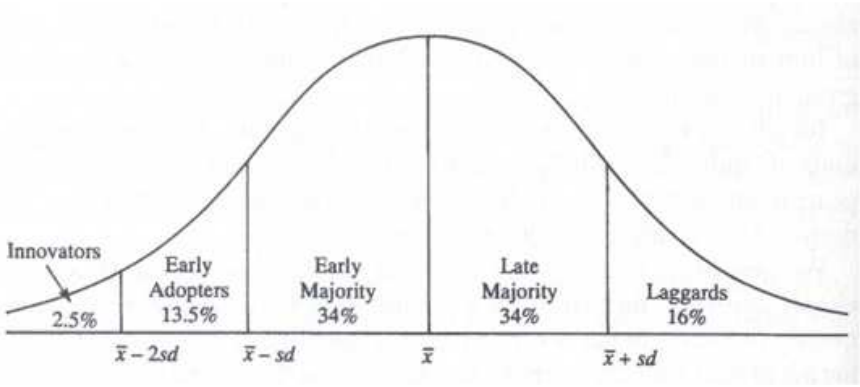
[271] Rogers, 1983, p. 245 in Mahajan et al., 1990, p. 37

[272] Mahajan et al., 1990, p. 37; Peterson, 1973, p. 325

[273] Rogers, 2003, p. 281

[274] Rogers, 1995, p. 22

laggards.[275] The distribution of these adopter categories follows a bell-shaped curve as illustrated in Figure 4.



Source: Rogers, 1995, p.281

Figure 4: Rogers' innovation adopter categories

- *Innovators*[276]

  The so-called "cosmopolites" are the first individuals that approve an innovation. They are integrated members of the local system but not all community members accept them. They love venturous lifestyles and taking risks, and they are interested in what is happening outside local boundaries. They play an important role in innovation diffusion because they import innovations into the domestic system.

- *Early adopters*[277]

  Early adopters are considered as "localites". They esteem strong social ties, and hold one of the most influencing social positions inside their community. They are both opinion leaders and role models for other members of the social system, and impact the decision-making of others.

- *Early majority*[278]

  The early majority accounts for about 34 per cent. Even though they esteem constant interpersonal interaction, they are rarely considered as opinion

[275] Rogers, 2003, p. 281

[276] Rogers, 2003, p. 283

[277] Rogers, 2003, p. 283

[278] Rogers, 2003, pp. 281, 283-284

leaders or role models. Further, even though they are very open-minded and willed to adopt new ideas, they rarely lead innovation diffusion. Nevertheless, this group plays a fundamental role because they can be considered as the "glue" that holds community members together.

- *Late majority*[279]

  The early majority accounts for 34 per cent. These individuals are very skeptical, and prefer not to adopt an innovation as long as other community members have successfully integrated it in daily routine. Thus, their decision to adopt of reject an innovation depends on the power of peer pressure.

- *Laggards*[280]

  The so-called "traditionalists" are the last ones that introduce an innovation. Usually, they are isolated community members without any notable opinion leadership position. Instead, they interact primarily with those individuals that share comparable attitudes and values. Their decisions are in line with their previous experience, and they prefer not to change their actions significantly from those in earlier periods. Innovation adaption occurs only if there are no doubts about its future success.

To sum up, it is possible to differentiate between "earlier adopters" and "later adopters". Both adopter categories do not differ significantly in age.[281] Instead, they differ in terms of (1) socio-economic variables, (2) personality variables, and (3) communication behaviour.[282] The main differences between these two forms of innovation adopters are summarized in Table 6 below.

[279] Rogers, 2003, pp. 281, 284

[280] Rogers, 2003, pp. 284-285

[281] Rogers, 2003, p. 298

[282] Rogers, 2003, p. 298

Table 6: Differences between "earlier adopters" and "later adopters"

Variables	*Earlier adopters*	*Later adopters*
Socio-economic variables: • formal education • degree of literacy • socio-economic status • social mobility • opinion leadership	+	-
Personal variables: • sense for intuition • sensibility • intellect • self-efficiency • openness towards science/risk/change	+	-
Communication behaviour: • media exposure • interaction with change agents • active information search • active knowledge accumulation	+	-

Adapted from Rogers, 2003, p. 298

Rogers' determination of innovation adopter categories offers both advantages and disadvantages.[283] On the one hand, most significant advantages are (1) the simple usage, (2) the standardization that makes comparisons, replications and generalizations possible, and (3) the assumption of a distribution along a bell-shaped curve that simplifies the prediction of other adopter types. On the other hand, this model is not without limitations. In fact, Rogers' approach cannot be used for all kinds of innovations.

Further, Peterson (1973) considers Rogers' model as inefficient, especially when innovations are related to marketing aspects.[284] In order to overcome these limitations, other scientists have elaborated further techniques of adopter categorization. Some of these alternative approaches are briefly described in Appendix C.

[283] Mahajan et al., 1990, p. 37

[284] Peterson, 1973, p. 327

3.6 Communication channels and innovation diffusion

Rogers (1995) defines communication as a "process in which participants create and share information with one another in order to reach a mutual understanding."[285] He differentiates between two distinct types of communication tools that support the circulation of knowledge inside the community, namely (1) interpersonal channels, and (2) mass media channels.[286] *Mass media*, although facilitating quick knowledge transfer among many individuals, cannot alter gridlocked attitudes, and cannot change individuals' decisions.[287] Impersonal communication mechanisms are preferred by earlier adopters,[288] and are useful in the earlier knowledge stages.[289] In contrast, *interpersonal media* are appropriate for changing attitudes towards an innovation, because interpersonal dialogue reduces emerging misunderstandings and social-psychological resistances.[290] Interpersonal channels are preferred by later adopters,[291] and are useful during persuasion stages.[292]

Further, Rogers (1995) differentiates between *cosmopolite channels* (outside communication sources) and *localite channels* (inside communication sources).[293] Interpersonal communication channels can either be cosmopolite or localite channels, while mass media channels are always cosmopolite channels. Outside communication sources are basically more central in knowledge stages, while local communication sources are more crucial in persuasion stages.

[285] Rogers, 1995, pp. 5-6

[286] Rogers, 1995, p. 194

[287] Rogers, 1995, p. 194

[288] Rogers, 1995, p. 197

[289] Rogers, 1995, p. 195

[290] Rogers, 1995, p. 194

[291] Rogers, 1995, p. 197

[292] Rogers, 1995, p. 195

[293] Rogers, 1995, pp. 196-197

4 TRUST

4.1 Definition and importance of trust

Organizational trust is a complex concept because, on the one hand, it incorporates numerous definitions, scientific approaches and methodologies.[294] On the other hand, a vast amount of studies, investigating antecedents, components, and consequences of trust have been elaborated over the last years.[295] Further, literature cites expressions, such as “cooperation”, “confidence”, or “predictability” as synonyms for the term “trust”, causing confusion and misunderstandings.[296]

Among diverse driving forces in organizational cooperation, trust is one of the most quoted concepts in literature.[297] Since the 1990s researchers agree upon one fact: Trust is one of the most crucial determinants in successful inter-firm exchange.[298] In fact, trust is a crucial precondition of successful inter-organizational cooperation,[299] because it impacts both the organizational structure as well as the extent of economic prosperity.[300] These positive effects can develop because between trusting parties because no one misuses others’ vulnerability.[301] According to Lie and Fang (2005), trust is in particular essential whenever uncertainty and opportunistic behaviour is present.[302] Then trust becomes an important managerial commodity that cannot be “purchased” easily in the marketplace, but, instead, needs to be developed though long-term strategic engagement.[303]

[294] An overview provides Seppänen et al., 2007, p. 252

[295] Seppänen et al., 2007, p. 256

[296] Mayer et al., 1995, p. 712

[297] Seppänen et al., 2007, p. 249

[298] Seppänen et al., 2007, p. 249

[299] Blomquist et al., 2004, p. 502

[300] Roberts, 2000, p. 434

[301] Dei Ottati, 2004, p. 3

[302] Lo/Tie, 2008, p. 148

[303] Roberts, 2000, p. 434

4.2 Trust in Italian industrial districts

In recent years some surveys have investigated trust in industrial districts (e.g., Dei Ottati 1994, 2003, 2004; Oba and Semerciöz, 2005). Unfortunately, only a limited number of articles explain the fundamental role that trust plays in Italian industrial districts.[304] Nevertheless, there is no doubt that trust is particularly relevant in vibrant Italian industrial districts.[305] In fact, Dei Ottati (2004) cites that the three crucial district-specific processes, namely (1) the "process of the localized social division of labor", (2) the "process of its flexible integration", and (3) the "process of localized learning and innovation", "need trust to be widespread among individuals and organizations."[306] Abrams et al. (2003) point out that in networks two different variants of trust are important, namely the trust in peoples' competency and the trust in peoples' benevolence.[307]

The following paragraphs re-examine some of the most crucial characteristics of Italian industrial districts, such as (1) the local social system, (2) the local manufacturing system, (3) the subtracting relations and local cooperation as well as (4) the local norms of business behaviour on the basis of the trust-based view.

Local social system and trust[308]

Taking into account the societal background of Italian industrial districts, trust can be considered as "collective capital" that is strictly linked to the particular characteristics of the local society. Above all, according to Dei Ottati (2004), trust can be analyzed from two distinct directions, namely from (1) the social capital view, and from (2) the personal capital view. According to this, the author distinguishes between two categories of social ties: On the one hand, relationships between district players exist, and, on the other hand, relations between district members and non-district members exist. In the first case social life is regulated through common values, norms, and principles of conduct. In this context trust is considered as *"social capital"*, which develops naturally through the compliance of formal and informal social principles. In the second case trust

[304] Dei Ottati, 2003, p. 82

[305] Dei Ottati, 2003, p. 82

[306] Dei Ottati, 2004, pp. 2-3

[307] Abrams et al., 2003, p. 63

[308] Dei Ottati, 2004, p. 3

is considered as *"personal capital",* which develops step by step over time. Hereby, district firms' judgment of whom or how much to trust depends on the partners' potential in terms of future benefits, resulting from the collaboration.

Local manufacturing system and trust

According to Dei Ottati (2004), in order to be successful in industrial districts, firms need to exhibit not only a positive reputation in terms of expertise, but, moreover, they also need to be appreciated as trustful business partners.[309] Trustworthiness is crucial especially for small-sized companies and start-up businesses; because, lacking abundant financial resources, being trusted is one of the most central sources of competitive advantage of these firms.[310]

Referring to Dei Ottati (1994), local reputation of trustworthiness develops over time, and companies need to constantly invest into their reputation.[311] According to this, on the one hand, companies have to deliver constantly high quality offerings and consistent performance, regardless of how exigent market conditions are.[312] On the other hand, district firms need to satisfy the interests business partners in every single moment; even if this leads to significant disadvantages on their behalf, and even if no lucrative transactions are guaranteed in future. [313]

Subtracting and cooperation and trust

As already mentioned in chapter 1, one of the fundamental characteristics of Italian industrial districts is the localized division of labor. High amounts of subtracting enterprises are resulting from this – this is in particular the case in the textile district of Prato, where 83 per cent of companies are subtracting firms.[314]

According to Dei Ottati (2004), trust in industrial districts is limited to district boarders, and trust is on the long run considerably stronger and easier to be

[309] Dei Ottati, 2004, p. 3

[310] Dei Ottati, 2004, p. 3

[311] Dei Ottati, 1994, p. 533

[312] Dei Ottati, 1994, p. 533

[313] Dei Ottati, 1994, p. 533

[314] Die Ottati, 2004, p.6

cultivated than in other industry systems.[315] This is because, according to the author, local institutions constantly safeguard trust as a "collective capital", supporting trust to "reproduce" locally, and to mitigate "substitutes of trust".

Local norms of business behaviour and trust

In Italian industrial districts trust is based on strict codes of business behaviour. According to Brusco (1999), shared common rules of conduct are for example:[316]

- "It is a good thing to trust those who deserve it, even though prudent attitudes are legitimate and allowed. These attitudes…represent cautions, typical of any careful entrepreneur." [317]
- "Two agents who work together on a continuous basis will never fully take advantage of the market power that is available to them, owing to their reciprocal interdependence… Each of them will take into consideration the survival needs and the success opportunities of the other." [318]
- "It is wrong and shameful for a client, a consultant, a subcontractor or an employee to use information, knowledge, or a network of relationships for personal gain to the detriment of the firm that has involved them in specific initiatives with good faith." [319]

4.3 Trust and knowledge transfer

Trust is the "magic ingredient that links strong ties and knowledge."[320] Trust diminishes the perceived risks and uncertainties that are associated with knowledge transfer.[321] Further, calculative trust reduces formal governance, and alleviates costs related to knowledge transfer.[322] Thus, trust has a positive impact on knowledge creation,[323] knowledge sharing,[324] and knowledge transfer.[325]

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[315] Die Ottati, 2004, p.532

[316] Dei Ottati, 2004, p.8

[317] Brusco 1999, p.21 in Dei Ottati, 2004, p.8

[318] Brusco 1999, p.22 in Dei Ottati, 2004, p.8

[319] Brusco 1999, p.24 in Dei Ottati, 2004, p.8

[320] Levin et al., 2011, p. 2

[321] Davenport/Prusak, 2003; Roberts, 2000, p. 433 in Joia/Lemos, 2010, p. 413

[322] Yu et al., 2006, p. 137

[323] Abrams et al., 2003, p. 64

In order to build and maintain trust in knowledge transfer activities, it is necessary to establish face-to-face contacts and opportunities of socialization.[326] Abrams et al. (2003) advise the following trust building strategies in knowledge sharing activities: (1)"act with discretion", (2) "be consistent between word and deed", (3) "ensure frequent and rich communication", (4) "engage in collaborative communication", (5) "ensure that decisions are fair and transparent", (6) "establish and ensure shared vision and language", (7) "hold people accountable for trust", (8) "create personal connections", (9) "give away something of value", and (19) "disclose your expertise and limitations."[327]

The trustworthiness of the knowledge source depends on (1) the extent to which knowledge sender and knowledge receiver share common languages, goals and concerns, and (2) how the knowledge seeker evaluates the confidentiality, discretion, receptivity, and the strength of relationship of the knowledge source.[328] In that context, Szulanski et al. (2004) find out that when causal ambiguity "increases, the effect of the perceived trustworthiness of the source on the accuracy of transfer weakens progressively and then becomes negative."[329]

Lastly, the role trust plays in knowledge transfer processes depends on the nature of knowledge. Levin et al. (2001) note that the degree of tacitness affects the role trust plays in knowledge transfer.[330] In fact, according to the authors, competence-based trust is essential for tacit knowledge transfer, while benevolence-based trust enhances the utility of both tacit and codified knowledge.[331] The authors further highlight that (1) both benevolence- and competence based trust are mediators between strong ties and delivery of usable knowledge, and (2) weak ties deliver accurate knowledge as well.[332]

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[324] Andrews/Delahaye, 2002, p. 797

[325] Levin et al., 2002, p. 22

[326] Roberts, 2000, p. 434

[327] Abrams et al., 2003, p. 67

[328] Levin et al., 2011, p. 5

[329] Szulanski, 2004, p. 608

[330] Levin et al., 2011, p. 3

[331] Levin et al., 2002, p. 22; Levin, 2011, p. 3

[332] Levin et al., 2002, pp. 22

5 EMPIRICAL STUDY

5.1 Research questions and hypotheses

After the presentation of main theoretical concepts, the following chapter is dedicated to the elaboration of an empirical survey. The main aim of this study is to understand how knowledge transfer is conducted among Italian small and medium-sized companies that operate exclusively in fashion and textile districts, and to figure out how knowledge characteristics, such as explicit and tacit knowledge, trust, and the orientation towards innovation adoption of companies have an impact on the choice of knowledge transfer mechanisms. At this point, after a brief overview of the theoretical concepts summarized in previous chapters, hypotheses are formulated and the research techniques are presented. Subsequent to descriptive statistics and the illustration of the applied statistical methodology, the formulated hypotheses will be tested empirically.

Research question 1:

Which role does tacitness of knowledge play in the choice of knowledge transfer mechanisms?

The first aim of this study is to link the two following two concepts: On the one hand, the knowledge-based theory that differentiates between diverse types of knowledge (see subsection 2.2.2) and knowledge attributes (see chapter 2.2.3). On the other hand, the media richness theory (see chapter 2.5.2) that assumes that communication media can be categorized according to their degree of media richness, differentiating between media with higher and lower degrees of information richness. The examination of the first hypothesis is aimed at testing already existing theories on this topic in the context of knowledge transfer mechanisms in Italian industrial districts (see subsection 2.5.3).

In detail, this study focuses basically on tacit knowledge and codified knowledge. It is assumed that the efficiency of knowledge transfer is impacted by the degree of tacitness of knowledge. In this survey the degree of tacitness is operationalized in accordance with the knowledge attributes identified by Kogut and Zander (1995): codifiability, teachability, and complexity. The authors assume that codifiability and teachability are “negatively related to the choice of

transfer […]; complexity should be positively related."[333] This knowledge-based theory is then linked to the information richness theory.

As already described in subsection 2.5.3, recent studies, such as those, for example, of Murray and Peyrefitte (2007), Windsperger and Gorovaia (2010) as well as Srećković and Windsperger (2011), assume that knowledge transfer mechanisms with lower degree of information richness are more likely used for the transfer of explicit knowledge, while knowledge transfer mechanisms with higher degree of information richness are more likely adopted for the transfer of tacit knowledge. According to this, the following two hypotheses are formulated:

H1A: The more tacit the shared knowledge, the more likely Italian district firms use rich knowledge transfer mechanisms (KTM_HIR).

H1B: The less tacit the shared knowledge, the more likely Italian district firms use lean knowledge transfer mechanisms (KTM_LIR).

Research question 2:

Which impact has trust on the choice of knowledge transfer mechanisms?

The second goal of this survey is to understand whether it makes a difference in the choice of knowledge transfer mechanisms if district members trust each other or not. As already highlighted in section 4.3, trust has a positive impact on knowledge transfer, and is in particular important when knowledge is tacit. The present study focuses on the substitutability approach of trust (see sub-subsection 2.5.3.3), and tries to enrich previous studies, such as, for example, from Lo and Lie (2008) and Srećković and Windsperger (2011). Accordingly, the following hypotheses are formulated:

H2A: The more district firms trust each other, the more likely they use lean knowledge transfer mechanisms (KTM_LIR).

H2B: The less district firms trust each other, the more likely they use rich knowledge transfer mechanisms (KTM_HIR).

[333] Kogut/Zander, 1993, p. 633

Research question 3:

Which impact has tacitness of knowledge in combination with trust on the choice of knowledge transfer mechanisms?

As already described in the section 4.3, the degree of tacitness affects the role trust plays in knowledge transfer, in particular when knowledge is tacit. So, if a relation between trust and knowledge characteristics exists, does trust in combination with tacitness of knowledge also have an impact on the selection of knowledge transfer mechanisms in Italian industrial districts? To find an answer to this question, the following hypotheses are formulated and tested empirically:

H3A: The positive influence of tacitness on the choice of rich knowledge transfer mechanisms (KTM_HIR) decreases with trust.

H3B: The negative influence of tacitness on the choice of lean knowledge transfer mechanisms (KTM_LIR) decreases with trust.

Research question 4:

Which role plays the orientation towards innovation adoption of companies in the choice of knowledge transfer mechanisms?

As explained in chapter 3, knowledge and innovations are highly dependent on each other. But which role does the orientation of district firms towards innovation adoption play? As already mentioned in sub-subsection 2.5.3.4, literature does not offer many insights on innovation adopter categories in relation to the usage of knowledge transfer media, in particular not in the context of industrial districts. In order to give an answer to this question, this work focuses on Rogers' (1995, 2003) theory of innovation adopter categories, differentiating between "earlier adopters" and "later adopters", and tests the following hypotheses:

H4A: Later adopters use rich knowledge transfer mechanisms (KTM_HIR) more likely than later adopters.

H4B: Earlier adopters use lean knowledge transfer mechanisms (KTM_LIR) more likely than later adopters.

H4C: The positive impact of openness towards innovation on the use of rich knowledge transfer mechanisms (KTM_HIR) increases with trust.

H4D: The positive impact of openness towards innovation on the use of lean knowledge transfer mechanisms (KTM_LIR) increases with trust.

5.2 Methodology

After having formulated four different types of hypotheses, the aim of this paper is to describe particularities of the survey instrument, the sample, and the data collection of the present study. In the following, empirical analyses and interpretation of research findings are given.

5.2.1 Survey instrument

Data was collected by using an already existing questionnaire. The original questionnaire was developed by Edwin Wiesinger (2008) in German language, and was recommended by Univ. Prof. Dr. Josef Windsperger in March 2010. This survey analyzed diverse determinants of knowledge transfer mechanisms in an Austrian business cluster. The present survey adds to this an additional item battery, investigating the role innovation adoption theory plays in the choice of knowledge transfer mechanisms in Italian industrial districts.

First, it was necessary to translate the original German questionnaire into Italian. The translation was realized accordingly to standard rules of the so-called ASQ model (ask-the-same-question approach) recommended by Harkness (2003). The first translation (one-to-one translation) was realized simultaneously by the author of the present study and by a German graduate of economics with fluent Italian language skills. It focused in particular on a literal translation of the original version. After that an Italian graduate of economics with good German language skills re-translated the Italian version into German. Consequently, comparing the different versions, those translations that reflected best the original wording were adopted. The final questionnaire was further reviewed by native speakers. For this purpose, people of different age, academic background, business background, and gender were contacted. Lastly, the final Italian questionnaire was conveyed into an electronic questionnaire.

The final questionnaire is divided into eleven question batteries and consists of two parts. The first part of the questionnaire aims at exploring general characteristics of Italian district firms in the fashion and textile business, asking for (1) contact details, (2) business sector, (3) sales, (4) number of employees, and (5) founding year. In order to assure the respondents' anonymity and their voluntariness it was not obligatory for them to respond to these introductory questions. The second part of the questionnaire refers to more specific questions,

asking respondents (1) which knowledge transfer mechanisms they use in inter-company interaction, (2) how they transfer knowledge to other district members, (3) how they acquire new knowledge from other district partners, (4) which degree of trust they perceive between district companies, (5) how they evaluate the degree of knowledge complexity, and (6) how innovative they consider themselves to be. The questionnaire was retrievable online from May to July 2011, and its completion required approximately ten minutes. Both the Italian and the original German questionnaire are attached in Appendix D.

5.2.2 Sample and data collection

The target population of this study consists of fashion and textile companies in Italian industrial districts. The first strategy was to contact exclusively companies from the district of Prato which is, as already mentioned before, one of the leading textile clusters worldwide.[334] The identification of district firms was based on two sources: (1) online data bases (e.g., "Unione Industriale Pratese")[335] and (2) the Italian Chamber of Commerce. In total, 485 residential district firms were contacted by mail. In total 144 companies accessed the online questionnaire, but only 34 firms answered at least most of the questions. In order to increase the response rate, diverse actions were set, ranging from multiple reminders to non-respondents and personal contacting via telephone as well as using a "Sacher cake lottery" as an incentive. Despite those attempts, the response rate still remained very low, and thus the sample size was too small to allow profound multivariate data analyses. This high non-response rate was also problematic because it leads to the question "whether the respondents are somehow different from those who didn't respond."[336] In fact, it can be assumed that it is critical to presuppose that the two groups (respondents and non-respondents) are identical.[337] In order to understand the reason why so many firms did not complete the questionnaire, even though they had agreed in a previous phone

[334] http://www.osservatoriodistretti.org/node/282/distretto-del-tessile-abbigliamento-di-prato (13/09/2011)

[335] http://www.ui.prato.it/unionedigitale/v2/default.asp (13/09/2011)

[336] Curchill/Iacobucci, 2005, p. 382

[337] Curchill/Iacobucci, 2005, p. 382

call to participate in the survey, some randomly selected companies were contacted personally in a second phone call session. Hereby, it resulted that the major reason for non-response was the critical economic situation that many local firms have to cope with during the present worldwide financial crisis.

This situation made it necessary to enlarge the sample, and to contact firms from other industrial districts. For this purpose, the so-called "snowball technique"[338] was used. A leading multinational fashion corporate group which stands in constant contact with retailers and producers in the Italian industrial districts was contacted. Managers of the single affiliates were asked to contact exclusively executive directors of target district firms, and to spread the questionnaire among district partners who might be interested in cooperating. This procedure resulted in an additional 131 usable questionnaires, i.e., questionnaires in which the majority of questions apart from the general company description have been answered. Unfortunately, the online questionnaire tool allowed skipping single questions or question batteries, thus the problem occurred that some respondents answered the questionnaire only in parts. However, the extension of the sample led to a satisfying sample size for all analyses.

Before pooling both samples, a structural comparison was made in order to understand whether the two samples are too different (see Appendix E). This comparison showed that the companies of the two samples differ significantly in term of company size and sales, as these two variables resulted highly inter-related. This fact has been dealt with by including sales as a control variable in the following statistical analyses. But as the two samples are structurally comparable rather similar with respect to their business experience (age), and in particular in their use of knowledge transfer mechanisms, it has been considered legitimate to merge all companies into one single sample, including in total 165 district firms.

5.3 Descriptive statistics

The following sections present the applied statistical techniques and the results. All data analyses were realized with SPSS. The theoretical description of statistical methods used in this study is based on commonly known existing

[338] Curchill/Iacobucci, 2005, p. 327

specialist literature (e.g., Backhaus et al., 2008), and therefore no references are provided for general theoretical assumptions.

In the following general descriptive statistics are presented. The main characteristics of the target companies and the graphical illustration of descriptive statistics of selected items are provided. The following subsections compare selected item batteries, focusing primarily on analyses of frequency distribution.

5.3.1 Business sector

The aim of the second question of the questionnaire was to understand how companies are distributed in the different fashion and textile industries. Respondents were given the possibility to choose among seven different response options, namely (1) textile production, (2) yarn production, (3) leather and footwear production, (4) special textile production, (5) clothing production, and (6) knitwear production. Lastly, it was possible to evade this question by marking (7) no answer. Figure 5 shows that in total most target district firms (42 per cent) belong to the leather and footwear industry. Two further very dominant sectors are the textile and the clothing sector. 26 per cent operate in the textile production, while 20 per cent operate in the clothing sector. Companies that produce special textiles (5 per cent), yarns (4 per cent), and knitwear (3 per cent) are rather underrepresented. In total, 16 companies refused to answer this question.

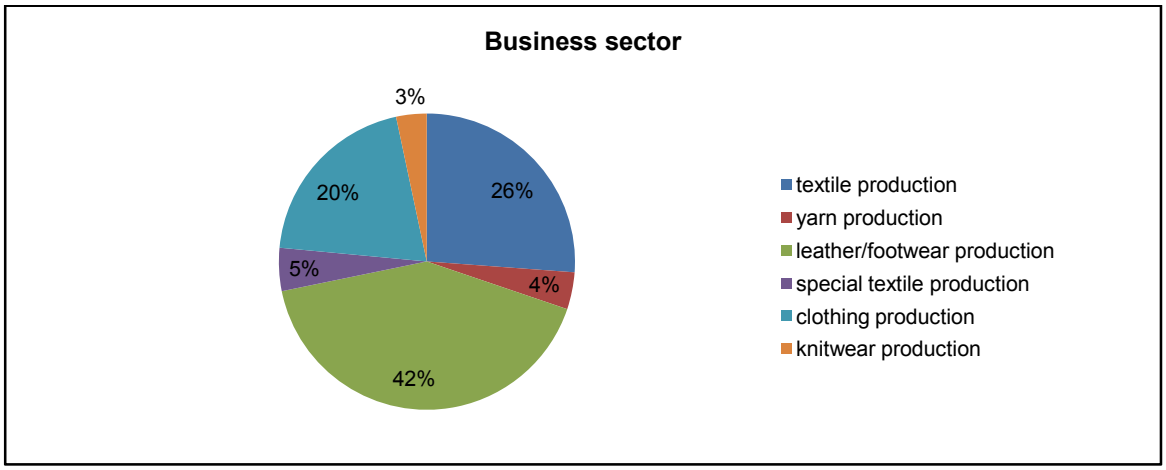

Figure 5: Descriptive statistics of variable BUSINESS SECTOR

5.3.2 Sales distribution 2010

The third question of the questionnaire asked for the amount of annual sales generated by target district firms in the year 2010 (see Figure 6). Here participating companies are classified into five groups, namely into companies that have generated (1) less than 500.000 €, (2) between 500.000 and 3 million €, (3) between 3 and 20 million €, (4) between 20 and 50 million €, and (5) more than 50 million €. Managers had the possibility to avoid answering this question by marking (6) no answer. Frequency analysis shows that about half of the sample (51 per cent) have generated between 3 and 20 million € in 2010, followed by 27 per cent that declare sales between 500.000 and 3 million €. The remaining companies of the sample fall into the categories "sales less than 500.000€" (6 per cent), "sales between 20 and 50 million €" (9 per cent), and "sales more than 50 million €" (4 per cent).

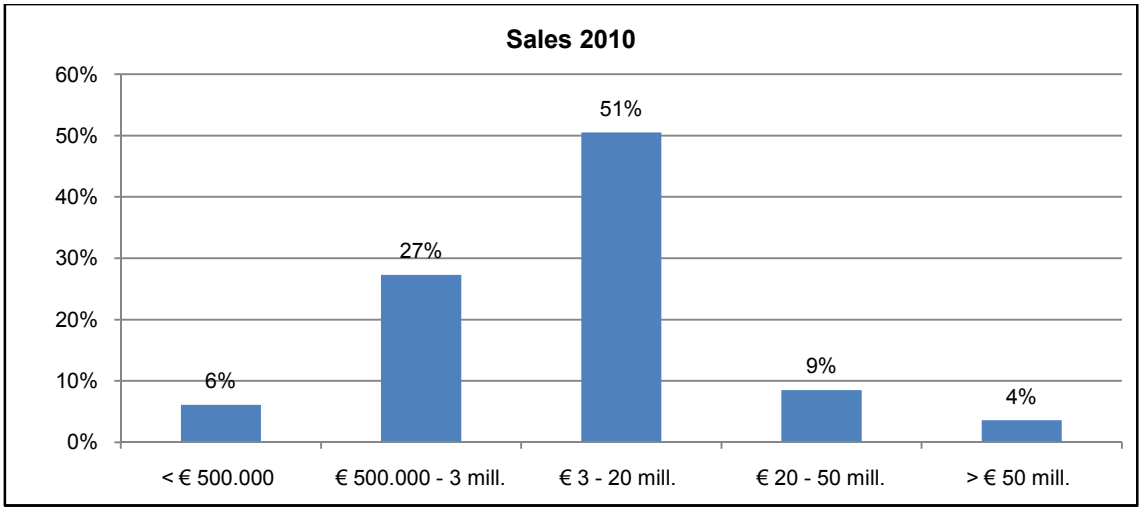

Figure 6: Descriptive statistics of variable SALES

5.3.3 Number of employees / company size

The fourth question investigated the average company size of the target firms. Here respondents had the possibility to declare the exact number of employees. After data collection, these responses are clustered in four groups according to the latest definition of SMEs declared by the European Commission (2006), namely into (1) micro firms (less than 10 employees), (2) small-sized firms (between 19 and 49 employees), (3) medium-sized firms (between 50 and 249

employees), and (4) big firms (more than 250 employees).[339] In total 153 firms answered this question. Figure 7 illustrates that more than half (52 per cent) of the participating firms are small-sized companies, followed by 31 per cent medium-sized firms. The remaining companies are either extremely small (11 per cent) or very large (5 per cent).

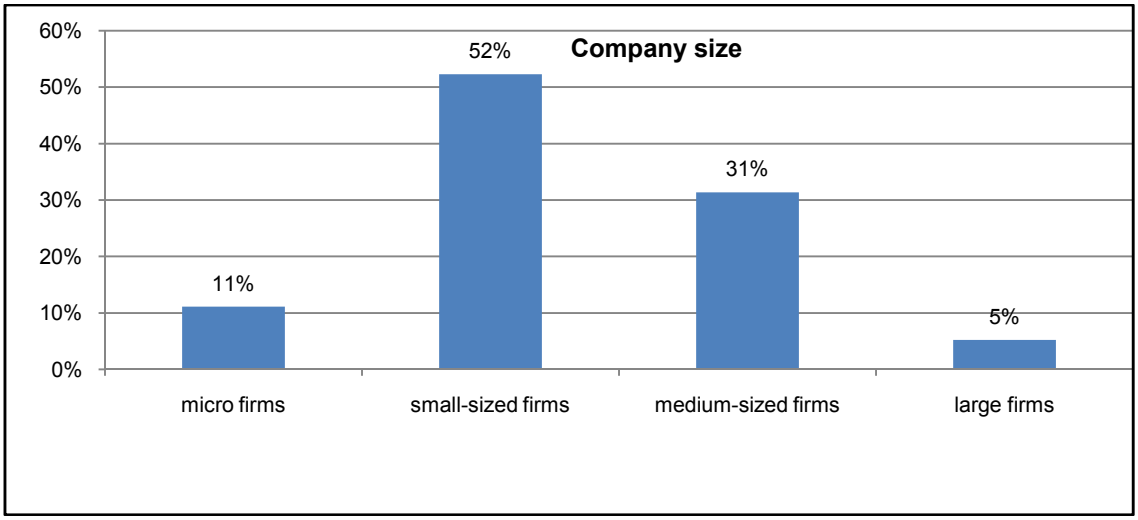

Figure 7: Descriptive statistics of variable SIZE

5.3.4 Company Age

Responses to the fifth question illustrate very clearly the long history of Italian textile and fashion district firms. After data collection, the companies are classified according to their founding year. Figure 8 illustrates that more than half of the participating companies (58 per cent) have been in operation for 21 to 50 years. There are many firms (23 per cent) that have stayed in business for longer than 50 years. Younger companies account for 20 per cent of the sample, as 6 per cent are between 11 and 20 years old, while 14 per cent are younger than 10 years.

[339] European Commission, 2006, p. 14

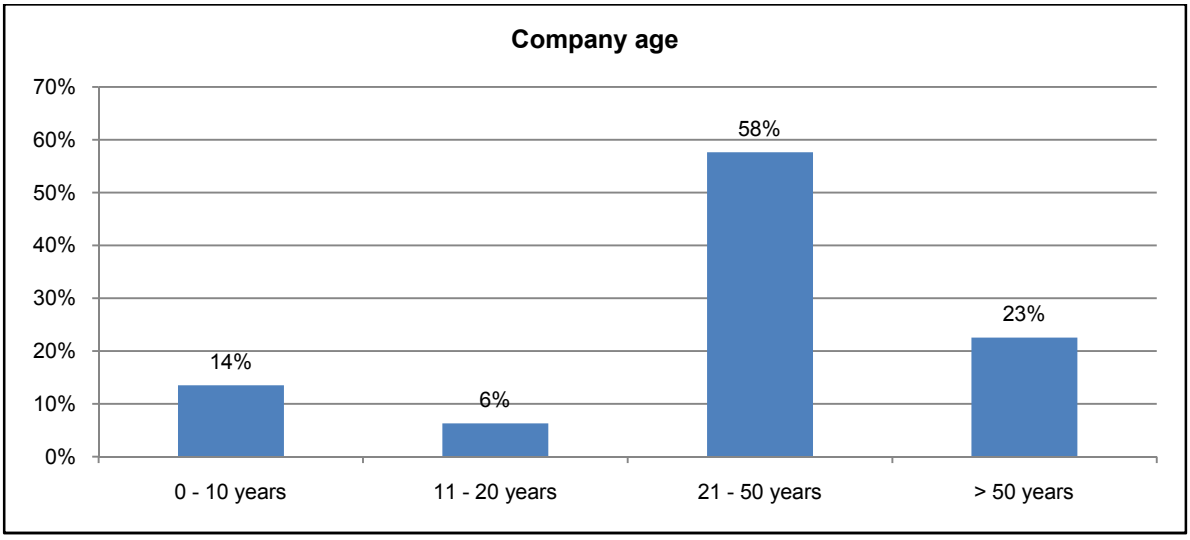

Figure 8: Descriptive statistics of variable COMPANY AGE

5.3.5 Knowledge transfer mechanisms

District firms were asked to rate 16 different communication tools used in knowledge transfer processes according to their importance on a five-staged Likert scale, where one indicates “no use at all” and five “very frequent use”. The list of knowledge transfer channels include (1) intranet, (2) platforms/chat systems, (3) online forums, (4) newsgroups, (5) e-mail, (6) internet, (7) fax, (8) telephone, (9) exchange of letters, (10) videoconferences, (11) seminars and workshops, (12) boards, (13) informal meetings, (14) formal meetings, (15) existing documents (e.g., articles, flyers), and (16) social networks. Further, respondents were asked to indicate additional knowledge transfer channels that are not included in the list. As can be seen in Figure 9, the target companies frequently use telephone calls, internet, e-mailing, as well as meetings in order to exchange knowledge. More modern communication tools, such as platforms, chat systems, social networks, newsgroups, videoconferences, and boards are not applied much.

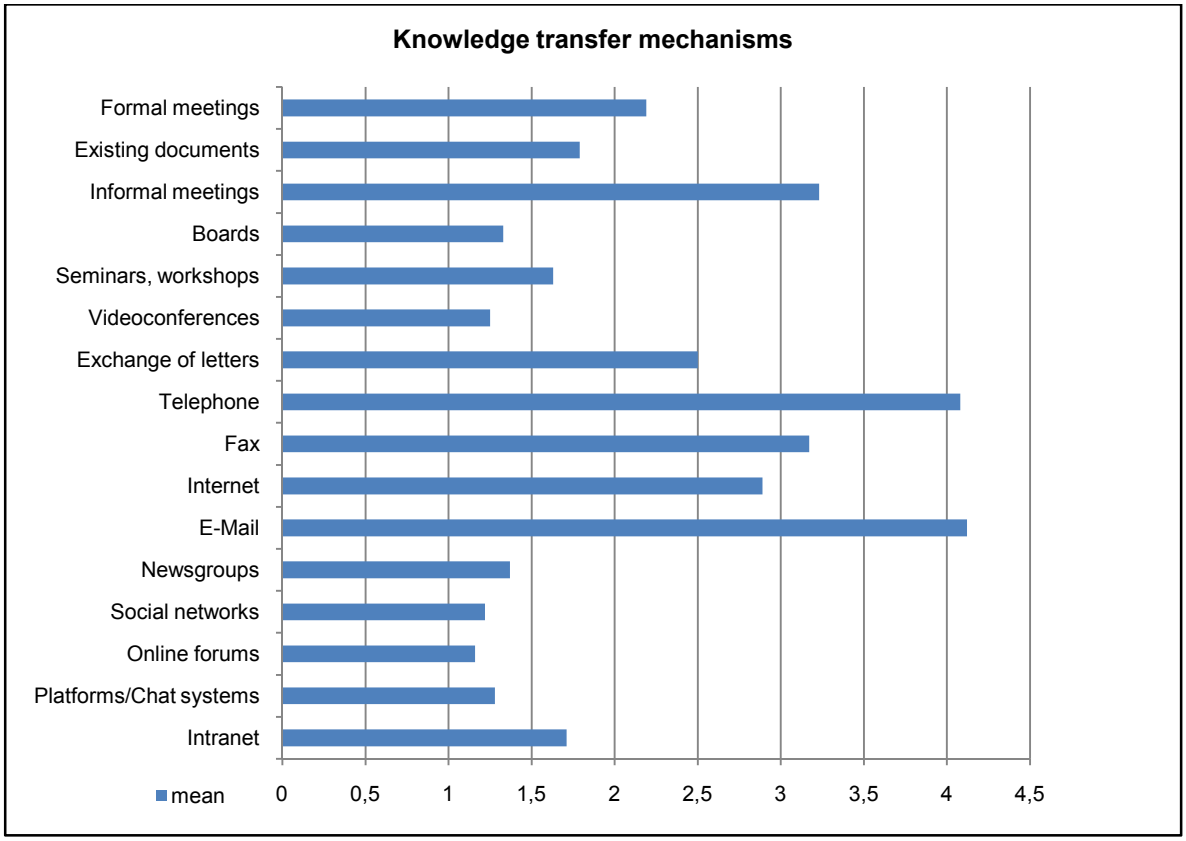

Figure 9: Descriptive statistics of variable KTM

5.3.6 Knowledge transfer

The seventh and eighth question batteries analyze how companies acquire and transfer knowledge inside district boarders. The two question batteries include eight knowledge transfer mechanisms each, including (1) creation of manuals that describe the processes and activities, (2) employee exchange, (3) usage of information technology, (4) training, (5) reading manuals, (6) support of experienced workers and personal dialogue, and (7) usage of notes that describe the business processes and activities. Also in this section the companies were asked to respond along a five-staged Likert scale, where stage 1 indicates “no use at all” and stage 5 indicates “very frequent use”.

This section aims at investigating district-specific knowledge characteristics in terms of codifiability (COD) and teachability (TEACH), in order to understand later on whether local knowledge transfer is easy or difficult. Comparing Figures 10 and 11, it is evident that firms evaluate the usage of knowledge transfer channels in both knowledge acquisition and transfer processes quite similarly. Exchange of employees, inter-personal dialogue, support of experienced workers as well as

information technologies are used extensively. Notes describing processes of business partners are more important in active knowledge transfer activities. The remaining mechanisms are used rather moderately with approximate means ranging between low scores of 1 and 2.

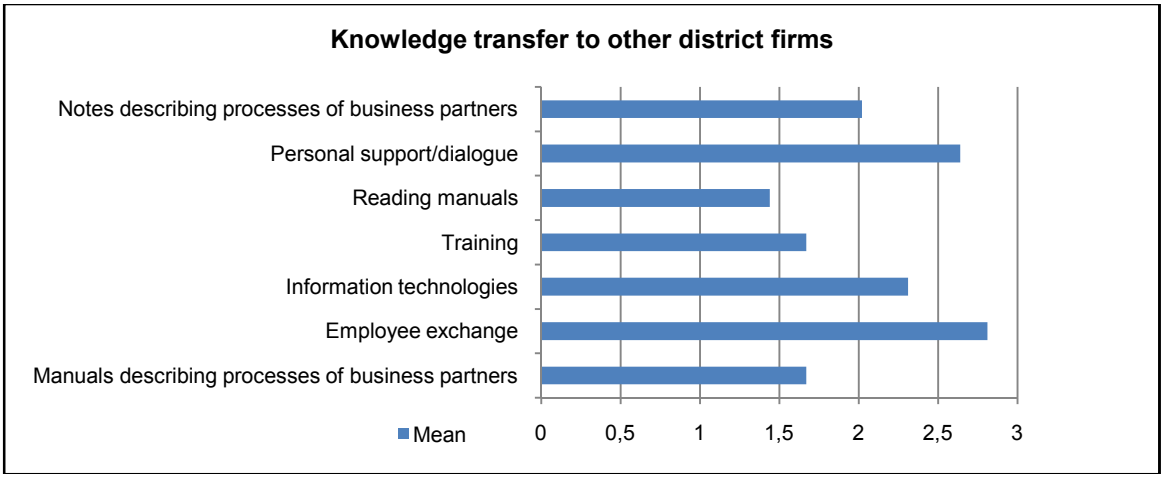

Figure 10: Descriptive statistics – knowledge transfer to other firms

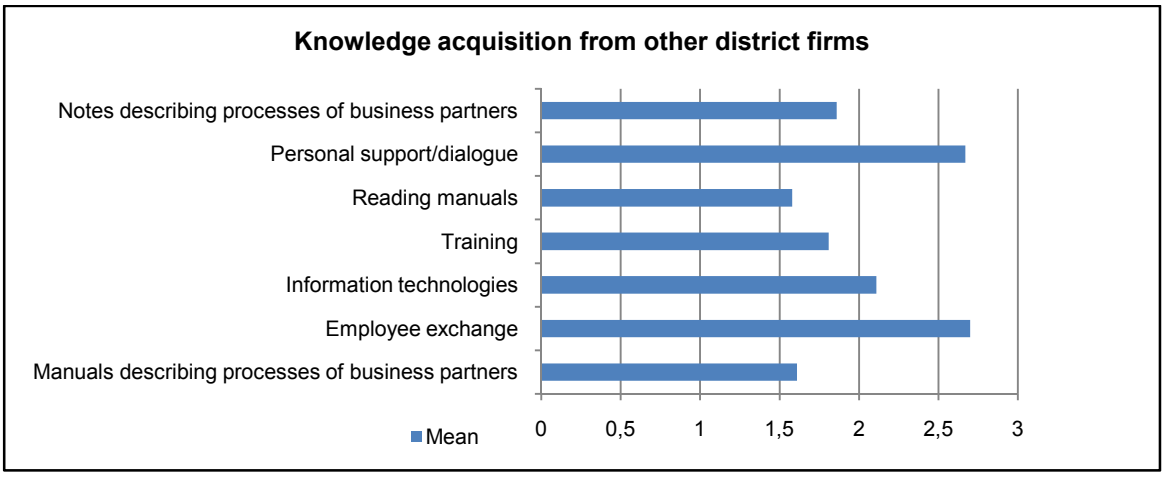

Figure 11: Descriptive statistics – knowledge acquisition from other firms

5.3.7 Complexity

The ninth question battery analyses the concept of complexity (COMPLEX) of transferred knowledge in fashion and textile districts, using the usual Likert scale. Fist, company representatives were asked whether district partners need to learn a vast amount of activities in order to be able to adopt the transmitted know-how successfully. Then respondents were asked to indicate to which extent the

techniques and methods used to adopt transmitted know-how are interdependent, heterogeneous, and difficult. Finally, companies evaluated whether it is easy or difficult to decompose transmitted know-how into single subtasks and how easily these subtasks can be learned. Figure 12 illustrates that Italian district firms in the fashion and textile sector consider techniques and methods used in the transfer of know-how averagely heterogeneous, interdependent and less difficult. Subtasks cannot be decomposed and learned very easily. In order to adopt transmitted know-how efficiently, learning processes are necessary, but also here the rating is below the scale mean of 3.

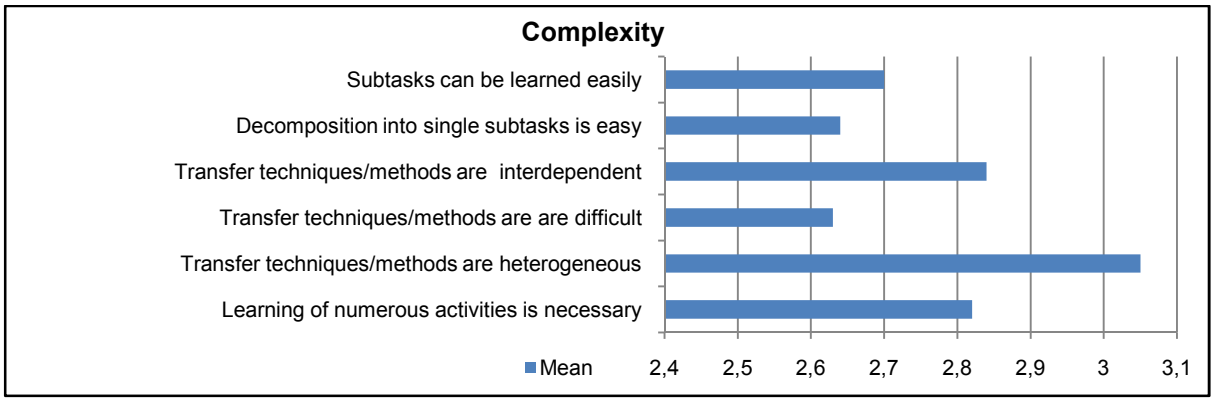

Figure 12: Descriptive statistics of variable COMPLEX

5.3.8 Trust

The ninth question battery investigated trust in Italian industrial fashion and textile districts. In this section, companies were asked to respond along a five-staged Likert scale. The higher the rating of an item, the more it applies to the district's reality. Respondents were asked to evaluate the degree (1) of trust among them and their business partners, (2) of atmosphere of openness and honesty between them, (3) of information exchange that goes beyond the stipulated extent, (4) of interaction based on collaboration and cooperation, and (5) of verbal agreements that are stipulated even if they include possible disadvantage for one party. Further, respondents indicated how much recommendations with the aim of (6) enhancing collaboration and (7) boosting alteration or innovation are heard and discussed between local business partners. Figure 13 gives evidence that trust plays an important role but not such a crucial role in target districts as expected, considering that single items solely reach mean values between 2.5 and 3.5.

Nevertheless, trust and an atmosphere of honesty and openness seem to foster the compliance of disadvantageous verbal agreements. District players are open towards collaboration and are interested in recommendations of any kind. Information exchange that goes beyond the stipulated extent is not strongly diffused but without doubt surpassingly present inside district boarders.

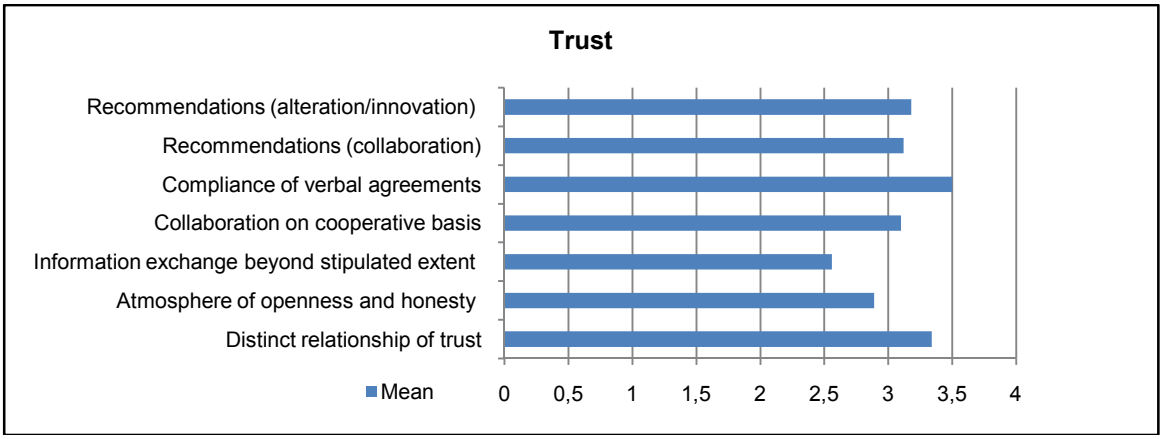

Figure 13: Descriptive statistics of variable TRUST

5.3.9 Orientation towards innovation

The last battery of the questionnaire includes eleven questions that investigate how district members perceive their individual orientation towards innovation adoption. Items are generated basically on Rogers' (1995, 2003) characterization of innovation adopter categories. Companies were asked to describe their innovative strategy on a Likert scale, where 1 indicates "do not agree at all" and 5 indicates "completely agree". The first aim is to understand the reasons of innovation adoption (IA). Uncertainties and risks of implementation of a new technology were investigated by presenting diverse scenarios. Companies were asked to indicate the degree to which they adopt an innovation, namely basically on the basis (1) of the company's desire to be a first-mover, (2) of the firm's orientation towards other district firms that should ex-ante examine and approve an innovation, (3) of the verification of success potential, and (4) of innovation adoption in line with companies' traditional behaviour and past experience. Additionally, further determinants of a companies' innovativeness were retrieved, such as the degree of skepticism towards new technologies, the existence of financial resources that make the absorption of losses due to a failed innovation possible, and the ability to learn and use easily complex technological know-how.

Lastly, the social role of district firms was investigated. Company representatives were asked to which extent they perceive themselves as opinion leaders or as socially appreciated district players. Further, respondents expressed whether they cultivate social relationships exclusively within district boarders, and prefer interaction primarily with district firms that have similar interests and attitudes, or whether they actively search new ideas also outside the district.

Figure 14 helps to understand to which extent target firms use the innovative strategies listed above, illustrating the average orientation towards innovation adoption. This analysis shows that firms tend to be rather indifferent in terms of innovation adoption. In fact, the figure shows that both types of items, namely those, reflecting optimistic feelings towards innovation, as well as those referring to a skeptical and passive attitude towards change, are on average similarly evaluated, making it difficult to understand whether the industrial districts of this survey show a clear tendency to be either innovators or imitators. Therefore, further analyses are required. The statistical overview of the variable INNO_GROUP (see Appendix E) shows that 127 people have responded to this question (38 did not do so). From these respondents 82 are later adopters, while 45 are earlier adopters. This illustrates that companies in the targeted industrial districts can be considered, overall, as rather conservative in terms of innovation adoption, and seem not to be not as open towards innovation as expected.

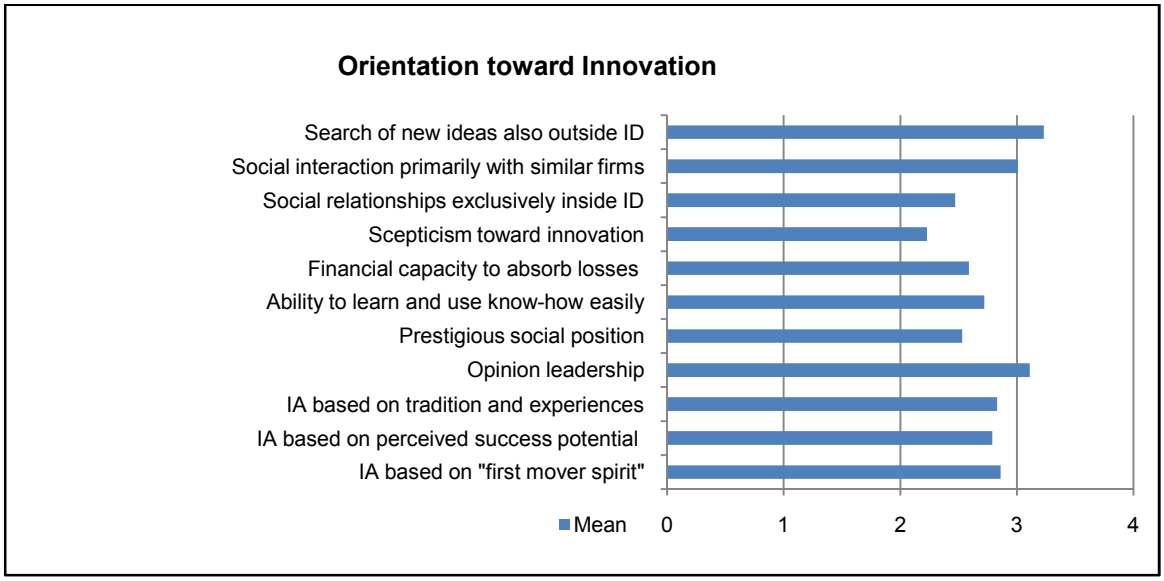

Figure 14: Descriptive statistics of variable INNO

5.4 Reliability analyses

After having presented general descriptive statistics, statistical methods used to test the formulated hypotheses are described. The following statistical approach was used for testing the hypothesis: First, previously constructed scales are tested on reliability. The paper proceeds with the adoption of multiple regression analyses and comparison of means in order to test the formulated hypotheses. The present work ends with an interpretation of the final results. Additional SPSS outputs and variable descriptions are given in Appendix E.

Preliminary to hypotheses testing, scales for the elements of tacit knowledge (codiafiability, teachability, and complexity), as well as for trust and innovativeness need to be designed and tested for reliability. Items for the scales related to knowledge transfer are elaborated according to past contributions of Nonaka and Takeuchi (1995). In order to differentiate between leaner and richer knowledge transfer mechanisms, the scales KTM_HIR (knowledge transfer mechanism with higher degree of information richness) and KTM_LIR (knowledge transfer mechanism with lower degree of information richness) are based on the works of Daft and Lengel (1983, 1986), Daft et al., (1987) Büchel and Raub (2001), Vickery et al. (2004) as well as of Kaplan and Haenlein (2010). The composition of the scales of knowledge attributes refers to Kogut and Zander's (1995) original theory, who have identified on the basis of precedent studies (e.g., Rogers, 1962; Winter, 1987) the following three knowledge characteristics codifiability, (2) teachability, (3) complexity. The scale measuring respondents orientation towards innovation adoption is based on Rogers' (1995, 2003) theory on innovation diffusion.

First, factor analysis is the starting point of scale construction, detecting the factor dimensions in sets of variables. As the scales used in this work are based on those used in previous diploma theses (e.g., Kotzian, 2008; Zwazl, 2008; Schwaiger, 2009; Hollnthoner, 2010), factor analyses are skipped as the content validity of the scales is assumed to be appropriate also for the present study.

Second, reliability analysis is necessary to test whether the survey instrument is reliable in terms of consistent results when measurement is repeated.[340] The main goal, hereby, is to make sure that scales used in the questionnaire are

[340] Reis/Judd, 2000, p. 297

reliable and appropriate for further statistical analyses. The internal consistency of scales is most commonly tested by using the Cronbach's Alpha coefficient.[341] For calculation of this coefficient, variables need to be metric or dichotomous. Low Alpha values (closer to 0 than to 1) indicate that "the sample of items performs poorly in capturing the construct which motivated the measure."[342] Alpha values greater than 0.80 are considered good values. However, in empirical practice also smaller values can be acceptable.[343] Nunnualy (1976), for example, highlights that in earlier stages of basic studies values between 0.50 and 0.60 are still tolerable.[344]

5.4.1 Knowledge transfer mechanisms

As already mentioned, referring to the information richness theory, it is possible to differentiate communication channels according to their degree of information (media) richness. Therefore, it is first necessary to categorize knowledge transfer mechanisms into knowledge transfer mechanisms with higher degree of information richness (KTM_HIR) and into knowledge transfer mechanisms with lower degree of information richness (KTM_HIR).The theoretical basis of the consequent classification of knowledge transfer mechanisms is based on previous studies described in detail in 2.5.2. In this study, direct personal communication is defined as a communication channel with higher degree of HIR. On the basis of this assumption, meetings, seminars, workshops, videoconferences, and boards can be considered as knowledge transfer mechanisms with high information richness (KTM_HIR). In contrast, communication media with slow feedback capacity and limited capacity to use mimics, gestures, and language cues, are considered as leaner knowledge transfer mechanisms (KTM_LIR). This category includes telephone, fax, exchange of letters, documents, as well as internet, intranet, e-mail, platforms, chat systems, online forums, and newsgroups. This study aims at investigating also the usage of social media in industrial districts, as this new form of

[341] Cortina, 1993, p. 98

[342] Churchill, 1979, p. 68

[343] Raithel, 2008, p. 115

[344] Churchill, 1979, p. 68

communication tool “is top of the agenda for many business executives today.”[345] Social media is included into the category of KTM_LIR, because, referring to Kaplan and Haenlein (2010), it is expected from the point of view of the author of this study that richer media (e.g., social networking sites, content communities, virtual worlds) are only rarely used in organizational knowledge transfer, while blogs and collaborative projects (e.g., Wikipedia) could constitute in practice valuable alternative communication tools. Table 7 summarizes the categorization of knowledge transfer mechanisms used in this survey according to their degree of media richness. In addition, mean values and standard deviations of the variables are shown.

Table 7: *KTMs according to the degree of information richness*

	Degree of media richness	*Mean*	*Standard deviation*
Intranet	low	1.71	1.289
Platforms/chat systems	low	1.28	0.764
Online forums	low	1.16	0.621
Social networks	low	1.22	0.659
Newsgroups	low	1.37	0.958
E-Mail	low	4.12	0.956
Internet	low	2.89	1.476
Fax	low	3.17	1.209
Telephone	low	4.08	0.932
Exchange of letters	low	2.50	1.195
Video conferences	high	1.25	0.747
Seminars, workshops	high	1.63	0.882
Boards	high	1.33	0.839
Informal meetings	high	3.23	1.341
Existing documents	low	1.79	1.013
Formal meetings	high	2.19	1.241

[345] Kaplan and Haenlein, 2010, p. 59

In a second step it is to be proved whether this classification is reliable or whether it is necessary to identify single items that should be eliminated from the scale.

Scale KTM_HIR

Table 8 shows that the original scale reaches a Cronbach's Alpha coefficient of 0.592. The item-total statistic shows that the quality of the scale can be improved by eliminating the item "informal meetings", which also has a low item-total correlation. By doing so, the Alpha of the final scale rises to 0.655. For the purpose of the present study, this value can be considered as tolerable. The scale KTM_HIR is then expressed by the mean of all remaining four items.

Table 8: Reliability of the scale KTM_HIR

Reliability Statistics	
Cronbach's Alpha	N of Items
0.592	5

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Videoconferences	8.11	7.346	0.459	0.505
Seminars, workshops	7.80	7.006	0.442	0.499
Boards	8.06	6.978	0.511	0.476
Informal meetings	6.15	6.309	0.213	0.655
Formal meetings	7.26	6.361	0.311	0.566

Final Reliability Statistics KTM_HIR	
Cronbach's Alpha	N of Items
0.655	4

Scale of KTM_LIR

In a first step, eleven items are included in the scale construction. The scale reaches a Cronbach's Alpha coefficient of 0.839. Eliminating the item "telephone", the final scale ameliorates to 0.850 (Table 9). The variable KTM_LIR is then expressed by the mean of the ten remaining items.

Table 9: Reliability of the scale KTM_LIR

Reliability Statistics	
Cronbach's Alpha	N of Items
0.839	11

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Intranet	23.01	42.532	0.539	0.823
Platforms/Chat systems	23.27	44.277	0.696	0.816
Online forums	23.38	46.110	0.628	0.823
Newsgroups	23.28	44.309	0.680	0.816
E-mail	20.31	46.969	0.304	0.841
Internet	21.91	37.797	0.625	0.817
Fax	21.47	40.279	0.591	0.819
Informal meetings	22.87	43.750	0.544	0.823
Others	23.10	45.756	0.446	0.831
Exchange of letters	22.09	39.641	0.664	0.811
Telephone	20.29	49.120	0.165	0.850

Final Reliability Statistics KTM_LR	
Cronbach's Alpha	N of Items
0.850	10

5.4.2 Knowledge attributes − tacitness of knowledge

According to the knowledge-based theory, the easiness of knowledge transfer depends on the degree of tacitness, as a low degree of tacitness makes knowledge transfer less difficult.[346] The measurement of the level of tacitness in this study is based on Kogut's and Zander's (1993) assumption that knowledge attributes such as codifiability, teachability, and complexity "measure the latent construct of the tacitness of knowledge."[347] Therefore, the following three scales are constructed: codifiability (COD), teachability (TEACH) and complexity (COMPLEX).

[346] Cavusgil et al., 2003, p. 20

[347] Kogut/Zander, 1993, p. 633

Scale COD

Kogut and Zander (1992) define codifiability as the "the ability of the firm to structure knowledge into a set of identifiable rules and relationships that can be easily communicated."[348] This study assumes that the degree of codifiability depends on the possibility (1) to create manuals, (2) to use information technologies, (3) to read manuals, and (4) to access to detailed notes describing processes between business partners (considering at each time the items of interest in the seventh and eighth question).

Reliability analyses show that the scale COD reaches a Cronbach's Alpha coefficient of 0.906 which is considered as an excellent quality of the scale (Table 10). Therefore scale COD can be expressed by the mean of all original items.

Table 10: Reliability of the scale COD

Reliability Statistics	
Cronbach's Alpha	N of Items
0.906	8

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Manuals (DS02_01)	12.59	29.890	0.656	0.898
Manuals (DS03_01)	12.64	30.321	0.752	0.890
Information Technologies (DS02_03)	11.95	30.528	0.574	0.906
Information Technologies (DS03_03)	12.11	29.252	0.700	0.894
Reading Manuals (DS02_05)	12.84	31.869	0.730	0.895
Reading Manuals (DS03_05)	12.68	31.372	0.711	0.895
Detailed notes (DS02_08)	12.36	27.843	0.784	0.886
Detailed notes (DS03_08)	12.43	28.424	0.772	0.887

Final Reliability Statistics COD	
Cronbach's Alpha	N of Items
0.906	8

[348] Kogut/Zander, 1992, p. 387

Scale TEACH

Teachability captures "the extent to which workers can be trained in schools or on the job; it reflects the training of individual skills."[349] According to Kogut and Zander (1992) it requires the development of small groups where members interact frequently with each other and develop a unique language that enables them to encode their knowledge.[350] The present paper assumes that exchange of employees, personal support and dialogue as well as training are benchmarks of teachability.

The scale TEACH is composed in total of eight items (considering at each time the items of interest in the seventh and eighth question). Table 11 illustrates the reliability of the scale TEACH. The Cronbach's Alpha coefficient reaches a value of 0.843. No item is eliminated because it would not lead to any further improvement of the consistency, and the scale TEACH is expressed by the mean of all eight original items.

Table 11: Reliability of the scale TEACH

Reliability Statistics	
Cronbach's Alpha	N of Items
0.843	8

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Employee exchange (DS02_02)	14.81	30.780	0.495	0.838
Trainings (DS02_04)	15.99	33.349	0.559	0.829
Personal dialogue/support (DS02_06)	15.05	28.547	0.735	0.803
Training is a quick/easy task (DS02_07)	15.78	32.594	0.565	0.827
Employee exchange (DS03_02)	14.93	30.839	0.511	0.835
Trainings (DS03_04)	15.83	33.741	0.498	0.834
Personal dialogue/support (DS03_06)	15.02	28.128	0.734	0.803
Training is a quick/easy task (DS03_07)	15.73	32.310	0.572	0.826

Final Reliability Statistics TEACH	
Cronbach's Alpha	N of Items
0.843	8

[349] Zander/Kogut 1995, p. 79

[350] Kogut/Zander, 1992, p. 389

Scale COMPLEX

According to Dennis and Kinney (1998), Daft and Lengel (1963, 1986) originally do not clearly differentiate between equivocality and complexity but often use the two concepts interchangeably.[351] Equivocality is defined as "confusion and lack of understanding"[352] due to "existence of multiple and conflicting interpretations about an organizational situation".[353] According to Kogut and Zander (1992), codifiability and complexity are related but they are two contrasting concepts.[354] Complexity refers to "the inherent variations in combining different kinds of competences"[355], or "a large number of parts that interact in a non simple way."[356] Complexity further depends on "the number of operations required to solve a task."[357] Moreover, Simonin (1999) assumes that complexity depends on "the number of interdependent technologies, routines, individuals, and resources linked to a particular knowledge or asset."[358] Lastly, Sorenson et al. (2005) advise to measure complexity by analyzing the level of interdependence between components that a technology incorporates.[359]

Therefore, this study states that complexity results from the necessity to learn vast amount of activities in order to be able to adopt the transferred knowledge successfully. Furthermore, it assumes that techniques and methods used to adopt transmitted know-how are heterogeneous, very difficult and highly interdependent. Lastly, it presupposes that complexity increases when it is difficult to decompose transmitted know-how into single subtasks, and when it is difficult to learn subtasks.

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[351] Sheer/Chen, 2004, p. 79

[352] Daft/Lengel, 1986, p. 556

[353] Daft et al., 1987, p. 357

[354] Kogut/Zander, 1992, p. 388

[355] Zander/Kogut, 1995, p. 79

[356] Simon, 1969, p. 195

[357] Kogut/Zander, 1992, p. 388

[358] Simonin, 1999, p. 600

[359] Sorenson et al., 2005, p. 2

Table 12 attests that the scale is reliable with an overall Cronbach's Alpha coefficient of 0.819. By deleting one item it is not possible to reach better scale properties. Therefore, the scale COMPLEX is then expressed by the mean of all eight items.

Table 12: Reliability of the scale COMPLEX

Reliability Statistics

Cronbach's Alpha	N of Items
0.819	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Learning of numerous activities is necessary	13.88	16.788	0.529	0.803
Transfer techniques/methods are heterogeneous	13.63	15.802	0.610	0.785
Transfer techniques/methods are very difficult	14.04	17.196	0.469	0.816
Transfer techniques/methods are highly interdependent	13.80	15.565	0.694	0.766
Decomposition into subtasks is easy	14.04	16.143	0.683	0.770
Subtasks can be learned easily	13.99	17.468	0.536	0.801

Final Reliability Statistics

COMPLEX

Cronbach's Alpha	N of Items
0.819	6

5.4.3 Scale TRUST

Table 13 shows the seven items of the original scale and reaches a Cronbach's Alpha coefficient of 0.911. In order to improve the quality of the scale, the item "compliance of verbal agreement even if these could be at disadvantage" was eliminated. By doing so, the Cronbach's Alpha coefficient reaches a very high level of 0.915, making the scale even more reliable. Therefore, the variable TRUST is then expressed by the mean of the remaining six items.

Table 13: Reliability of the scale TRUST

Reliability Statistics	
Cronbach's Alpha	N of Items
0.911	7

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Distinct relationship of trust	18.33	31.402	0.814	0.888
Atmosphere of openness and honesty	18.75	32.059	0.797	0.890
Information exchange beyond stipulated extent	19.08	34.649	0.643	0.907
Collaboration on cooperative basis	18.54	31.037	0.803	0.889
Compliance of verbal agreements	18.11	34.620	0.567	0.915
Recommendations (collaboration)	18.53	33.776	0.781	0.893
Recommendations (alteration/innovation)	18.47	33.579	0.729	0.898

Final Reliability Statistics TRUST	
Cronbach's Alpha	N of Items
0.915	6

5.4.4 Scale INNO

In order to categorize Italian district firms in the textile and fashion business into "earlier adopters" and "later adopters", the variable INNO has been created in accordance to Rogers' (1995, 2003) theory of innovation adoption.

Table 14 shows that the Cronbach's Alpha coefficient of the original scale, including eleven items, reaches a value of 0.627. By eliminating items "skepticism towards innovation", "IA based on perceived success potential", "IA based on tradition and experiences" and "social relationships exclusively inside ID" a major improvement of the final scale can be established. Then the scale reaches a Cronbach's Alpha coefficient of 0.853. Thus, the scale INNO is expressed then by the mean of the remaining seven items.

Table 14: Reliability of the scale INNO

Reliability Statistics	
Cronbach's Alpha	N of Items
0.627	11

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
IA based on „first mover spirit"	17.172	28.596	0.670	0.824
Financial capacity to absorb losses	17.405	27.756	0.661	0.825
Ability to learn and use know-how easily	17.302	30.595	0.581	0.837
Opinion leadership	16.914	26.079	0.761	0.808
Prestigious social position	17.526	29.869	0.620	0.832
Social interaction primarily with similar firms	17.043	33.589	0.358	0.863
Social relationships exclusively inside IDs	16.793	26.896	0.652	0.828

Final Reliability StatisticsINNO	
Cronbach's Alpha	N of Items
0.853	7

In succession, the variable INNO was divided into two categories in order to differentiate between the two innovation adopter categories "earlier adopters" and "later adopters". The break was drawn along the scale mean. Later adopters are decoded with 1 (including scale values between 1 and smaller than 3) while earlier adopters are decoded with 2 (including scale values between 3 and 5).

5.5 Hypothesis testing

Hypotheses H1A, H1B, H2A, H2B, H3A, H3B, H4C and H4D are tested with multiple linear regressions. Regression analyses help to understand the relationships between variables, and is used to understand whether one or more predictor variables have a direct impact on one criterion variable.

5.5.1 Variables

For hypothesis testing, the variables KTM_HIR and KTM_LIR are considered as dependent variables, while variables COD, TEACH, and COMPLEX as well as the TRUST and INNO are explanatory variables. In addition, two control variables are introduced in the multiple regression models. The first control variable AGE refers to the founding year of target firms. According to Windsperger and

Gorovaia (2010), the age of companies is an appropriate control variable to test knowledge transfer mechanisms because, according to Inkpen (2000), learning and standardization of "system-specific know-how" application increases over time.[360] Cavusgil et al. (2003) further highlight that experience of cooperation increases companies' ability to "recognize and to understand proper mechanisms of information gathering, interpretation and diffusion."[361] Consequently, it is assumed that longer years of experience lead to an increased use of lean transfer mechanisms rather than of rich transfer mechanisms.[362] The second control variable refers to the SALES that target companies have generated in the year 2010.

5.5.2 Multiple regression: model assumptions

The efficiency of regression analyses depends on the examination of the following model assumptions: (1) linearity of the relationship between independent and dependent variable, (2) normal error distribution, (3) absence of heteroscedasticity, (4) absence of autocorrelation, and (5) absence of multicollinearity.

- *Examination of linearity and normal error distribution*

  Regression analyses require a linear relation between dependent and independent variables. Linearity can be controlled with the help of scatter plots. A basic requisite for regression analyses is further the normal distribution of both estimated regression parameters and residuals. Violation of this premise leads to invalid significance tests (F-tests or T-tests) and misleading results. Testing of violation of normal error distribution is based on a preliminary examination of scatter plots and Kolmogorow-Smirnow (K-S) tests.

  In this survey, first tests made clear that both dependent variables KTM_HIR and KTM_LIR show significant obliquity and non-normal distribution of residuals (see Appendix E). In order to meet the general premises of regression analyses, a transformation was necessary. After some tests, a

[360] Windsperger/Gorovaia, 2010, p. 11

[361] Cavusgil et al., 2003, p. 20

[362] Windsperger/Gorovaia, 2010, p. 11

transformation based on the natural logarithm was identified as the most appropriate one. The transformed variables are consequently named HIR_ln and LIR_ln.

- *Examination of heteroscedasticity*

  Another fundamental premise of regression analysis is homoscedasticity (homogeneous variance of the errors). Heteroscedasticity is the complementary case, leading to inefficiency of estimates and biases in the relative standard error of regression coefficients or in confidence intervals. In order to test for heteroscedasticity it is advised to control residuals visually by plotting estimated values. When residuals appear in the form of a triangular distribution, then heteroscedasticity can be assumed.

- *Examination of autocorrelation*

  Autocorrelation violates the fundamental basis of regression analysis as well. In this case residuals appear uncorrelated in time series. This leads to underestimation of standard errors and to biases in confidence intervals. In this case a Durbin-Watson (D-W) test shows whether regression analysis can be conducted or not. This statistic evaluates the correlation between two residuals, assuming that the observed values are not autocorrelated. Usually values range between 0 and 4. Values closer to 0 indicate that a positive autocorrelation may exist. Values closer to 4 indicate a negative autocorrelation. As a thumb rule, values between 1.5 and 2.5 can be considered as unproblematic.

- *Examination of multicollinearity*

  A further prerequisite of regression analysis is the exposure of multicollinearity. Multicollinearity affects regression outcomes negatively, whenever exactly linear dependency emerges. First evidence of multicollinearity is the correlation matrix of the independent variables. Hereby, high values of correlation coefficients (close to 1) are considered as problematic. Further, it is necessary to check the R^2. The more the R^2 reaches values close to 1, the more likely a variable can be considered as redundant.

  Lastly, it is necessary to examine the variance inflation factors (VIF). It is assumed that the higher the VIF values, the higher multicollinearity. Most

commonly VIF values greater than 10 are considered as serious signs of multicollinearity, requiring the elimination of one or more variables.[363]

In the present study, multicollinearity is particularly challenging. In order to test the independence of the intended predictor variables, a preliminary data check was conducted. Spearman's correlation coefficient was used, because this measure does not require normal distribution of the variables. Table 15 shows the correlation between the scales COMPLEX, TEACH, COD, TRUST, INNO as well as of the control variables AGE, SALES, and SIZE.

Table 15: Correlations of variables

	COMPLEX	TEACH	COD	TRUST	INNO	AGE	SALES	SIZE
COMPLEX	1.000							
TEACH	**0.470	1.000						
COD	**0.277	**0.713	1.000					
TRUST	**0.535	**0.546	**0.363	1.000				
INNO	**-0.375	**-0.263	**-0.439	**-0.261	1.000			
AGE	0.039	-0.083	0.035	-0.118	-0.191	1.000		
SALES	0.003	-0.147	-0.062	0.000	-0.078	**0.377	1.000	
SIZE	0.119	0.026	0.121	0.104	**-0.306	**0.377	**0.574	1,000

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

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

As SALES is highly related with both the AGE and the SIZE of the company, only AGE and SALES were chosen as control variables. However, it must be pointed out that also AGE and SALES are correlated. In order to control for possible violation of the model assumption, the VIF statistic needs to be included in all models. As an additional precaution measure, stepwise regression is chosen if variables with remarkable inter-correlation are introduced. For the interpretation of the regression model, the R^2 and the regression coefficients need to be investigated.

[363] O'Brien, 2007, p. 673

- *Examination of R-square*

  A fundamental measure of quality of the regression function is the coefficient of determination R-Square (R^2). It is a measure of “goodness of fit” and indicates how well the criterion variable is explained by the predictor variable(s). It illustrates the percentage of original variability of the dependent variable that can be explained by the regression model. The higher the value of the determination coefficient, the better the model fits to the data. The F-test statistic makes clear whether the obtained R^2 can be considered as significant.

- *Examination of regression coefficients*

  The regression coefficient is the slope of the regression function. It expresses the extent to which the dependent variable changes when the dependent variable alters. In order to understand which direction the relationship between both variables types takes it is necessary to consider the signs of the standardized regression coefficients (Beta values). Positive signs indicate a positive relationship, while negative signs indicate a negative relationship. When Beta is zero, no perfectly linear relationship exists.

5.5.3 Hypothesis 1

H1A: The more tacit the shared knowledge, the more likely Italian district firms use rich knowledge transfer mechanisms (KTM_HIR).

Hypothesis H1A was based on the following regression equation:

$HIR\_ln = \alpha + \beta_1 * TEACH + \beta_2 * COMPLEX + \beta_3 * COD + \beta_4 * SALES + \beta_5 * AGE + \varepsilon$

Because of the inter-relatedness of the scales COD, TEACH, and COMPLEX, this regression was realized as a stepwise regression model. Stepwise analysis introduces all predictor variables step by step, beginning with the one that has the strongest correlation with the dependent variable. The stepwise regression model considers only those predictor variables that reach sufficiently high F-values. Variables with an F-value of ≤ 0.05 are included into the final model, while variables with F-values of ≥ 0.1 are excluded. Thus, the result is a lean model with only a few important variables. The results are summarized in Table 16:

Table 16: SPSS output - H1A

	HIR_ln
Intercept	B -0.130
	Std Err B (0.114)
TEACH	--
COMPLEX	--
COD	B 0.320**
	Std Err B (0.057)
	Beta 0.567**
AGE	--
SALES	--
MODEL	**F= 31.555****
	Adj.R^2 = 0.313
	VIF = 1.000
	DW = 2.021

** p < 0.01; * p < 0.05

The adjusted R^2 reaches a value of 0.313, which means that 31.3 per cent of HIR_ln usage can be explained by the included variables. As the F value shows, this model is statistically significant. VIF, Durbin Watson statistics and the residual plot show no violation of assumptions. The stepwise regression model shows that of all scales for tacitness, only the codiafiability (COD) remains a significant predictor for HIR usage. The Beta of 0.567 is significant at an α = 0.01 level. The positive sign of the coefficient shows a positive relation between COD and HIR_ln. All the other variables and control variables have not been included in the final stepwise model as they do not have a significant effect on HIR_ln. On basis of these results, H1A has to be rejected.

H1B*: The less tacit the shared knowledge, the more likely Italian district firms use lean knowledge transfer mechanisms (KTM_LIR).*

Hypothesis H1B is based on the regression equation below:

$LIR\_ln = \alpha + \beta_1 * TEACH + \beta_2 * COMPLEX + \beta_3 * COD + \beta_4 * SALES + \beta_5 * AGE + \varepsilon$

Table 17 illustrates the results of the stepwise regression model:

Table 17: SPSS output - H1B

	LIR_ln
Intercept	B 0.390
	Std Err B (0.085)
TEACH	--
COMPLEX	--
COD	B 0.233 **
	Std Err B (0.039)
	Beta 0.553 **
AGE	--
SALES	--
MODEL	**F= 31.818 ** **
	Adj.R^2 = 0.297
	VIF = 1.000
	DW = 1.961

** p < 0.01; * p < 0.05

According to the F-test, the whole model is statistically significant. The adjusted R^2 reaches a value of 0.297, thus 29.7 per cent of the variance of LIR_ln can be explained by the model. The VIF and Durbin Watson statistics show that no violation of assumptions can be observed. The plot of the residual is also unproblematic. Only COD remains in the final model. The Beta of 0.553 is significant at an α = 0.01 level. All other variables do not have any significant effect on LIR_ln. On basis of these findings, H1B has to be rejected as well.

5.5.4 Hypothesis 2

H2A: The more Italian district firms trust each other, the more likely they transfer knowledge by using lean knowledge transfer mechanisms (KTM_LIR).

Hypothesis H2A leads to the following regression equation:
$LIR\_ln = \alpha + \beta_1 * TRUST + \beta_2 * AGE + \beta_3 * SALES + \varepsilon$

Table 18 summarizes the results of the regression conducted on basis of on this equation:

Table 18: SPSS output - H2A

	LIR_ln
Intercept	B 0.642**
	Std Err B (0.152)
TRUST	B 0.128**
	Std Err B (0.034)
	Beta 0.380**
AGE	B 0.000
	Std Err B (0.001)
	Beta 0.002
SALES	B -0.057
	Std Err B (0.047)
	Beta -0.134
MODEL	**F=5.319****
	Adj.R^2 = 0.127
	VIF = 1.229

** p < 0.01; * p < 0.05

The regression model as a whole is significant, the F values (5.319) have a p-value of 0.002 ($p < 0.01$). The adjusted R^2 reaches a value 0.127, thus 12.7 per cent of LIR_ln usage can be explained through the regressor variables. Examination of collinearity and of autocorrelation as well as the distribution of residuals is unproblematic. The results of the regression model show that the regression coefficient of TRUST (Beta = 0.380) is significant on the $\alpha = 0.01$ level. In accordance with the hypothesis, TRUST has a positive sign, and therefore it can be assumed that the more district members trust each other, the more they tend to use KTM_LIR. Hence, hypothesis H2A is confirmed.

H2B: The less Italian district firms trust each other, the more likely they transfer knowledge by using rich knowledge transfer mechanisms (KTM_HIR).

Testing of hypothesis H2B leads considers the regression equation below:
$HIR\_ln = \alpha + \beta_1 * TRUST + \beta_2 * AGE + \beta_3 * SALES + \varepsilon$

This regression model is realized by the default method provided by SPSS ("enter"). The following Table shows the results.

Table 19: SPSS output – H2B

	HIR_ln
Intercept	B -0.057
	Std Err B (0.196)
TRUST	B 0.112**
	Std Err B (0.042)
	Beta 0.300**
AGE	B 0.000
	Std Err B (0.001)
	Beta 0.024
SALES	B 0.067
	Std Err B (0.059)
	Beta 0.141
MODEL	**F=2.992***
	Adj.R^2 = 0.075
	VIF = 1.223
	DW = 1.870

** $p < 0.01$; * $p < 0.05$

The adjusted R^2 reaches a value 0.075, thus 7.5 per cent of HIR_ln usage can be explained through the included regressor variables. This seems to be a low value, however, at a significance level of $\alpha = 0.05$, the F value of the whole regression model (2.992) is significant with a p-value < 0.05. Thus, the model can be interpreted. Both examinations of collinearity and of autocorrelation of residuals show no violation of model assumptions. The same is true for the visual control of normal distribution of residuals. The results of the regression analysis show that TRUST has a significant influence on the choice of KTM_HIR. The regression coefficient of TRUST (Beta 0.300) is significant on the $\alpha = 0.01$ level. TRUST has a positive sign, and, therefore, it can be assumed that the more district members trust each other, the more they tend to use KTM_HIR. Hence, hypothesis H2B is rejected.

5.5.5 Hypothesis 3

H3A: The positive influence of tacitness on the choice of richer knowledge transfer mechanisms decreases (KTM_HIR) with trust.

This assumption is transferred into a complex regression equation which considers also possible interaction effects:

$$HIR\_LN = \alpha + \beta_1*TEACH + \beta_2*COMPLEX + \beta_3*COD + \beta_4*TRUST + \beta_5*TRUST*TEACH + \beta_6*TRUST*COMPLEX + \beta_7*TRUST*COD + \beta_8*AGE + \beta_9*SALES + \varepsilon$$

In SPSS, this equation is realized as stepwise regression model. Table 20 displays the results:

Table 20: SPSS output – H3A

	HIR_ln
Intercept	B -0.130
	Std Err B (0.114)
COD	B 0.320**
	Std Err (0.057)
	Beta 0.569**
TEACH	--
COMPLEX	--
TRUST	--
TRUST*COD	--
TRUST*TEACH	--
TRUST*COMPLEX	--
AGE	--
SALES	--
MODEL	**F=31.555****
	Adj.R^2 = 0.313
	VIF = 1.000
	DW =2.021

** p < 0.01; * p < 0.05

The whole regression model is as a whole significant, the F value (31.555) has a p-value of 0.000 ($p < 0.01$). R^2 reaches a value 0.313, thus 31.3 per cent of HIR_ln usage can be explained through the regressor variables. Examination of collinearity and examination of autocorrelation of residuals as controlled by VIF and Durbin Watson statistics and the residual plot guarantee that the model assumptions have not been violated. The results of the stepwise regression analysis show that only COD is a significant predictor. The other variables do not have any significant impact on the choice of KTM_HIR. Hence, neither TRUST itself nor any of its interaction effects influences the choice of richer knowledge transfer mechanism positively. Thus, hypothesis H3A has to be rejected.

H3B: The negative influence of tacitness on the choice of leaner knowledge transfer mechanisms (KTM_LIR) decreases with trust.

This can be expressed as the following equation:

$$LIR\_LN = \alpha + \beta_1 * TEACH + \beta_2 * COMPLEX + \beta_3 * COD + \beta_4 * TRUST + \beta_5 * TRUST * TEACH + \beta_6 * TRUST * COMPLEX + \beta_7 * TRUST * COD + \beta_8 * AGE + \beta_9 * SALES + \varepsilon$$

In SPSS, this equation was realized as stepwise regression model. Table 21 displays the results:

Table 21: SPSS output – H3B

	LIR_ln
Intercept	B 0.390
	Std Err B (0.085)
COD	B 0.233**
	Std Err (0.039)
	Beta 0.553**
TEACH	--
COMPLEX	--
TRUST	--
TRUST*COD	--
TRUST*TEACH	--
TRUST*COMPLEX	--
AGE	--
SALES	--
MODEL	**F= 34.818 ** **
	Adj.R^2 = 0.297
	Max. VIF = 1.000
	DW =1.961

** p < 0.01; * p < 0.05

Based on the significant F value, the whole regression can be interpreted. The adjusted R^2 of 0.297 means that 29.7 per cent of the variance of LIR_ln can be explained by the model. Both VIF and Durbin Watson statistics show that no violation of assumption has occurred. Of all predictor variables in the equation, only COD remains. The Beta of 0.553 is significant on a level of α = 0.01. All other variables have not been included in the final stepwise regression model. As

neither TRUST itself nor any of its interaction effects influences the choice of lean knowledge transfer mechanisms, hypothesis H3B has to be rejected as well.

5.5.6 Hypothesis 4

The last part of the survey investigates the differences between earlier and later innovation adopters in Italian fashion and textile districts. First, before testing H4, it is investigated whether adopter categories differ in terms of general characteristics, including annual sales 2010, company size, and business experience in terms of number of years since year of foundation. Consequently, later innovation adopters and earlier adopters are analyzed on the basis of their usage of knowledge transfer mechanisms. The overall null hypothesis is: “Earlier adopters do not differ from later adopters in terms of trust, age, sales, size, and usage of knowledge transfer mechanisms.”

Two independent groups of companies − earlier and late adopters − were created based on the scale of innovativeness (INNO). Firms with an innovativeness score below the median were considered to be later adopters, firms with a score above the median as earlier adopters. In order to understand to which extent earlier adopters differ from later adopters, comparison of means was conducted.

Comparison of means is used to test whether differences between statistical groups or samples exist. A preliminary Kolmogorov-Smirnov-Test is conducted in order to analyze whether the included variables are normally distributed, and to choose the appropriate test. If the variables show a normal distribution, comparison of means in two independent groups can be conducted with T-Tests, while if variables are not normally distributed, comparison of means must be conducted with the non-parametric Mann Whitney U-Test (M-W).

Table 22 below summarizes the results of the Kolmogorov-Smirnov test on normal distribution for selected variables. A significant result (significance values smaller than 0.05) shows that the distribution of variable differs significantly from the normal distribution.

Table 22: Examination of normal distribution (K-S Test)

	TRUST	AGE	SALES	SIZE	HIR	LIR
K-S	0.379	0.000	0.000	0.000	0.000	0.090

Do earlier adopters differ from later adopters in terms of annual sales 2010?

The variable SALES is not normally distributed due to a significance level of 0.001 ($p < 0.05$) at the Kolmogorov-Smirnov test. Thus, a Man Whitney U-test is conducted (see Table 23). Eighty later adopters (n1) and 45 earlier adopters (n2) respond to this question. Considering the null hypothesis of the Mann-Whitney U-test (median1 = median2 or median1 – median2 = 0), the two-tailed asymptotic significance is 0.435 ($p > 0.05$) it is concluded that there is no difference in the median grades of adopter categories. In other words, early and late adopters do not differ with respect to their sales.

Table 23: Comparison of means of variable SALES

Ranks

SALES	N	Mean Rank	Sum of Ranks
Later adopters	80	64.71	5177.00
Earlier adopters	45	59.96	2698.00
Total	125		

Test statistics(a)

	SALES
Mann-Whitney-U	1663.000
Wilcoxon-W	2698.000
Z	-0.780
Asympt. Sig.(2-tailed)	0.435

a Group Variable: INNO_GROUP

Do earlier adopters differ from later adopters in terms of company size?

The variable SIZE does not show a normal distribution, thus the Man-Whitney U-Test is the appropriate test (see Table 24). Seventy-six later adopters and 45 earlier adopters respond to this question. Considering the null hypothesis of the

Mann-Whitney U-Test (median1 = median2 or median1 – median2 = 0) and of α = 0.05 higher than the found two-tailed asymptotic significance of 0.004, it is assumed that there is a difference in the median grades of adopter categories. A detailed comparison of medians show that later adopters (median = 45) employ more personnel than earlier adopters (median = 23).

Table 24: Comparison of means of variable SIZE

Mann-Whitney test

Ranks

SIZE	N	Mean Rank	Sum of Ranks
Later adopters	76	68.01	5168.50
Earlier adopters	45	49.17	2212.50
Total	121		

Test statistics(a)

	SIZE
Mann-Whitney-U	1177.500
Wilcoxon-W	2212.500
Z	-2,.857
Asymp. Sig, (2-tailed)	0.004

a Group Variable: INNO_GROUP

Mean values

INNO_GROUP	Mean	N	Stand. Dev.	Median
Later adopters	105,53	76	236,755	45,00
Earlier adopters	40,40	45	43,724	23,00
Total	81,31	121	191,659	35,00

Do earlier adopters differ from later adopters in terms of age?

The variable AGE is not normally distributed due to a significance at the Kolmogorov-Smirnov test. Thus, a Man Whitney U-test is conducted (see Table 25) Fifty-nine later adopters and 26 earlier adopters answer this question. According to the Mann-Whitney U-test, at the significance level of α = 0.05 and a found two-tailed asymptotic significance of 0.159 it can be concluded that earlier adopters and later adopters do not differ in terms of business experience.

Table 25 Comparison of means of variable AGE

Mann-Whitney test

Ranks

AGE	N	Mean Rank	Sum of Ranks
Later adopters	59	45.50	2684.50
Earlier adopters	26	37.33	970.50
Total	85		

Test statistics(a)

	AGE
Mann-Whitney-U	619.500
Wilcoxon-W	970.500
Z	-1.408
Asympt. Sig. (2-tailed)	0.159

a Group Variable: INNO_GROUP

Do earlier adopters differ from later adopters in terms of trust?

The scale TRUST is normally distributed with a asymptotic significance of 0.379 at the Kolmogorov-Smirnov-test. This shows that a T-test is appropriate (see Table 26). The null hypothesis presupposes that earlier adopters and later adopters are equal in terms of trust. The Levene-Test shows that variances of both groups are equal with a significance of 0.353 ($p > 0.05$). As the 2-tailed significance of the T-Test reaches a value of 0.131 ($p > 0.005$) it can be assumed that there is not a significant difference between earlier adopters and later adopters in terms of trust.

Table 26: Comparison of means of variable TRUST

Group statistics

TRUST	N	Mean	Std. Deviation	Std. Error Mean
Later Adopters	82	3.1126	0.99550	0.10993
Earlier Adopters	45	2.8393	0.92254	0.13752

***Table 26: Comparison of means of variable TRUST** (continued)*

Independent sample test

TRUST	Levene's Test for Equality of Variances		T-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Upper	Lower
Equal variances assumed	0.871	0.353	1.518	125	0.131	0.27334	0.18004	-0.08297	0.62966
Equal variances not assumed			1.553	96.742	0.124	0.27334	0.17606	-0.07611	0.62279

H4A: Later adopters in Italian industrial districts more likely use richer knowledge transfer mechanisms (KTM_HIR) than earlier adopters.

The variable KTM_HIR is not normally distributed with a significance level of $p < 0.001$ in the Kolmogorov-Smirnov- test. Thus, the Mann-Whitney U-test is applied (see Table 27). Sixty-nine later adopters and 35 earlier adopters ware included in the analyses. According to the Mann-Whitney U-test, the test statistic is highly significant ($p < 0.001$) which indicates that adopter categories differ in terms of media use. In fact, closer analysis of the means and medians shows that later adopters (median = 1.75) more likely use KTM_HIR than earlier adopters (median = 1.25).This confirms the formulated hypothesis.

Table 27: SPSS output H4A

Mann-Whitney test

Ranks

KTM_LIR	N	Mean Rank	Sum of Ranks
Later adopters	69	60.25	4157.00
Earlier adopters	35	37.23	1303.00
Total	104		

***Table 27: SPSS output H4A** (continued)*

Test statistic (a)

	KTM_HIR
Mann-Whitney-U	673.000
Wilcoxon-W	1303.000
Z	-3.727
Asympt. Sig. (2-tailed)	0.000

a Group variable: INNO_GROUP

Mean values

KTM_HIR	Mean	N	Std.Dev	Median
Later adopters	1.9118	69	0.94723	1.7500
Earlier adopters	1.3667	35	0.45876	1.2500
Total	1.7284	104	0.85371	1.5000

H4B: Earlier adopters in Italian industrial districts more likely use leaner knowledge transfer mechanisms (KTM_LIR) than later adopters.

The variable KTM_LIR is normally distributed according to the Kolmogorov-Smirnov-test. Thus, T-test is required. Table 28 shows that 81 later adopters and 44 earlier adopters are investigated. The null hypothesis presupposes that earlier adopters and later adopters are equal in terms of KTM_LIR usage. The Levene-Test has a significance of 0.922 (> 0.05) which gives evidence that the variances in both groups are equal. The two-tailed significance of the T-Test is 0.008 (< 0.05). This makes the rejection of null hypothesis necessary. In fact, later adopters (median = 2.56) use more KTM_LIR than earlier adopters (median = 1.95).

Table 28: SPSS output H4B

Group statistics

KTM_LIR	N	Mean	Std. Deviation	Std. Error Mean
Later adopters	81	2.6595	0.92322	0.10258
Earlier adopters	44	2.1904	0.93060	0.14029

***Table 28: SPSS output H4B** (continued)*

Independent sample test

KTM_LIR	Levene's Test for Equality of Variances		T-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval oft he Difference	
								Upper	Lower
Equal variances assumed	0.010	0.922	2.705	123	0.008	0.46906	0.17338	0.12586	0.81226
Equal variances not assumed			2.699	87.783	0.008	0.46906	0.17380	0.12367	0.81445

Mean values

KTM_LIR	Mean	N	Std. Dev	Median
Later adopters	2,6595	81	,92322	2,5556
Earlier adopters	2,1904	44	,93060	1,9500
Total	2,4944	125	,94910	2,3333

To sum up, later adopters more likely use both types of knowledge transfer mechanisms compared with earlier adopters. These results are not completely in line with Rogers' (1995, 2003) theory (see section 3.4) that assumes that earlier adopters are active information searchers, and are more exposed to media in general, preferring in particular impersonal mass media to accumulate knowledge related to upcoming new products and technologies.

Therefore, in order to understand whether one or more knowledge transfer mechanisms exist that are used significantly differently by later and earlier adopters, further analyses are conducted. Figure 15 attests previous results. It shows the frequencies resulting from the comparison of means (Mann-Whitney-test due to non-normal distribution of variables) of all single knowledge transfer mechanisms.

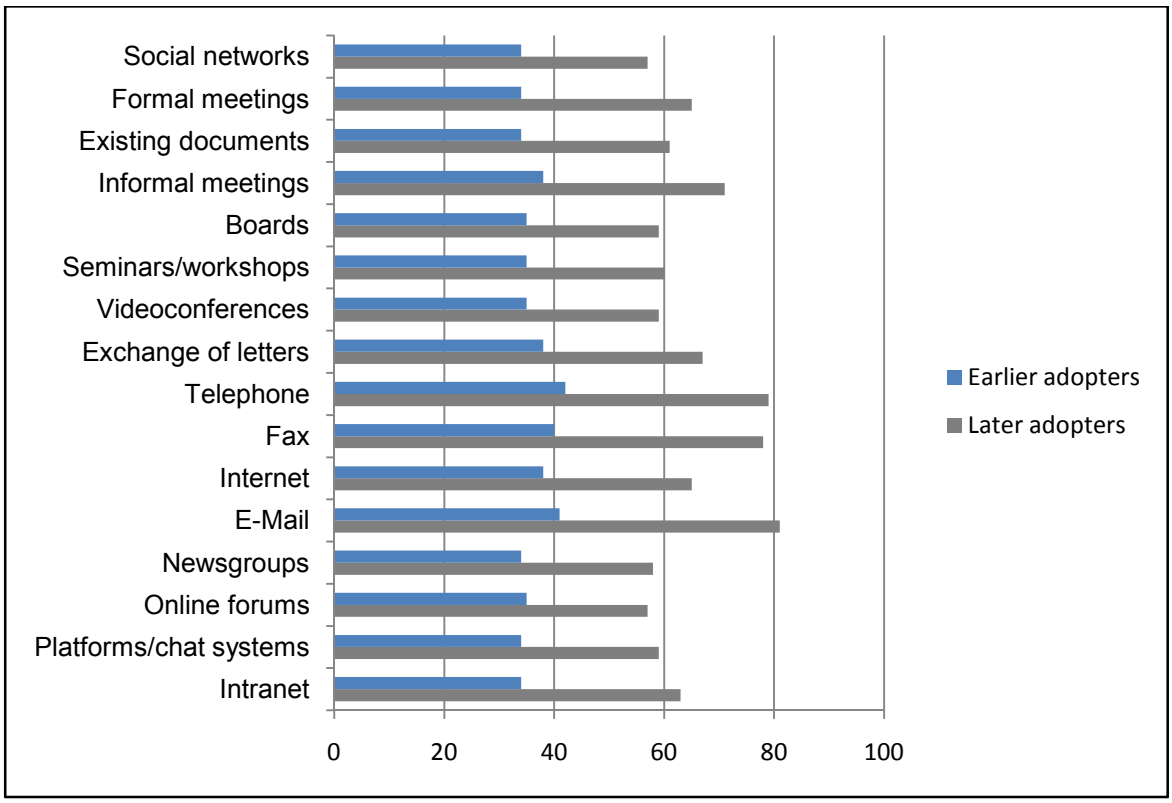

Figure 15: Innovation adopters and usage of KTMs

The test statistic (see Appendix E) shows that the significant differences between later and earlier adopters exist for internet ($p = 0.001$), fax ($p = 0.028$), videoconferences ($p = 0.014$), boards ($p = 0.028$), informal meetings ($p = 0.009$), existing documents ($p = 0.001$), formal meetings ($p = 0.013$), and social networks ($p = 0.038$).

Table 29 illustrates that the extent of difference of usage of single knowledge transfer mechanisms between later and earlier innovation adopters. Later adopters use more internet, faxes, existing documents, and formal meetings, while earlier adopters count strongly on informal meetings in knowledge transfer with a high median score of 4.

Table 29: SPSS output H4A and H4B

Mean values

INNO GROUP		Internet	Fax	Videoconferences	Boards	Informal meeting	Existing doc	Formal meeting	Social networks
Later adopter	Mean	3.26	3.40	1.42	1.46	3.08	2.15	2.37	1.28
	N	65	78	59	59	71	61	65	57
	Std. Dev.	1.361	1.132	0.932	0.953	1.168	1.108	1.167	0.750
	Median	**3.00**	**3.50**	**1.00**	**1.00**	**3.00**	**2.00**	**2.00**	**1.00**
Earlier adopter	Mean	2.13	2.75	1.09	1.11	3.71	1.41	1.82	1,03
	N	38	40	35	35	38	34	34	34
	Std. Dev.	1.474	1.428	0.507	0.471	1.523	0.821	1.193	,171
	Median	**1.00**	**3.00**	**1.00**	**1.00**	**4.00**	**1.00**	**1.00**	**1,00**
Total	Mean	2.84	3.18	1.30	1.33	3.30	1.88	2.18	1.19
	N	103	118	94	94	109	95	99	91
	Std. Dev.	1.500	1.272	0.814	0.822	1.330	1.071	1.198	0.613
	Median	3.00	3.00	1.00	1.00	3.00	2.00	2.00	1.00

H4C: The positive impact of openness towards innovation on the use of KTM_HIR increases with trust.

Hypothesis H4C leads to the following regression equation:

$HIR\_In = \alpha + \beta_1 * INNO + \beta_2 * TRUST + \beta_3 * TRUST * INNO + \beta_4 * AGE + \beta_5 * SALES + \varepsilon$

This hypothesis has been tested in a stepwise regression model which brought the following results:

Table 30: SPSS output H4C

	HIR_ln
Intercept	B 1.069**
	Std Err B (0.146)
INNO	B -0.218**
	Std Err B (0.052)
	Beta -0.455**
TRUST	--
TRUST*INNO	--
AGE	--
SALES	--
MODEL	**F=17.460****
	Adj.R^2 = 0.195
	Max. VIF = 0.979
	DW = 1.909

** p < 0.01; * p < 0.05

Table 29 shows that adjusted R^2 reaches a value of 0.195. Thus, only 19.6 per cent of the variance can be explained by the independent variables. The Anova Table illustrates that the whole regression model is significant with an F value of 17.460 and a significance of 0.000 ($p < 0.05$). No violation of assumptions can be observed. The coefficient Table indicates that only the variable INNO is highly significant ($p = 0.000$) with a Beta of -0.455. Thus, considering the negative sign of the standardized Beta, the variable INNO is negatively related to the use of HIR_ln. The interaction effect of TRUST*INNO is, among others, not significant, and therefore automatically excluded from the model. Consequently, H4C has to be rejected.

H4D: The positive impact of openness towards innovation on the use of KTM_LIR increases with trust

Hypothesis H4D leads to the following regression equation:

$LIR\_ln = \alpha + \beta_1 * INNO + \beta_2 * TRUST + \beta_3 * TRUST * INNO + \beta_4 * AGE + \beta_5 * SALES + \varepsilon$

Table 31 describes the results of the stepwise regression model:

Table 31: SPSS output H4D

	LIR_ln
Intercept	B 0.502**
	Std Err B (0.109)
TRUST	B 0.126**
	Std Err B (0.035)
	Beta 0.373**
INNO	--
TRUST*INNO	--
AGE	--
SALES	--
MODEL	**F=13.053****
	Adj.R^2 = 0.128
	VIF = 0.993
	DW = 1.650

** p < 0.01; * p < 0.05

The model has an adjusted R^2 of 0.128. Thus, only 12.8 per cent of the variance can be explained by the independent variable. However, the entire model is significant as shown by the significant F-test (F = 13.053, p = 0.001). VIF, Durbin Watson statistics and the residual plot show that no violation of assumptions occurs. The coefficient Table indicates that only the variable TRUST is highly significant with a Beta of 0.373. Thus, considering the positive sign of the standardized Beta, only the variable TRUST is positively related to the choice of KTM_LIR. The interaction effect of TRUST*INNO is, among others, not significant, and therefore automatically excluded from the model. Consequently, H4D has to be also rejected.

CONCLUSIONS

The present thesis focuses on the fundamental role effective knowledge management plays in organizations, and aims at explaining how knowledge transfer mechanisms are used in industrial districts. The main goal of this work is to understand which knowledge transfer mechanisms are preferred by Italian district firms that operate in the fashion and textile business. This conclusion discusses the main findings of the present empirical analyses. Hereby, the main aim is to link general contributions on knowledge management summarized in previous chapters with the resulting findings of empirical investigation. Finally, emerging limitations of the present survey are cited, and possible recommendations for further consecutive studies are highlighted.

The first goal of this work is to statistically describe the characteristics of the companies surveyed in the sample. The major part of respondents has been operating in the leather/footwear, textile and clothing industry for more than 20 years. About half of that district firms that are used in the sample are small and medium-sized companies. Most of them have on average generated annual sales between 3 and 20 millions of Euro in 2010.

Consequently, it is described how knowledge is transferred among district firms. Italian district players acquire and transfer knowledge preferably through personal dialogue, exchange of employees, and information technologies. Closer examination of local knowledge transfer mechanisms makes it quite clear that district members share knowledge primarily by e-mail and telephone or in informal meetings. In contrast, modern communication media, such as videoconferences, newsgroups, online forums, platforms, chat systems, and intranet are less appreciated. These findings are in line with those of Belussi (2005) and Gottardi (2003). The reasons why direct and personal communication is preferred in knowledge transfer rather than modern and less personal communication may be the following: First, Italian district firms prefer “relatively low-cost ready-made” technologies rather than complex communication tools.[364] Second, they prefer conservative communication tools that are easy to use and

[364] Belussi, 2005, p. 263

do not necessitate many investments in reorganization of local procedures and relations.[365]

Apart from the descriptive part of this paper, this study aims at understanding the district-specific particularities of knowledge transfer, investigating the impact of knowledge characteristics, trust, and companies' orientation towards innovation adoption on the choice of knowledge transfer mechanisms.

- H1A and H2B are directed to understand whether the degree of knowledge tacitness, has an impact on the use of knowledge transfer mechanisms. Surprisingly, they show contradicting results, in contrast to previous studies. In fact, multiple regression in this case indicates that only codifiability of knowledge has a positive impact on the use of both types of knowledge transfer mechanisms. Thus codifiability of transferred knowledge evidently increases the disposition to communicate inside the districts. This is in line with Gottardi (2003), who states that language and knowledge codification is rarely standardized in industrial districts.[366] Thus, from the point of view of the author of this study, it makes inter-personal interaction and dialogue among district players indispensable.
- H2A and H2B examine the relation between trust and knowledge transfer mechanisms. Statistical results indicate that the more Italian district firms trust each other, the more likely they use both forms of knowledge transfer mechanisms. This finding is in line with the complementary view of trust.
- H3A and H3B investigate the interactive effect between tacitness of knowledge and trust. It is assumed that the effect of tacitness on the choice knowledge transfer mechanisms is positively impacted by trust. Statistical results of this study indicate that none of these assumptions can be applied to Italian district firms that operate in the fashion and textile industry.
- H4A, H4B, H4C, and H4D focus on the impact of firms' attitude towards innovation adoption on the selection of knowledge transfer mechanisms. Hereby, Italian district firms are categorized into earlier and later innovation

[365] Chiarvesio and Micelli, 2000; Di Maria, 2000; Chiarvesio, 2001; Capitani and Di Maria, 2000 in Gottardi, 2003, p. 10

[366] Gottardi, 2003, p. 10 referring to Chiarvesio and Micelli, 2000; Di Maria, 2000; Chiarvesio, 2001; Capitani and Di Maria, 2000

adopters. It is tested whether these two groups differ in terms of sales, company size, age, and trust, as well as in the usage of knowledge transfer mechanisms. Preliminary analyses show that earlier adopters do not differ from later adopters in terms of sales, age, and trust, but vary indeed in company size. In fact, later adopters employ on average more personnel than earlier adopters. After this examination, it is assumed that later adopters, usually preferring personal communication, may prefer knowledge transfer mechanisms with richer more personal knowledge transfer mechanisms (H4A), while earlier adopters, habitually preferring impersonal mass media, may use also more likely leaner knowledge transfer mechanisms (H4B). Only H4A can be approved in this study. It is therefore considered that communication behaviour in highly creative and vibrant sectors, such as the fashion and textile sector, may differ significantly to traditional and less dynamic sectors, such as the agricultural sectors, investigated by Rogers (1995, 2003).

- Lastly, H4C and H4D investigate the interaction effect between openness towards innovation adoption and trust. Unfortunately, statistical results indicate that no interaction affects of such kind exist.

How does the present work extend already existing contributions on knowledge management in the literature? First, this thesis links diverse theoretical concepts that have been already broadly discussed in the literature, but that have been rarely analyzed in interconnection to each other. In fact, the main aim has been to link the knowledge-based theory, the trust-based theory, as well as the innovation diffusion theory of organizations with the media richness theory. Second, existing literature on determinants, influencing the choice of knowledge transfer mechanisms, has focused basically on cluster firms in technical sectors, while the present survey focuses in particular on companies operating in more vital and creative sectors.

Revealed findings of the empirical research are of practical relevance for scientists and practitioners. On the one hand, results illustrate well district firms' day-to-day experiences in knowledge transfer processes and the crucial role of trust in local cooperation. On the other hand, the study describes local companies' attitude towards the adoption of new ideas and technologies. It helps

to understand how district firms, categorized in later and earlier innovation adopters, differ in terms of general demographic factors, trust, and in particular in terms of the usage of knowledge transfer mechanisms.

Nevertheless, this work is not without limitations. First, although the present thesis considers a not insignificant number of determinants, influencing the choice of knowledge transfer mechanisms, only a limited insight on knowledge transfer is presented. In fact, there are many other environmental, organizational, and social conditions that empirical research could investigate in future. Second, the survey focuses exclusively on fashion and textile companies, operating in industrial districts. Therefore, if the same research would be realized in other industry systems or branches, results may vary. Further, this study includes principally Italian small and medium-sized companies into the sample. Thus, it would be interesting to find out whether the selection of knowledge transfer mechanisms of smaller companies may differ in comparison to large enterprises. Moreover, it is questionable whether country-specific characteristics may influence the selection of knowledge transfer mechanisms. Last, considering the determination of adopter categories based on Rogers (1995, 2003), some resulting limitations have to be highlighted: On the one hand, as already described in chapter 3, Rogers assumes that the distribution of innovation diffusion is normally distributed, but in practice, according to Mahajan et al. (1990), this presumption is doubtful.[367] On the other hand, disregarding the simpleness of Rogers' method, Rogers cannot prove that his technique is applicable for all forms of innovations.[368] In fact, according to Price et al. (1986), Rogers' research is directed primarily at agricultural companies, and involves first and foremost discrete innovations and common communication media (mass media and interpersonal communication) that are atypical compared to those in consumer product sectors,[369] such as the fashion and textile sector.

[367] Mahajan et al., 1990, p. 37

[368] Mahajan et al., 1990, p. 37

[369] Price et al., 1986

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APPENDICES

APPENDIX A: CURRICULUM VITAE

PERSONAL INFORMATION:

NAME: **Susanna Ender**
DATE OF BIRTH: 31/10/1980
PLACE OF BIRTH: Vienna
NATIONALITY: Austria

EDUCATION / TRAINING:

Since 10/2008: **UNIVERSITY OF VIENNA, Vienna**
M.Sc.: International Business Studies

09/2003 – 10/2007: **FACOLTÀ DI ECONOMIA DELL'UNIVERSITÀ DI FIRENZE, Florence**
B.Sc.: International Business and Marketing

09/1999 – 10/2002: **FASHION INSTITUTE VIENNA, Vienna**
Specialized Diploma Course: "Fashion Design and Product Development"

09/1987 – 10/1999: **SCHULZENTRUM MARIA REGINA, Vienna**
Elementary school and grammar school (A-levels, "Matura")

WORK EXPERIENCE:

06/2009 - 09/2009: **GUCCI GROUP N.V., Paris**
Internship

01/2008 – 06/2008: **HENKEL CENTRAL EASTERN EUROPE GmbH, Vienna**
Marketing Assistant

07/2007 – 12/2007: **DOUGLAS COSMETICS GmbH, Hagen**
Internship – International Brand Management

12/2004 – 02/2005: **KOSTELIA SRL, Florence**
Project related assistance

08/2001 – 01/2003: **KAYIKO – The Private Luxury Label KG, Vienna**
Marketing assistant and freelance designer

10/2002 – 12/2002: **M.LISKA & Co GmbH, Vienna**
Collaboration for the "Austrian Creative Fur Contest 2002".

03/2002 – 09/2002: **THANG DE HOO, Vienna**
Personal assistant

06/2001 – 07/2001: **ALTA MODA ROMA 2001, Rome**
Internship

06/2000 – 07/2000: **HUGO BOSS and SONIA RYKIEL, Vienna**
Sales assistant

10/1996- 04/1998: **MARKET RESEARCH INSTITUTE, Vienna**
Freelancer

LANGUAGE SKILLS:

GERMAN:	First language
ENGLISH:	Proficient user
ITALIAN:	Proficient user
FRENCH:	Basic user

COMPUTER SKILLS:

Excel
Lotus Notes
Photoshop
Powerpoint
R version 2.4.1
SAP
Word

APPENDIX B: ABSTRACTS

English abstract

In Italy industrial districts are known as particularly vital places of innovation, where localized knowledge spillovers and trust among district firms play a fundamental role. Even though literature on industrial districts, knowledge transfer, organizational trust, and innovation adoption exists, there is a general lack of contributions that link all these concepts. In fact, up to now only a very limited number of researchers have investigated the determinants that have an impact on the selection of knowledge transfer mechanisms. Therefore, after an extensive literature review, an online survey has been conducted, targeting exclusively at Italian district firms that operate in the fashion and textile sector. Consequently, based on the findings of 165 completed questionnaires an empirical survey has been undertaken. This work focused on the theory of knowledge transfer mechanisms, using the media richness theory. According to this theory, two types of communication media exist, namely communication channels with lower degrees of media richness (e.g., e-mail, fax, letters) or communication channels with higher degree of media richness (e.g., face-to-face dialogue, meetings). This concept has then been linked with:

- the knowledge-based theory of companies, investigating the impact that knowledge characteristics (codifiability, teachability, complexity) have on the choice of knowledge transfer mechanisms. It has been assumed that explicit knowledge, as being less complex and highly codifiable and teachable, is transferred easier than tacit knowledge. Consequently, it has been hypothesized that the tacitness of knowledge is positively related to the choice of knowledge transfer mechanisms with higher degrees of media richness. The present study has found out that only codifiability of knowledge has a positive impact on the use of both types of knowledge transfer mechanisms.
- the concept of trust. It has been assumed that trust (or distrust) increases the usage of knowledge transfer mechanisms with lower (or higher) degrees of information richness. Empirical examination has shown that trust impacts positively the use of both forms of knowledge transfer mechanisms.
- the theory of innovation adopter categories identified by Rogers – the author of the book “Diffusion of innovations”. In this context, it has been analyzed whether innovator adopters (earlier and later adopters) differ in terms of sales, size, age, and trust. Hereby, it has become clear that adopter categories differ only according to company size. Furthermore, it has been assumed that later adopters, preferring personal communication, adopt more likely richer knowledge transfer mechanisms, while earlier adopters, habitually focusing on impersonal mass media, use more likely leaner knowledge transfer mechanisms. Empirical results suggest the partial rejection of these hypotheses.

To complete, it has been investigated whether the choice of knowledge transfer mechanisms on the basis of the tacitness of knowledge or on the basis of the form of innovation adoption varies when trust comes into play. In this case it has emerged that no significant interaction effects exist.

German abstract

Italienische Industriedistrikte sind Beispiele besonders innovationsfreudiger, regionaler Produktionsnetzwerke, in denen sowohl ein effizienter Austausch kontextuellen Wissens als auch ausgeprägte Vertauensbeziehungen maßgeblich zum Wettbewerbsvorteil der lokalen Unternehmen beitragen. Obwohl es in der Literatur zahlreiche Untersuchungen zu Themen wie Wissensaustausch, Vertrauen und Innovation in Industriedistrikten gibt, sind es nur wenige Studien, die all diese Themenbereiche miteinander verknüpfen. So existiert nur eine limitierte Anzahl von Untersuchungen, die die Einflussfaktoren von Wissenstransfermechanismen untersuchen. Ziel der vorliegenden Arbeit ist es daher, auf der Basis einer ausführlichen Literaturrecherche genau diesen Aspekt des Wissensmanagements näher zu durchleuchten. Die vorliegende empirische Studie bezieht sich ausschließlich auf italienische Unternehmen, die im Mode- und Textilsektor tätig sind. Insgesamt konnten mit Hilfe einer Online-Befragung 165 ausgefüllte Fragebögen ausgewertet werden.

Die vorliegende Arbeit analysiert Wissenstransfermechanismen im Hinblick auf die Medienreichhaltigkeitstheorie, die zwischen wenig reichhaltigen Medien (E-mail, Fax, Briefe) und stark reichhaltigen Medien (persönliche Kommunikation, Meetings) unterscheidet. Diese Theorie wird in Beziehung gesetzt zu

- der Theorie der Wissensattribute (Kodifizierbarkeit, Lehrbarkeit, Komplexität), welche davon ausgeht, dass explizites Wissen aufgrund seiner geringen Komplexität und einfachen Kodifizierbarkeit und Lehrbarkeit leichter ausgetauscht werden kann als implizites Wissen. Die vorliegende Arbeit analysiert inwieweit der Transfer von impliziertem (oder explizitem) Wissen in einem verstärkten Gebrauch sehr (oder weniger) reichhaltiger Wissens-transfermechanismen resultiert. Die empirische Studie zeigt, dass nur Kodifizierbarkeit des Wissens einen signifikanten positiven Einfluss auf beide Formen von Wissenstransfermechanismen hat.
- dem Konzept des Vertrauens in Unternehmen. Es wird angenommen, dass Vertrauen (oder Misstrauen) den Gebrauch von weniger (oder sehr) reichhaltigen Transfermechanismen impliziert. Die Studie konnte aufgrund signifikanter Ergebnisse untermauern, dass Vertrauen einen positiven Einfluss auf beide Transfermechanismen ausübt.
- der Theorie der Innovationsadoption von Rogers, dem Autor des Buches „Diffusion of innovations“, der diverse Formen von Innovationsadoptionstypen aufzeigte. Die vorliegende Arbeit untersucht ob Unternehmen, die Innovationen sehr früh (oder spät) annehmen, eher zu gering (oder stark) reichhaltigen Wissenstransfermechanismen greifen. Die Untersuchung zeigte, dass späte Adoptoren beide Wissenstransfermechanismen verstärkt benutzen.

Abschließend wurde untersucht ob der Einfluss der Art des Wissens oder der Form der Innovationsadotion durch Vertrauen verstärkt wird. Die vorliegende Studie konnte keinerlei signifikante Beweise für die Existenz solcher Interaktionseffekte generieren.

APPENDIX C: ADDITIONAL INFORMATION

Data and information

Data[370] can be defined as "raw material", representing the precondition of information production and has been considered as "a set of discrete, objective facts about events [...] most usefully described as structured records of transactions."[371] With the help of technology systems data can be collected, stored and organized.

Information is defined as "a message usually in the form of a document or an audible or visible communication", and is destined "to shape the person who gets it, to make some difference in his outlook or insight."[372]

In industrial districts two different forms of information exist: (1) system information and (2) task information.[373] *System information* describes conditions of market demand, while *task information* pictures local manufacturing cycles and technological requirements inside a district. The right employment of these types of information is fundamental for the constant adaption of district firms to local environmental changes.

In respect to literature on innovation, Rogers (1995) distinguishes between two distinct forms of information, namely: (1) software information and (2) information on innovation evaluation.[374] While *software information* is incorporated in a technology and helps to decrease uncertainty about the "cause-effect relationships in achieving a desired outcome"[375], *information on innovation* evaluation is needed to reduce uncertainty about the introduction of an innovative technology.

[370] Davenport/Prusak, 2000, pp. 2-3

[371] Davenport/Prusak, 2000, p. 2

[372] Davenport/Prusak, 2000, p. 3

[373] Lombardi, 2000, p. 77

[374] Rogers, 1995, p. 14

[375] Rogers, 1995, p. 14

The SECI model

The so-called SECI model includes four knowledge creation processes, namely (1) socialization, (2) externalization, (3) internalization and (4) combination.[376] Dynamic engagement of these processes and social interaction among organizational members bring into action the so-called "spiral of knowledge creation".[377] According to Nonaka and Toyama (2003), the SECI processes can be described as follows:[378]

- The first way of knowledge creation consists in *socialization*. This model consists of "converting new tacit knowledge through shared experiences in day-to-day social interaction."[379] Hereby, individuals convert tacit knowledge into tacit knowledge by observing and imitating other individuals and "socialize" knowledge by practicing new knowledge inputs.
- The model referred to as *externalization* transforms tacit knowledge into codified knowledge and makes it thus transferable among organizational members by using, for example, images or codes.
- The third model consists in exchanging explicit knowledge among organizational members throughout diverse knowledge transfer mechanisms. Typical transfer mechanisms used in this process (referred to as *combination*) are computerized communication systems and databases.
- The model of knowledge creation is called *internalization*. In this model codified knowledge is transformed into tacit knowledge, for which training programmes, manuals and documents are common transfer mechanisms. Once knowledge has been transferred and understood by individuals, it is internalized. Then new knowledge can have an impact on the perception and behaviour of organizational members.

[376] Nonaka, 1991, pp. 98-99; Nonaka, 1994, pp. 18-20; Nonaka/Kono, 1998, pp. 42-45; Nonaka et al., 2000, pp. 9.-12; Nonaka/Toyama, 2003, pp.4-6;

[377] Nonaka, 1991, p. 99; Nonaka, 1994, p. 18

[378] Nonaka/Toyama, 2003, pp.4 - 6

[379] Nonaka/Toyama, 2003, p.4

The "Ba" model

Another model on knowledge creation has been elaborated by Nonaka and Konno (1998), the so-called concept of "Ba". According to the authors, the Japanese term "ba" can be translated as "a shared space for emerging relationships […] a platform for advancing individual and/or collective knowledge […] This space can be physical (e.g., office, dispersed business space), virtual (e.g., e-mail, teleconference), mental (e.g., shared experience, ideas, ideals) or any combination of them."[380] It is possible to differentiate between four different forms of "Ba", namely (1) originating Ba, (2) interacting Ba, (3) exercising Ba and (4) cyber Ba.[381]

- The *originating Ba* is the optimal place for socialization characterized by "care, love, trust, and commitment."[382] In this place individuals share common emotions, experiences and attitudes.
- The *interacting Ba* is similar to the externalization concept of the SECI model. It is a place where individuals share mental models through personal dialogue. Here tacit knowledge is transformed into explicit knowledge.
- The *exercising Ba* refers to the internalization stage of the SECI model. In this space, explicit knowledge is converted into tacit knowledge by "learning by doing".
- The *cyber Ba* corresponds to the combination model of the SECI process. It is a place where social interaction is not experienced in a real environment but in a virtual environment by using information technology systems.

The leadership model

According to this approach, distinct company-specific knowledge assets exist, representing the fundamental basis of any knowledge creation activity.[383] Knowledge assets are defined as "inputs, outputs and operating factors of knowledge-creating processes".[384] Nonaka et al. (2000) name four different types

[380] Nonaka/Konno, 1998, p. 40

[381] Nonaka/Konno, 1998, pp. 45-47; Nonaka et al., 2000, pp. 13-19; Nonaka/Toyama, 2003, pp. 6-9

[382] Nonaka/Konno, 1998, p. 46

[383] Nonaka et al., 2000, p. 20

[384] Nonaka et al., 2000, p. 20

of assets, namely (1) experiential knowledge assets, (2) conceptual knowledge assets, (3) routing knowledge assets, and (4) systematic knowledge assets.[385]

- *"Experiential knowledge assets"* refer to tacit assets that are generated through firsthand experience of internal and external organizational units. This asset category constitutes a crucial source of competitive advantage of companies, and includes five distinct types of knowledge, such as work-related knowledge (e.g., abilities and know-how), emotional knowledge (e.g., love and relief), physical knowledge (e.g., mimics and gestures), energetic knowledge (e.g., sense of enthusiasm and/or of existence), and rhythmic knowledge (e.g., improvisation and entrainment).
- *"Conceptual knowledge"* assets refer to explicit knowledge assets. They can be expressed in a direct way through language and/or in an indirect way through symbols and imagery.
- *"Routine knowledge assets"* are represented by systemized, documented and practice-oriented knowledge about goods, technologies, clientele and suppliers. Hereby, manuals, licenses and patents play a fundamental role in the creation of knowledge.
- *"Systematic knowledge assets"* incorporate tacit knowledge that has become routine in daily working life through shared culture, routines and patterns of thought.

Alternative models of innovation adopters

Apart from Rogers (1995), Peterson (1973) elaborates an alternative approach of innovation adopter categories.[386] It can be used when specific adoption dates are known. The scientist assumes that "adopters are permitted to 'determine' their own 'natural' categories, unconstrained by the imposition of some preconceived artificial or external framework."[387] This model incorporates both advantages and disadvantages. It is possible to identify exclusive and complete adopter types that are classified according to way they perceive themselves to be innovative. This

[385] Nonaka et al., 2000, pp. 21-22

[386] Peterson, 1973, p. 326

[387] Peterson, 1973, p. 326

model does not consider at all the form of diffusion distribution. Another advantage of this approach refers to the determination of a correct number of adopter categories, making this model suitable for all possible forms of innovations. But apart from these advantages there exist also limitations. In fact, Peterson (1973) points out that it is difficult to replicate and compare adopter categories across different types of innovation because of the intrinsic situation-specific nature of his model.

A more modern approach of adopter categorization is the technological readiness index (TRI). According to Parasuraman (2000), this index measures the readiness of individuals to use and adopt innovations, assuming that innovation and adoption depends on the perceived benefits of innovations, and on peoples' general predispositon to innovative technologies.[388]

Additional concepts of Rogers' innovation diffusion theory

Time

Diffusion theory has integrated the concept of time as an influencing factor in communication research.[389] Its importance is determined by the fact that the time an innovation needs to diffuse in a social system is determined by the characteristics of social forces inside the system that either accelerate or restrain the utilization of innovation.[390] Furthermore, time influences (1) the decision process related to innovation, (2) the degree of innovativeness of every single member of the social system, and (3) the adoption rate of an innovation itself.[391]

Innovation decision phases

Time plays thus a vital role in deciding whether or not to use innovation. This decision evolves along a five-stage-long process,[392] in which the individual judges step by step the newness and uncertainty related to a new technology.[393]

[388] Bowden/Corkindale, 2005, p. 565

[389] Kroeber-Riel/Weinberg, 2003, p. 678

[390] Katz, 1992, p. 195 in: Kroeber-Riel/Weinberg, 2003, p. 678

[391] Rogers, 1995, p. 20

[392] Rogers, 1995, p. 163

[393] Rogers, 1995, p. 161

These stages are (1) the knowledge phase, (2) the persuasion phase, (3) the decision phase, (4) the implementation phase, and (5) the confirmation phase.[394]

- During the *knowledge phase*[395] potential adopters get to know about the existence of an innovation. This phase can be either an accidental or an actively planned research process. When uncertainty is high, individuals tend to increase information research, trying to find satisfying answers to questions, such as: What is this innovation? How does it work? Why does it work? How can it be used?
- In the *persuasion phase*[396] individuals build up their own attitude towards the new product. Hereby, people judge the relative advantage, the compatibility, and the complexity of an innovation, by then comparing their opinions with those of other people. Finally, consequences of innovation adoption are evaluated. At his moment exchange of knowledge through interpersonal dialogue is preferred to impersonal mass media.
- In the *decision phase*[397] individuals evaluate the convenience of adopting an innovation, using diverse trial strategies, and focusing on opinion leaders and visual demonstrations.
- In the *implementation phase*[398] individuals want to adopt an innovation, they ask themselves: “Where do I obtain the innovation?”, “How do I use it?”, “How does it work?”, “What operational problems am I likely to encounter?”, “How can I solve them?”[399]
- The confirmation stage:[400] After the implementation of an innovation, some individuals need to reinforce their final decision. These individuals try to find further affirmative information.

[394] Rogers, 1995, p. 163

[395] Rogers, 1995, pp. 162-167

[396] Rogers, 1995, pp. 167-171

[397] Rogers, 1995, pp. 171-172

[398] Rogers, 1995, pp. 172-180

[399] Rogers, 1995, p. 173

[400] Rogers, 1995, pp. 180-185

Rate of adoption

The adoption rate of an innovation is defined as "the relative speed with which an innovation is adopted by members of a social system."[401] In general, it is assumed that if the rate of adoption of a successful innovation is graphically visualized, it has the form of a S-shaped curve.[402] In praxis, adoption rates vary also according to the different characteristics that every single innovation incorporates.[403] Hereby, Rogers (1995) describes five particular features of innovation, each of them appreciated differently by innovation adopters, namely (1) relative advantage, (2) compatibility, (3) complexity, (4) triability, and (5) observability.[404] According to this, the author states that the increase of the perceived degree of complexity of an innovation accelerates the adoption of an innovation.[405] Usually, the adoption of a new technology can be facilitated by offering customers innovations at reduced prices.[406] But apart from the economic factor price, also other factors such as observability, profitability, and social status have an impact on the rate of adoption.[407] In fact, especially in the fashion sector the social prestige of latest trends influences purchase decisions positively.[408] A new fashion trend is considered as a so-called "fad" - an innovation "that represents a relatively unimportant aspect of culture, which diffuses very rapidly, mainly for status reasons, and then is rapidly discontinued."[409]

Social system

A social system can be defined as "a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal"[410], whose members are

[401] Rogers, 2003, p. 221

[402] Rogers, 2003, p. 298

[403] Rogers, 1995, p. 15

[404] Rogers, 1995, pp. 15-16

[405] Rogers, 1995, pp. 15-16

[406] Rogers, 1995, p. 213

[407] Rogers, 1995, p. 214

[408] Rogers, 1995, p. 214

[409] Rogers, 1995, p. 214

[410] Rogers, 1995, p. 23

"individuals, informal groups, organizations, and/or subsystems".[411] The structure and particular characteristics of a social system have an impact on the diffusion of innovation in diverse modes. In fact, innovation adoption is impacted by shared communication practices and social regulations[412] as well as by opinion leaders and change agents.[413] In addition, different forms of decision-making can influence the diffusion progress, namely (1) optional decisions (independent decisions of single people), (2) collective decisions (consensual decisions of a group of people, (3) authority decisions (decisions made by people with high social position or technical expertise), and (4) contingent decisions (sequential decisions).[414] Lastly, innovation decision is impacted by the resulting consequences of innovations. In this sense Rogers (1995) differentiates between (1) desirable and undesirable[415], (2) direct and indirect[416], and (3) anticipated and unanticipated changes.[417]

[411] Rogers, 1995, p. 23

[412] Rogers, 1995, p. 24

[413] Rogers, 1995, pp. 26-28

[414] Rogers, 1995, pp. 28-30

[415] Rogers, 1995, p. 412

[416] Rogers, 1995, p. 415

[417] Rogers, 1995, p. 419

APPENDIX D: QUESTIONNAIRES

Original German questionnaire

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Betreff: Studie zum Thema ‚Wissensmanagement in Clusterunternehmen'

Sehr geehrte Frau Geschäftsführerin!
Sehr geehrter Herr Geschäftsführer!

Am Institut für Betriebswirtschaftslehre der Universität Wien (Lehrstuhl: Organisation und Planung) wird unter meiner Leitung ein Forschungsprojekt über ‚Wissensmanagement in Clusterunternehmen' durchgeführt. Dabei wird folgende Frage untersucht:

> *Welche Faktoren beeinflussen den Wissenstransfer zwischen den Partnerunternehmen im Cluster?*

Die Untersuchung wird mit Hilfe eines Fragebogens durchgeführt, der allen Partnerunternehmen im Cluster übermittelt wird. Die Ergebnisse dieser Studie sind nicht nur für die Wissenschaft von Bedeutung, sondern vor allem für das Management von Unternehmensnetzwerken. Wir ersuchen Sie daher höflichst, uns bei dieser wissenschaftlichen Untersuchung zu unterstützen und den beiliegenden Fragebogen auszufüllen.

Wir möchten uns für Ihre freundliche Unterstützung schon im Voraus recht herzlich bedanken. Wir werden Ihnen die **Ergebnisse nach Abschluss der Untersuchung** übermitteln.

Wien, am 29. Februar 2008

Mit freundlichen Grüßen
Josef Windsperger

WISSENSMANAGEMENT UND VERTRAUEN IN CLUSTERBEZIEHUNGEN

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Ihr Name und Aufgabenbereich:

Firmenname und Adresse:

Tel. Nr.

E-Mail:

Ziel des Fragebogens ist es, das Wissensmanagement österreichischer Clusterunternehmen zu untersuchen. Der Fragebogen besteht aus zwei Teilen:

A) Allgemeine Fragen zu Ihrem Unternehmen
B) Spezifische Fragen zu Wissenstransfer und Vertrauen

Nach Möglichkeit bitte ich Sie alle gestellten Fragen zu beantworten. Für etwaige Probleme beim Ausfüllen des Fragebogens stehe ich Ihnen gerne persönlich zur Verfügung: E-Mail: josef.windsperger@univie.ac.at, 004314277-38180.

Bitte kreuzen Sie jenes Feld an, das aus Ihrer Sicht der Unternehmenssituation am besten entspricht.

Ein BEISPIEL:	**Überhaupt nicht**				**In sehr großem Ausmaß**
In welchem Ausmaß nutzt unser Unternehmen das Internet beim Informationsaustausch mit anderen Clusterunternehmen?	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Je nachdem wie intensiv Ihr Unternehmen das Internet nutzt, kreuzen Sie bitte eine Zahl auf der Skala 1-5 an, wobei **1 überhaupt nicht** und **5 in sehr großem Ausmaß** bedeuten.

Alle erhobenen Daten werden streng vertraulich behandelt und nur in aggregierter Form verwendet. Anhand des Datenmaterials können keine Rückschlüsse auf einzelne Unternehmen gezogen werden. *2*

A) Allgemeine Fragen zu Ihrem Unternehmen

A1. Zu welchem Sektor innerhalb des Bau-Energie-Umwelt-Clusters gehört Ihr Unternehmen?

☐ Dienstleistung: Unternehmensberatung
☐ Dienstleistung: Instandhaltung / Service
☐ Dienstleistung: Training / Schulung / Personalentwicklung
☐ Dienstleistung: Sonstige
☐ Planung: Bauträger, Architekten, Planungsbüros
☐ Zulieferer: Baustoffe, Dämmstoffe, HKL-Komponenten, Energieanlagen
☐ Objektbau: Holzbau, Passiv- und Niedrigenergiehäuser
☐ Holzverarbeiter: Tischlerei, Zimmerer
☐ Handel / Vertrieb
☐ anderer Sektor. Welcher?

A2. Wie hoch war ca. Ihr Umsatz in Euro im Jahre 2006 in Österreich?

☐ unter 500.000 € ☐ zwischen 500.000 und 3 Millionen € ☐ zwischen 3 und 20 Millionen € ☐ zwischen 20 und 100 Millionen € ☐ über 100 Millionen €

A3. Anzahl der Mitarbeiter:

A4. Zeitpunkt des Eintritts in den Cluster:

B) Wissenstransfer und Vertrauen

B1. In welchem Ausmaß erfolgt der Informationsaustausch zwischen unserem Unternehmen und den Clusterpartnern mit Hilfe der folgenden Maßnahmen?	**Überhaupt nicht**				**In sehr großem Ausmaß**
Intranet	1☐	2☐	3☐	4☐	5☐
Chat-Systeme	1☐	2☐	3☐	4☐	5☐
Onlineforen	1☐	2☐	3☐	4☐	5☐
Newsgroups	1☐	2☐	3☐	4☐	5☐
E-mail	1☐	2☐	3☐	4☐	5☐
Internet: Sonstiges	1☐	2☐	3☐	4☐	5☐
Fax	1☐	2☐	3☐	4☐	5☐
Telefon	1☐	2☐	3☐	4☐	5☐
Briefverkehr	1☐	2☐	3☐	4☐	5☐
Videokonferenz	1☐	2☐	3☐	4☐	5☐
Seminare, Workshops	1☐	2☐	3☐	4☐	5☐
Ausschüsse	1☐	2☐	3☐	4☐	5☐
Informelle Treffen zwischen den Mitarbeitern	1☐	2☐	3☐	4☐	5☐
Rückgriff auf existierende Dokumente (z.B.: Statistiken, Artikel, Flyer)	1☐	2☐	3☐	4☐	5☐
Formelle Treffen der Clusterunternehmen (z.B.: Top-Manager, Abteilungsleiter)	1☐	2☐	3☐	4☐	5☐
Sonstiges:	1☐	2☐	3☐	4☐	5☐

Alle erhobenen Daten werden streng vertraulich behandelt und nur in aggregierter Form verwendet. Anhand des Datenmaterials können keine Rückschlüsse auf einzelne Unternehmen gezogen werden. *3*

B2. Welche der folgenden Aussagen treffen auf das von *uns an* die Partnerunternehmen weitergegebene Wissen zu?	**Überhaupt nicht**				**In sehr großem Ausmaß**
Ein Handbuch, das die Prozesse/Tätigkeiten zwischen uns und dem/den Partnerunternehmen beschreibt, kann erstellt werden bzw. ist bereits erstellt worden.	1☐	2☐	3☐	4☐	5☐
Durch Austausch von Mitarbeitern zwischen dem/den Partnerunternehmen und uns können sich diese leicht Wissen von uns aneignen.	1☐	2☐	3☐	4☐	5☐
Die Mitarbeiter des/der Partnerunternehmen können sich durch Schulung neues Wissen über uns schnell und einfach aneignen.	1☐	2☐	3☐	4☐	5☐
Die Mitarbeiter des/der Partnerunternehmen können durch das Lesen von Handbüchern neues Wissen über uns leicht erlernen.	1☐	2☐	3☐	4☐	5☐
Mitarbeiter des/der Partnerunternehmen können durch persönliche Unterstützung/Gespräche mit unseren Mitarbeitern die wichtigsten Prozesse/Tätigkeiten leicht erlernen.	1☐	2☐	3☐	4☐	5☐
Das Training der Mitarbeiter des/der Partnerunternehmen zum Erwerb von neuem Wissen ist eine schnelle und einfache Aufgabe.	1☐	2☐	3☐	4☐	5☐
In unserem Unternehmen gibt es detaillierte Aufzeichnungen über die Prozesse/Tätigkeiten zwischen uns und dem/den Partnerunternehmen.	1☐	2☐	3☐	4☐	5☐

B3. Welche der folgenden Aussagen treffen auf das von *uns vom* Partnerunternehmen erworbene Wissen zu?	**Überhaupt nicht**				**In sehr großem Ausmaß**
Ein Handbuch, das die Prozesse/Tätigkeiten zwischen uns und dem/den Partnerunternehmen beschreibt, kann erstellt werden bzw. ist bereits erstellt worden.	1☐	2☐	3☐	4☐	5☐
Durch Austausch von Mitarbeitern zwischen uns und dem/den Partnerunternehmen können sich diese leicht Wissen von dem/den Partner(n) aneignen.	1☐	2☐	3☐	4☐	5☐
Große Teile der Geschäftsprozesse/Tätigkeiten zwischen uns und dem/den Partnerunternehmen können mit dem Einsatz der Informationstechnologie durchgeführt werden.	1☐	2☐	3☐	4☐	5☐

Alle erhobenen Daten werden streng vertraulich behandelt und nur in aggregierter Form verwendet. Anhand des Datenmaterials können keine Rückschlüsse auf einzelne Unternehmen gezogen werden. 4

Unsere Mitarbeiter können sich durch Schulung neues Wissen über das/die Partnerunternehmen schnell und einfach aneignen.	1☐	2☐	3☐	4☐	5☐
Unsere Mitarbeiter können durch das Lesen von Handbüchern das Wissen über das/die Partnerunternehmen leicht erlernen.	1☐	2☐	3☐	4☐	5☐
Unsere Mitarbeiter können durch persönliche Unterstützung/Gespräche mit erfahrenen Mitarbeitern des/der Partnerunternehmen die wichtigsten Prozesse/Tätigkeiten leicht erlernen.	1☐	2☐	3☐	4☐	5☐
Das Training der Mitarbeiter zum Erwerb von neuem Wissen über den/die Partner ist eine schnelle und einfache Aufgabe.	1☐	2☐	3☐	4☐	5☐
In unserem Unternehmen gibt es detaillierte Aufzeichnungen über die Prozesse/Tätigkeiten zwischen uns und dem/den Partnerunternehmen.	1☐	2☐	3☐	4☐	5☐

B4. Bitte geben Sie an, ob folgende Aussagen auf die Beziehung zu Ihrem/Ihren Partner(n) zutreffen:	**Trifft überhaupt nicht zu**		**Trifft teilweise zu**		**Trifft vollständig zu**
Es herrscht großes Vertrauen zwischen uns und dem/den Partner(n).	1☐	2☐	3☐	4☐	5☐
Es herrscht eine Atmosphäre von Offenheit und Ehrlichkeit.	1☐	2☐	3☐	4☐	5☐
Der Informationsaustausch geht über das vereinbarte Ausmaß hinaus.	1☐	2☐	3☐	4☐	5☐
Die Zusammenarbeit beruht auf partnerschaftlicher Basis.	1☐	2☐	3☐	4☐	5☐
Wir halten uns an mündliche Vereinbarungen, auch wenn es zu unserem Nachteil sein könnte.	1☐	2☐	3☐	4☐	5☐
Die Vorschläge des/der Partner(s) zur Verbesserung der Zusammenarbeit werden gehört und diskutiert.	1☐	2☐	3☐	4☐	5☐
Die Vorschläge des/der Partner(s) zu Neuerungen werden gehört und diskutiert.	1☐	2☐	3☐	4☐	5☐

B5. Welche der folgenden Aussagen treffen auf das von uns an die Clusterpartner weitergegebene Wissen zu?	**Trifft überhaupt nicht zu**		**Trifft teilweise zu**		**Trifft vollständig zu**
Die Clusterpartner müssen eine Vielzahl von Tätigkeiten erlernen, um unser weitergegebenes Know How erfolgreich anwenden zu können.	1☐	2☐	3☐	4☐	5☐
Die Tätigkeiten zur Anwendung des weitergegebenen Know How sind sehr heterogen.	1☐	2☐	3☐	4☐	5☐
Die Tätigkeiten zur Anwendung des weitergegebenen Know How sind sehr schwierig.	1☐	2☐	3☐	4☐	5☐
Die Tätigkeiten zur Anwendung des weitergegebenen Know How sind sehr interdependent.	1☐	2☐	3☐	4☐	5☐
Unser weitergegebenes Know How kann leicht in Teilaufgaben zerlegt werden.	1☐	2☐	3☐	4☐	5☐
Die Teilaufgaben können leicht erlernt werden.	1☐	2☐	3☐	4☐	5☐

Wir möchten uns für Ihre freundliche Unterstützung recht herzlich bedanken. Bei Interesse übermitteln wir Ihnen nach Abschluss der Untersuchung gerne die Ergebnisse. Wenn Sie dies wollen, dann geben Sie bitte hier Ihre **Email-Adresse** an:

Bitte übermitteln Sie den ausgefüllten Fragebogen an:

UNIV. PROF. DR. JOSEF WINDSPERGER (UNIVERSITÄT WIEN)
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Sie finden den Fragebogen auch unter folgendem **Link**:

http://www.univie.ac.at/IM/de/index.html unter „NEWS“

Rubrik DG: DOMANDE GENERALI

[DG01] Text input
Dati Aziendali
"Dichiarazione dei dati aziendali (non obbligatoria):"

DG01_01 Nome e posizione aziendale
DG01_02 Ragione sociale e indirizzo
DG01_03 Telefono
DG01_04 E-Mail
Text input

[DG02] Selection
Settore di Attivita
"Poiché il seguente questionario si riferisce esclusivamente a imprese dei distretti industriali italiani nel..."

DG02 Settore di Attivita
1 = Produzione di tessuto
2 = Produzione di filato
3 = Lavorazione di pelle e cuoio e/o produzione di pelletteria/calzature
4 = Produzione di tessuti speciali
5 = Produzione di abbigliamento
6 = Maglificio
-9 = Not answered

[DG03] Selection
Giro di Affari
"A quanto ammontava il giro d'affari dell'impresa nell'anno 2010?"

DG03 Giro di Affari
1 = meno di 500.000 €
2 = tra 500.000 e 3 milioni di €
3 = tra 3 e 20 milioni di €
4 = tra 20 e 50 milioni di €
5 = più di 50 milioni di €
-9 = Not answered

[DG04] Text input
Numero di Dipendenti
"Numero totale di dipendenti e collaboratori dell'impresa:"

DG04_01 Numero di Dipendenti 1
Text input

[DG05] Text input
Inizio di Attivita
"Data inizio attività impresa:"

DG05_01 Inizio di Attivita 1
Text input

Rubrik DS: DOMANDE SPECIFICHE

[DS01] Scale (extremes labeled)
Channels
"Con quali strumenti e in quale misura avviene lo scambio di informazioni tra la Sua azienda e le altre a..."

DS01_01 Intranet
DS01_02 Piattaforme Chat
DS01_03 Forum Online
DS01_17 Social Networks (Twitter, Facebook...)
DS01_04 Newsgroup
DS01_05 E-mail
DS01_06 Internet: varie ed eventuali
DS01_07 Fax
DS01_08 Telefono
DS01_09 Corrispondenza
DS01_10 Videoconferenza
DS01_11 Seminari, Workshop
DS01_12 Comitato
DS01_13 Incontri informali tra i collaboratori
DS01_14 Ricorso a documenti esistenti (p.e.: statistiche, articoli, flyer)
DS01_15 Ricorso ad incontri formali tra i membri del distretto (p.e.: top-manager, caporeparto)
DS01_16 Altro

1 = per niente
5 = completamente
-9 = Not answered

[DS07] Text input
Altri Channels
"Se utilizza un´altro strumento di communicazione La prego di specificarlo:"

DS07_01 Altri Channels 1
Text input

[DS02] Scale (extremes labeled)
Modo di Trasmissione_1
"Come avviene la trasmissione di conoscenze dalla Sua azienda alle altre aziende del distretto industriale?"

DS02_01 È possibile creare, o è già stato creato un manuale che descrive i processi/attività tra la Sua azienda e le altre aziende del distretto.
DS02_02 L'apprendimento di conoscenze è facilitato dallo scambio di collaboratori tra le aziende del distretto.
DS02_03 Una buona parte dei processi/attività aziendali tra le imprese del distretto possono essere eseguiti usando nuove tecnologie di informazione.
DS02_04 Gli impiegati delle altre aziende del distretto possono apprendere facilmente conoscenze nuove relative alla Sua azienda attraverso corsi di formazione.
DS02_05 Gli impiegati delle altre aziende del distretto possono facilmente apprendere conoscenze nuove relative alla Sua azienda attraverso la lettura di manuali.
DS02_06 Gli impiegati delle altre aziende del distretto possono apprendere facilmente i più importanti attività riguardanti la Sua azienda attraverso un dialogo personale con i nostri impiegati.
DS02_07 Il training degli impiegati delle altre aziende del distretto, diretto all´acquisizione di nuove conoscenze, è un´operazione veloce e facile.
DS02_08 Nella Sua azienda si usa note dettagliate che descrivono i processi/attività tra la Sua azienda e le altre aziende deldistretto.

1 = per niente
5 = completamente
-9 = Not answered

[DS03] Scale (extremes labeled)
Modo di Trasmissione_2
"In che modo la Sua azienda acquisisce conoscenze dalle altre aziende del distretto?"

DS03_01 È possibile creare, o è già stato creato un manuale che descrive i processi/attività tra la Sua azienda e le altre aziende del distretto.

DS03_02 L'apprendimento di conoscenze è facilitato dallo scambio di collaboratori tra le aziende del distretto.

DS03_03 Una buona parte dei processi/attività aziendali tra le imprese del distretto possono essere eseguiti usando nuove tecnologie di informazione.

DS03_04 Gli impiegati della Sua azienda possono apprendere facilmente e velocemente conoscenze nuove relative alle altre imprese del distretto attraverso corsi di formazione.

DS03_05 Gli impiegati della Sua azienda possono apprendere conoscenze nuove sulle altre imprese del distretto attraverso la lettura di manuali.

DS03_06 Gli impiegati della Sua azienda possono apprendere facilmente i più importanti processi/ attività aziendali grazie ad un dialogo personale con impiegati esperti delle altre aziende del distretto.

DS03_07 Il training degli impiegati della Sua azienda diretto all´acquisizione di conoscenze nuove sulle altre aziende del distretto è un´operazione veloce e facile.

DS03_08 Nella Sua azienda si usa note dettagliate che descrivono i processi/attività tra la Sua azienda e le altre aziende.

1 = per niente
5 = completamente
-9 = Not answered

[DS04] Scale (extremes labeled)
Relazioni Distrettuali
"La preghiamo di precisare in quale misura le seguenti enunciazioni corrispondono alla relazione con il Suo p..."

DS04_01 Esiste una relazione di grande fiducia tra la Sua azienda e le altre aziende del distretto.

DS04_02 L'ambiente del distretto è caratterizzato da sincerità e correttezza.

DS04_03 I flussi di informazioni tra le aziende del distretto vanno oltre la dimensione concordata.

DS04_04 La collaborazione tra le aziende del distretto si fonda sulla collaborazione reciproca.

DS04_05 Rispettiamo accordi verbali anche se possono essere a nostro svantaggio.

DS04_06 Le proposte delle altre aziende del distretto relative al miglioramento della collaborazione vengono ascoltate e seguite.

DS04_07 Le proposte delle altre aziende del distretto relative a innovazioni e nuovi processi vengono ascoltate e discusse.

1 = per niente
5 = completamente
-9 = Not answered

[DS05] Scale (extremes labeled)
Compelxita
"La preghiamo di precisare in quale misura le seguenti enunciazioni relativamente alla conoscenza trasmessa d..."

DS05_01 Per poter applicare efficacemente il know-how trasmesso dalle altre aziende del distretto è necessario imparare tecniche e pratiche varie.

DS05_02 Le tecniche e pratiche che riguardano il ricorso al know-how trasmesso sono eterogenee.

DS05_03 Le tecniche e pratiche che riguardano il ricorso al know-how trasmesso sono molto complicate.

DS05_04 Le tecniche e pratiche che riguardano il ricorso al know-how trasmesso sono interdipendenti.

DS05_05 Il know-how trasmesso può essere facilmente suddiviso in compiti parziali.

DS05_06 I compiti parziali possono essere appresi facilmente.

1 = per niente
5 = completamente
-9 = Not answered

[DS06] Scale (extremes labeled)

Diffusione di Innovazione

"Riguardo all´adozione di nuove tecnologie, quale delle seguenti enunciazioni corrisponde al meglio al prop..."

DS06_01 Essendo consapevole di eventuali situazioni di incertezza e di rischio, la Sua impresa vuole essere una delle prime aziende del distretto ad adottare una nuova tecnologia.

DS06_02 Essendo consapevole di eventuali situazioni di incertezza e di rischio, la Sua impresa preferisce adottare una nuova tecnologia soltanto dopo che gli altri membri del distretto hanno esaminato e collaudato l'innovazione, verificandone il suo possibile successo.

DS06_03 La Sua impresa mantiene un controllo sostanziale di risorse finanziarie capaci di assorbire eventuali perdite dovute al fallimento di una innovazione.

DS06_04 La Sua impresa è generalmente scettica di fronte d'innovazione.

DS06_05 La Sua impresa decide in modo tradizionalista sulle innovazioni, affidandosi solo alla sua esperienza passata.

DS06_06 La Sua impresa generalmente apprende ed adotta facilmente il complesso know-how tecnico.

DS06_07 La Sua impresa può essere considerata opinion leader nel distretto industriale.

DS06_08 La Sua impresa gode di una prestigiosa posizione sociale all´interno del distretto industriale.

DS06_09 La Sua impresa coltiva rapporti sociali esclusivamente con membri del proprio distretto industriale.

DS06_10 La Sua impresa preferisce interagire maggiormente con membri del distretto che mostrano atteggiamenti ed interessi simili.

DS06_11 La Sua impresa cerca attivamente informazioni su nuove idee attraverso mass-media e/o un network interpersonale che va oltre i confini del distretto.

1 = per niente
5 = completamente
-9 = Not answered

APPENDIX E: ADDITIONAL SPSS OUTPUTS

Description of variables

Variable	*Response*	*Meaning*
FINISHED	0	Canceled
FINISHED	1	Finished
DG01		**Company data**
DG01_01	text input	Name
DG01_02	text input	Adress
DG01_03	text input	Telephone number
DG01_04	text input	E-Mail
DG02		**Business sector**
DG02	1	textile production
DG02	2	yarn production
DG02	3	leather and footwear production
DG02	4	special textile production
DG02	5	clothing production
DG02	6	knitwear production
DG02	-9	not answered
DG03		**Sales 2010**
DG03	1	less than 500.000 €
DG03	2	between 500.000 and 3 million €
DG03	3	between 3 and 20 million €
DG03	4	between 20 and 50 million €
DG03	5	more than 50 million €
DG03	-9	not answered
DG04	text input	**Number of employees**
DG05	text input	**Founding year**
DS01_01		**Communication channels**
DS01_01_01	scale 1-5	Intranet
DS01_01_02	scale 1-5	Platforms/chat systems
DS01_01_03	scale 1-5	Online forums
DS01_01_04	scale 1-5	Newsgroups
DS01_01_05	scale 1-5	E-Mail
DS01_01_06	scale 1-5	Internet: others
DS01_01_07	scale 1-5	Fax
DS01_01_08	scale 1-5	Telephone
DS01_01_09	scale 1-5	Exchange of letters
DS01_01_10	scale 1-5	Videoconferences
DS01_01_11	scale 1-5	Seminars, workshops

Variable	*Response*	*Meaning*
DS01_01_12	scale 1-5	Boards
DS01_01_13	scale 1-5	Informal meetings of collaborators
DS01_01_14	scale 1-5	Existing documents (e.g. Statistics, articles, flyers)
DS01_01_15	scale 1-5	Formal meetings of district members (top-managers, district managers)
DS01_01_17	scale 1-5	Social networks
DS01_01_16	scale 1-5	Others
DS07_01	text input	Example for others
DS02		**Knowledge transfer to other district firms**
DS02_01	scale 1-5	It is possible to create or it has been already created a handbook that describes inter-firm processes/activities
DS02_02	scale 1-5	By exchanging employees between your company and partner companies, it is easy to transfer knowledge
DS02_03	scale 1-5	A great part of business processes/activities between your company and partner firms are conducted by using information technologies
DS02_04	scale 1-5	In trainings partner firms' employees can accumulate new knowledge about your company quickly and easily
DS02_05	scale 1-5	Employees can accumulate new knowledge easily by reading manuals
DS02_06	scale 1-5	Employees can easily learn the most important activities/processes with the help of personal dialogue with experienced collaborators
DS02_07	scale 1-5	The training of employees to acquire new knowledge about the business partners is a quick and easy task
DS02_08	scale 1-5	There exist detailed notes that describe the business processes and activities between your company and partner firms
DS03		**Knowledge transfer from other district firms**
DS03_01	scale 1-5	It is possible to create or it has been already created a handbook that describes inter-firm processes/activities
DS03_02	scale 1-5	By exchanging employees between your company and partner companies, it is easy to transfer knowledge
DS03_03	scale 1-5	A great part of business processes/activities between your company and partner firms are conducted by using information technologies
DS03_04	scale 1-5	In trainings your employees can accumulate new knowledge about partner companies quickly and easily
DS03_05	scale 1-5	Your employees can accumulate new knowledge of other district firms easily by reading manuals
DS03_06	scale 1-5	Your employees can easily learn the most important activities/processes of other district companies with the help of personal dialogue with experienced collaborators of partner firms
DS03_07	scale 1-5	The training of employees to acquire new knowledge about the business partners is a quick and easy task
DS03_08	scale 1-5	There exist detailed notes that describe the business processes and activities between your company and partner firms
DS04		**Trust**
DS04_01	scale 1-5	There is a distinct relationship of trust between your company and your business partners inside the district
DS04_02	scale 1-5	There prevails an atmosphere of openness and honesty between your company and your business partners inside the district
DS04_03	scale 1-5	The exchange of information inside the district goes beyond the stipulated extent
DS04_04	scale 1-5	The collaboration between your company and business partners inside the district relies on a cooperative basis

Variable	*Response*	*Meaning*
DS04_05	scale 1-5	We comply with verbal agreements, even if these could be at our disadvantage
DS04_06	scale 1-5	The recommendations of your partners with the goal to enhance collaboration are usually heard and discussed inside the district
DS04_07	scale 1-5	The recommendations of your business partners in terms of alteration/innovation are heard and discussed inside the district
DS05		**Complexity**
DS05_01	scale 1-5	District partners must learn a vast amount of activities, in order to be able to adopt successfully the from us transmitted know-how
DS05_02	scale 1-5	The techniques and methods used to adopt transmitted know-how are heterogeneous
DS05_03	scale 1-5	The techniques and methods used to adopt transmitted know-how are very difficult
DS05_04	scale 1-5	The techniques and methods used to adopt transmitted know-how are highly interdependent
DS05_05	scale 1-5	It is easy to decompose transmitted know-how into single subtasks
DS05_06	scale 1-5	Subtasks can be learned easily
DS06		**Innovation Adoption**
DS06_01	scale 1-5	Being aware of possible uncertainties and risks, your company wants to be always the first district firm that adopts a new technology
DS06_02	scale 1-5	Being aware of possible uncertainties and risks, your company prefers to adopt a new technology only after the other district firms have examined and approved the innovation, verifying its possible success
DS06_03	scale 1-5	Your company has substantial financial resources that enable you to absorb the possible losses of a failed innovation
DS06_04	scale 1-5	Your company is in general skeptical in front of new technologies
DS06_05	scale 1-5	Your company's decision to adopt an innovation is based on traditional behaviour and past experiences
DS06_06	scale 1-5	In general your company learns and uses complex technological know-how easily
DS06_07	scale 1-5	Your company can be considered as an opinion leader inside the district
DS06_08	scale 1-5	Your company holds a prestigious social position among district firms
DS06_09	scale 1-5	Your company cultivates social relationships exclusively with district members
DS06_10	scale 1-5	Your company prefers to interact primarily with district firms that have similar interests and attitudes
DS06_11	scale 1-5	Your company searches actively new ideas, using mass media and/or interpersonal networks that go also beyond the district borders

Comparison between two samples

Mann-Whitney-Test

Ranks

	REGION	N	Mean Rank	Sum of Ranks
SALES (classes)	1 PRATO	33	57.76	1906.00
	2 other districts	125	85.24	10655.00
	Total	158		
SIZE	1 PRATO	30	39.53	1186.00
	2 other districts	123	86.14	10595.00
	Total	153		
AGE	1 PRATO	24	53.94	1294.50
	2 other districts	87	56.57	4921.50
	Total	111		

Test Statistics (a)

	SALES (classes)	SIZE	AGE
Mann-Whitney-U	1345.000	721.000	994.500
Wilcoxon-W	1906.000	1186.000	1294.500
Z	-3.367	-5.167	-0.355
Asymp. Sig. (2-tailed)	0.001	0.000	0.723

a Group variable: REGION

Mean values

Case Processing Summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
SALES (classes) * REGION	158	95,8%	7	4.2%	165	100.0%
SIZE * REGION	153	92.7%	12	7.3%	165	100.0%
AGE* REGION	111	67.3%	54	32.7%	165	100.0%

Report

REGION		SALES (classes)	SIZE	AGE
1 PRATO	Mean	2.33	25.77	31.7500
	N	33	30	24
	Std. Dev.	0.854	43.438	16.94557
	Median	2.00	12.50	32.0000
2 other districts	Mean	2.86	85.99	41.4368
	N	125	123	87
	Std. Dev.	0.817	196.044	38.86072
	Median	3.00	35.00	32.0000
Total	Mean	2.75	74.18	39.3423
	N	158	153	111
	Std. Dev.	0.850	178.279	35.45073
	Median	3.00	31.00	32.0000

Mann-Whitney-Test

Ranks

	REGION	N	Mean Ranks	Sum of Ranks
KTM_HIR	1 PRATO	25	73.86	1846.50
	2 other districts	108	65.41	7064.50
	Total	133		
KTM_LIR	1 PRATO	33	86.36	2850.00
	2 other districts	126	78.33	9870.00
	Total	159		

Test statistics (a)

	KTM_HIR	KTM_LIR
Mann-Whitney-U	1178.500	1869.000
Wilcoxon-W	7064.500	9870.000
Z	-1.000	-0.893
Asymp. Sig. (2-tailed)	.317	.372

a Group variable: REGION

Mean values

Case processing summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
KTM_HIR * REGION	133	80.6%	32	19.4%	165	100.0%
KTM_LIR * REGION	159	96.4%	6	3.6%	165	100.0%

Report

REGION		KTM_HIR	KTM_LIR
1 PRATO	Mean	2.1667	2.7009
	N	25	33
	Std. Dev.	1.34306	1.13689
	Median	1.5000	2.3333
2 other districts	Mean	1.6852	2.4684
	N	108	126
	Std. Dev.	0.79632	0.89988
	Median	1.5000	2.3333
Total	Mean	1.7757	2.5166
	N	133	159
	Std. Dev.	0.93683	0.95466
	Median	1.5000	2.3333

Variable INNO_GROUP

Frequencies

Statistics

INNO_GROUP

N	Valid	127
	Missing	38

INNO_GROUP

		Frequencies	Percent	Valid Percent	Cumulative Percent
Valid	Later adopters	82	49.7	64.6	64.6
	Earlier adopters	45	27.3	35.4	100.0
	Total	127	77.0	100.0	
Missing	System	38	23.0		
Total		165	100.0		

Mean values

Case processing summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
DS06_01 * INNO_GROUP	123	74.5%	42	25.5%	165	100.0%
DS06_02 * INNO_GROUP	121	73.3%	44	26.7%	165	100.0%
DS06_03 * INNO_GROUP	123	74.5%	42	25.5%	165	100.0%
DS06_04 * INNO_GROUP	120	72.7%	45	27.3%	165	100.0%
DS06_05 * INNO_GROUP	121	73.3%	44	26.7%	165	100.0%
DS06_06 * INNO_GROUP	120	72.7%	45	27.3%	165	100.0%
DS06_07 * INNO_GROUP	120	72.7%	45	27.3%	165	100.0%
DS06_08 * INNO_GROUP	120	72.7%	45	27.3%	165	100.0%
DS06_09 * INNO_GROUP	120	72.7%	45	27.3%	165	100.0%
DS06_10 * INNO_GROUP	121	73.3%	44	26.7%	165	100.0%
DS06_11 * INNO_GROUP	120	72.7%	45	27.3%	165	100.0%

Report

INNO_GROUP		DS06_01	DS06_02	DS06_03	DS06_04	DS06_05	DS06_06	DS06_07	DS06_08	DS06_09	DS06_10	DS06_11
Later adopters	Mean	2,23	2,45	1,95	1,74	2,64	2,23	2,35	2,01	2,19	3,27	2,61
	N	79	77	80	77	77	77	77	77	78	78	76
	Std. Dev.	,891	1,176	,884	1,056	1,050	,826	,914	,835	1,094	,921	1,234
	Median	2,00	2,00	2,00	1,00	3,00	2,00	2,00	2,00	2,00	3,00	2,00
Earlier adopters	Mean	4,00	3,36	3,79	3,12	3,16	3,58	4,47	3,44	3,00	2,53	4,30
	N	44	44	43	43	44	43	43	43	42	43	44
	Std. Dev.	,863	1,526	1,146	1,721	1,311	,906	,855	,908	1,667	,882	1,002
	Median	4,00	3,50	4,00	3,00	4,00	4,00	5,00	3,00	3,00	3,00	5,00
Totalt	Mean	2,86	2,79	2,59	2,23	2,83	2,72	3,11	2,53	2,48	3,01	3,23
	N	123	121	123	120	121	120	120	120	120	121	120
	Std. Dev.	1,224	1,380	1,317	1,482	1,174	1,070	1,352	1,100	1,372	,970	1,411
	Median	3,00	3,00	2,00	2,00	3,00	3,00	3,00	3,00	2,00	3,00	3,00

KTM versus INNO_GROUP

Kolmogorov-Smirnov test

		DS01_01	DS01_02	DS01_03	DS01_04	DS01_05	DS01_06	DS01_07	DS01_08	DS01_09	DS01_10	DS01_11	DS01_12	DS01_13	DS01_14	DS01_15	DS01_16	DS01_17
N		122	116	113	115	154	126	148	153	132	115	119	113	133	115	124	88	115
Normal Parameters (a.b)	Mean	1.71	1.28	1.16	1.37	4.12	2.89	3.17	4.08	2.50	1.25	1.63	1.33	3.23	1.79	2.19	1.53	1.22
	Std. Dev.	1.289	0.764	0.621	0.958	0.956	1.476	1.209	0.932	1.195	0.747	0.882	0.839	1.341	1.013	1.241	1.028	0.659
Most extreme differences	Absolute	0.431	0.494	0.513	0.492	0.238	0.193	0.194	0.248	0.193	0.502	0.326	0.484	0.147	0.304	0.227	0.426	0.499
	Positive	0.431	0.494	0.513	0.492	0.178	0.193	0.124	0.163	0.193	0.502	0.326	0.484	0.146	0.304	0.227	0.426	0.499
	Negative	-0.290	-0.359	-.399	-.352	-0.238	-0.163	-0.194	-0.248	-0.132	-0.368	-0.237	-0.348	-0.147	-.217	-0.168	-0.302	-0.371
Kolmogorov-Smirnov-Z		4.764	5.325	5.451	5.275	2.950	2.170	2.365	3.067	2.212	5.380	3.553	5.141	1.701	3.264	2.529	3.993	5.348
Asymp. Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000

Mann-Whitney test

Ranks

	INNO_GROUP	N	Mean Ranks	Sum of Ranks
DS01_01	Later adopters	63	50.96	3210.50
	Earlier adopters	34	45.37	1542.50
	Total	97		
DS01_02	Later adopters	59	48.39	2855.00
	Earlier adopters	34	44.59	1516.00
	Total	93		
DS01_03	Later adopters	57	47.34	2698.50
	Earlier adopters	35	45.13	1579.50
	Total	92		
DS01_04	Later adopters	58	48.85	2833.50
	Earlier adopters	34	42.49	1444.50
	Total	92		

DS01_05	Later adopters	81	59.10	4787.00
	Earlier adopters	41	66.24	2716.00
	Total	122		
DS01_06	Later adopters	65	59.95	3896.50
	Earlier adopters	38	38.41	1459.50
	Total	103		
DS01_07	Later adopters	78	64.29	5015.00
	Earlier adopters	40	50.15	2006.00
	Total	118		
DS01_08	Later adopters	79	57.92	4575.50
	Earlier adopters	42	66.80	2805.50
	Total	121		
DS01_09	Later adopters	67	56.91	3813.00
	Earlier adopters	38	46.11	1752.00
	Total	105		
DS01_10	Later adopters	59	50.79	2996.50
	Earlier adopters	35	41.96	1468.50
	Total	94		
DS01_11	Later adopters	60	49.45	2967.00
	Earlier adopters	35	45.51	1593.00
	Total	95		
DS01_12	Later adopters	59	50.62	2986.50
	Earlier adopters	35	42.24	1478.50
	Total	94		
DS01_13	Later adopters	71	49.39	3507.00
	Earlier adopters	38	65.47	2488.00
	Total	109		
DS01_14	Later adopters	61	54.98	3354.00
	Earlier adopters	34	35.47	1206.00
	Total	95		
DS01_15	Later adopters	65	54.93	3570.50
	Earlier adopters	34	40.57	1379.50
	Total	99		
DS01_16	Later adopters	42	39.99	1679.50
	Earlier adopters	31	32.95	1021.50
	Total	73		
DS01_17	Later adopters	57	48.51	2765.00
	Earlier adopters	34	41.79	1421.00
	Total	91		

Test statistics (a)

	DS01_01	DS01_02	DS01_03	DS01_04	DS01_05	DS01_06	DS01_07	DS01_08	DS01_09	DS01_10	DS01_11	DS01_12	DS01_13	DS01_14	DS01_15	DS01_16	DS01_17
Mann-Whitney-U	947.500	921.000	949.500	849.500	1466.000	718.500	1186.000	1415.500	1011.000	838.500	963.000	848.500	951.000	611.000	784.500	525.500	826.000
Wilcoxon-W	1542.500	1516.000	1579.500	1444.500	4787.000	1459.500	2006.000	4575.500	1752.000	1468.500	1593.000	1478.500	3507.000	1206.000	1379.500	1021.500	1421.000
Z	-1.199	-1.086	-0.790	-1.824	-1.131	-3.633	-2.200	-1.423	-1.799	-2.451	-0.755	-2.199	-2.606	-3.569	-2.472	-1.756	-2.074
Asymp. Sig. (2-tailed)	0.230	0.278	0.429	0.068	0.258	0.000	0.028	0.155	0.072	0.014	0.451	0.028	0.009	0.000	0.013	0.079	0.038

a Group variable: INNO_GROUP

Mean values

Case processing summary

	Cases					
	Included		Excluded		Total	
	N	Percent	N	Percent	N	Percent
DS01_06 * INNO_GROUP	103	62.4%	62	37.6%	165	100.0%
DS01_07 * INNO_GROUP	118	71.5%	47	28.5%	165	100.0%
DS01_10 * INNO_GROUP	94	57.0%	71	43.0%	165	100.0%
DS01_12 * INNO_GROUP	94	57.0%	71	43.0%	165	100.0%
DS01_13 * INNO_GROUP	109	66.1%	56	33.9%	165	100.0%
DS01_14 * INNO_GROUP	95	57.6%	70	42.4%	165	100.0%
DS01_15 * INNO_GROUP	99	60.0%	66	40.0%	165	100.0%
DS01_17 * INNO_GROUP	91	55.2%	74	44.8%	165	100.0%

Report

INNO_GROUP		DS01_06	DS01_07	DS01_10	DS01_12	DS01_13	DS01_14	DS01_15	DS01_17
Later adopters	Mean	3.26	3.40	1.42	1.46	3.08	2.15	2.37	1.28
	N	65	78	59	59	71	61	65	57
	Std. Dev.	1.361	1.132	0.932	0.953	1.168	1.108	1.167	0.750
	Median	3.00	3.50	1.00	1.00	3.00	2.00	2.00	1.00
Earlier adopters	Mean	2.13	2.75	1.09	1.11	3.71	1.41	1.82	1.03
	N	38	40	35	35	38	34	34	34
	Std. Dev.	1.474	1.428	0.507	0.471	1.523	0.821	1.193	0.171
	Median	1.00	3.00	1.00	1.00	4.00	1.00	1.00	1.00
Total	Mean	2.84	3.18	1.30	1.33	3.30	1.88	2.18	1.19
	N	103	118	94	94	109	95	99	91
	Std. Dev.	1.500	1.272	0.814	0.822	1.330	1.071	1.198	0.613
	Median	3.00	3.00	1.00	1.00	3.00	2.00	2.00	1.00