MSc. BUSINESS ADMINISTRATION

THE ROLE AND CONTRIBUTION OF CREATIVE INDUSTRIES AS AN ENABLER OF INNOVATION IN THE CITY OF BERLIN: AN ANALYSIS OF PAST AND CURRENT PERFORMANCE AND PREDICTIONS OF THE FUTURE

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Abstract

Creative industries tend to cluster in larger cities and are known as drivers of innovation. Their innovativeness is discussed in the context of an open and collaborative innovation process and it is argued that the close proximity of firms contributes to creative industries competitive advantage due to the easier knowledge and economic exchange with various partners. The external environment – including the diversity of people, the easier access of qualified labor as well as the activities of urban life – positively influences the innovation process of creative industries and the respective innovation output. Creative industries' innovation output includes product and process innovation, but also innovative business models, market innovation and technological innovation. Linking the concepts of creative industries to the concept of clusters, innovation and networks this study argues that horizontal and vertical collaboration in the innovation process of creative industries has an influence on their innovation output. A quantitative analysis of Berlin's creative industries provides empirical evidence.

Keywords: Berlin, creative industries, creative cluster, collaboration, innovation

Executive summary

What is the relationship between the horizontal and vertical collaboration activities in the innovation process of firms in creative industries in Berlin and their innovation output? This study explores the collaboration behavior in the innovation process of creative industries with regard to their innovation output. It bases on a quantitative analysis of 361 firms from five different sectors of Berlin's creative industries from which the statistical data is retrieved from the Berlin Innovation Survey 2012.

In the context of cities creative industries tend to establish in clusters. Scientists, policy and decision-makers have identified creative industries as drivers of innovation, because they influence the city's development by means of their innovation output. This includes product and process innovation, but also innovative business models, market innovation and technological innovation. The innovation output of creative industries based on their ability of using creativity and generating symbolic meaning, both which result in intellectual property embodied in creative goods and services.

In creative clusters two dimensions are identified in which creative industries collaborate - vertical and horizontal. Vertical collaboration partners are classified as universities and research institutions, suppliers, customers and clients whereas horizontal collaboration partners are defined as competitors. The innovativeness of creative industries is linked to their (open) innovation process which is subdivided into five different phases: idea generation, R&D/construction, product design, testing and market launch. It is argued that vertical and horizontal collaboration during the innovation process of creative industries influences the respective innovation output (product and process innovation).

The close proximity of firms in creative clusters contributes to creative industries competitive advantage, because they benefit from the knowledge and economic exchange with various partners in the economy. Therefore, governmental institutions of cities work on policies and guidelines which promote and support the development and the networking activities of creative industries.

The study's empirical findings (from descriptive and regression analysis) mainly confirm the propositions from the literature. Further, the results demonstrate that firms in Berlin's creative industries collaborate in the innovation process with partners on both (vertical and horizontal) dimensions. Vertical collaboration in the innovation process of creative industries contributes to the development of product and process innovation. In four phases (idea generation, testing, product design, R&D/construction) of the product innovation process of creative industries a positive and significant relationship to vertical collaboration is found. Process innovation in relationship to vertical collaboration during all phases of the innovation process of creative industries demonstrates a positive and significant link.

Other than expected horizontal collaboration indicates no relationship to product innovation during four phases (idea generation, product design, testing and market launch) of the innovation process of creative industries. However, it is interesting that there is one exception, namely a positive effect of horizontal collaboration during the phase R&D/construction in the innovation process of creative industries on product innovation. Nevertheless, horizontal collaboration in the innovation process of creative industries shows significant linkages to their innovation output mainly with regard to process innovation.

Hence, this study encourages policy and decision-makers in the city of Berlin to further promote collaboration of creative industries through policies and guidelines. This is related to linkages on the vertical dimension including suppliers, clients, customers and also

universities/research institutes. Additionally, it is recommended to further develop programs in which effective working and collaboration mechanisms are supported which contribute to each of the phases of the innovation process. Moreover, policies and guidelines on the horizontal dimensions should be further promoted with regard to process innovations of creative industries. This could be for instance, through networking activities in which firms in creative industries are able to improve standards, strengthen their position on the market and enhance their innovation projects.

However, due to the diversity of Berlin's creative cluster characterized by a large landscape of subsectors, it is suggested that policies and guidelines need to be developed for each sector to address the needs of these firms and to promote their innovation potential.

Content

Figures and tables

Index of abbreviations

1. BIS – Berlin Innovation Survey
2. CEER – Center of European Economic Research
3. Pr – Predicted probability
4. r - coefficient
5. R&D – Research and development
6. SME – Small and medium sized enterprises
7. ß – Cumulative distribution function of the standard probability function
8. UK – United Kingdom
9. x – Independent variable
10. y – Dependent variable
11. Φ – Standard cumulative normal probability

I. INTRODUCTION

1.1 Relevance of the research

In 2011, the local government of the region Berlin-Brandenburg agreed on an innovation strategy which supports the development of business clusters. One of these clusters refers to Berlin's creative industries (Senatsverwaltung für Wirtschaft, Technologie und Forschung, 2012). The governance aims to create synergies in the city by promoting networks. In this regard, research on the impact of vertical and horizontal collaboration in the innovation process is of a particular relevance.

Creative industries include a diverse spectrum of activities dealing with art and culture, but also with business and technology (Kimpeler & Georgrieff). Firms of this industry indicate a high innovation potential, because they are operating in various fields such as marketing, distribution, production or design (Bakshi & McVittie, 2009). The creative sector is characterized by being clustered in cities. Reasons are that creative industries take advantage of their environment and that they have the opportunity to interact with different stakeholders in the innovation process (Wu, 2005). Creative industries contribute to cities and regions through their business activities by means of their innovation output in forms of creative goods, services and processes (Müller, Rammer, & Trüby, 2009). This is achieved through the exchange of knowledge with various actors inside and outside their cluster.

With regard to the city of Berlin, creative industries have become an essential location and economic factor for the German capital. It is known as pulsating creative urban area that contributes to the development of new ideas and sets trends for business and society (Berliner Senate, 2013). In comparison to other German metropolises, Berlin is equipped with a large and diverse landscape of creative industries (Berliner Senate, 2008). Branches such as architecture, engineering, film, art, literature, journalism, music, fashion, broadcasting, design, games, software and multimedia and telecommunication, advertising, public relations, consulting and market research belong to it (Bakshi & McVittie, 2008; Berliner Senate, 2008; Martens, 2011). Based on their ability to generate intellectual property, all of these industries are producers of creative goods and services (Handke, 2004; Stoneman, 2010).

This study relates to the theory of creative industries and their linkages to innovation. It is based on a quantitative analysis of data raised in the course of the Berlin Innovation Survey (BIS) 2012 (see Appendix 2). The aim of this research is to explore whether vertical and

horizontal collaboration in the innovation process of Berlin's creative industries contributes to their innovation output. In particular, it is tested whether variables of (vertical and horizontal) collaboration partnerships in different phases of the innovation process indicate a significant link to creative industries' products and processes. The methodological approach consists of a regression model, an approach that is regularly used in the literature on innovation and particularly on creative industries. The sample consists of 361 firms in creative industries located in the city of Berlin.

This paper identifies gaps in the research dealing with the collaboration activity of creative industries related to their own innovation outputs. Despite the fact that the city of Berlin is known as a creative city (Lange, Kalandides, Stöber, & Mieg, 2008), few empirical research exists regarding the innovation activity of creative industries and their economic contribution to the city of Berlin. To the best of the author's knowledge, the present paper is the first to address this gap in prior research. It provides an outlook of collaboration partnerships in the innovation process and their contribution to innovation in the city of Berlin. Hence, it may eventually even have implications for Berlin's guidelines and policies towards its creative cluster strategy programs.

1.2 Research question

In the literature only a few studies deal with the collaboration activity in the innovation process of creative industries and its relationship to the innovation output. With regard to the city of Berlin, its image titled as a creative city and well known of its creative industries motivates to conduct this study by using data from Berlin enterprises which belong to the creative cluster.

In particular, the following research question is addressed in this study:

What is the relationship between the horizontal and vertical collaboration activities in the innovation process of firms in creative industries in Berlin and their innovation output?

Sub-questions are formulated as follows:

- Which kinds of collaboration networks exist in the innovation process of Berlin's creative industries?
- Which kinds of innovations are achieved by Berlin's creative industries?
- In which phases of the innovation process do firms in creative industries collaborate with network partners?

1.3 Structure of the research

In developing the theory, two general approaches were taken into consideration. These were deductive and inductive reasoning.

Inductive methods of reasoning start with an empirical data analysis (Alasuutari, Bickman, & Brannen, 2008). Based on specific observations from the data analysis researchers continue to develop general propositions and theoretical concepts which are linked to the identified observations (Alasuutari, Bickman, & Brannen, 2008). The inductive research type is common when doing qualitative research (Thomas, 2006) and is linked to a bottom-up-strategy (Alasuutari, Bickman, & Brannen, 2008).

In contrast, deductive methods of reasoning contain a top-down strategy (Alasuutari, Bickman, & Brannen, 2008). The researcher starts with a general topic of interest and acquires information from the relevant literature. Based on the theory, hypotheses are developed before data is collected for their verification (Alasuutari et al., 2008). The deductive approach is widely used when dealing with quantitative methodology (Thomas, 2006).

Taking these two methods of reasoning into consideration this thesis was designed as deductive research. The author of this thesis decided to start with the theory of creative industries linked to cities, innovation and collaboration and based on these findings to develop hypotheses with regard to the collaboration activity in the innovation process of creative industries and their relationship to their innovation output in the city of Berlin.

Thus, the thesis is structured as follows: The next section (Chapter 2) starts with the theoretical background of the study. It presents the concept of creative industries and characteristics of their goods and services. Furthermore, it deals with creative industries and innovation in the context of cities. Additionally, it presents characteristics of creative industries in the city of Berlin. Further, it deals with types of innovation and the innovation process in relation to creative industries and discusses empirical studies of creative industries linked to innovation.

In Chapter 3 the theoretical framework for the research is developed. It investigates in a broader context the theory of networks applied to creative industries and hypotheses are derived.

Chapter 4 illustrates the methodology of this study, including the research model, the dependent and independent variables, as well as the means of data collection and data analysis. The latter is divided in three parts. Firstly, a descriptive analysis is conducted in order to get insights about key characteristics of conducted variables. This includes firms and innovation characteristics in creative industries in the city of Berlin. The descriptive statistic is based on an univariate analysis and is tested for central tendency (Lewis-Beck, 1995; Walsh, 1990). Secondly, a correlation analysis is used to test data validity and reliability. Furthermore, it checks whether a relationship between independent and dependent variables exists. Thirdly, to give powerful statements regarding the results of hypotheses a suitable type of regression model is evaluated and applied.

In Chapter 5, results of the investigation are presented. This includes results of the descriptive and econometric analysis.

Finally, Chapter 6 discusses the key findings, practical implication and limitations of this research. Additionally, it provides an outlook for further research.

II. LITERATURE REVIEW

2.1 Creative industries

2.1.1 Definitions of creative industries

Comparing the definitions from the literature on the one hand, and the governmental level on the other, it gets clear that to the best of the author's knowledge no standard definition exists. However, there are two widely used terminologies. These are cultural industries and creative industries, both of which show certain similarities (Cunningham, 2002; Fesel & Söndermann, 2007; O'Connor, 2000; Throsby, 2008)

One of the differences between these two definitions is the wording. The term cultural industries stresses the importance of cultural aspects, whereas the term creative industries rather focuses on creativity (Fesel & Söndermann, 2007; Throsby, 2008).

Both definitions focus on firms' goods and services. Cultural goods are related to cultural content which is either explained in the context of art, symbolic meanings or values (O'Connor, 2000; Throsby, 2008). The concept of creative industries is related to creativity in the context of individuality and differentiation of creative goods and services (Fesel & Söndermann, 2007; Throsby, 2008).

Creative industries are often regarded as an extension of the definition of cultural industries (Throsby, 2008). Cultural industries are mostly identified in classical sectors such as "arts, crafts, antiques, architecture" (Cunningham, 2002, p.54) and commercial businesses such as broadcast, media and film. Creative industries, however, are interpreted to link the paradigm shift to sectors of the new economy such as information and communication technologies (Hutton, 2003) and the digital market (Cunningham, 2002).

A broad definition in the academic literature classifies creative industries as a sector which belongs to copyright, design, patents and trademarks (Howkins, 2001, as cited by Cunningham, 2002, p. 54). Throsby (2008) defines a creative industry "simply as one where some input of creativity is required in its production" (p.9). The output of creative industries contains intangible assets such as design and copyrights, but also inventions in sciences or engineering which are protected by patents (Cunningham, 2002).

The concept of creative industries was first promoted in the 1990s by the UK government (DCMS, 2007). It refers to creative industries "as industries which have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the generation and exploitation of intellectual property" (DCMS, 2001,p.5).

As this research is closely related to creative industries in the city of Berlin, the present thesis relies on a specific definition that is also used by the city officials. It combines the two terms creativity and culture. Thus, for this research, creative industries are defined as "cultural and creative companies – which are mostly profit oriented and deal with the creation, production and (medial) distribution of cultural/creative goods and services" (Creative Metropole, 2011,p.9).

2.1.2 Characteristics of creative goods and services

Creative industries are a set of industries organized as a form of sub-communities. The innovation output is mostly associated to creative goods and services (Bakshi & McVittie, 2009; Caves, 2003; Flew, 2005). Throsby (2001) argues "that cultural goods and services involve "creativity" in their production, embody some degree of "intellectual property" and convey "symbolic meaning" " (p. 112). All of these terms also relate to creative industries, yet in a slightly different context.

To differentiate between creativity and innovation in the theory of creative industries is quite challenging, because there are overlaps of the two concepts (Bakshi & McVittie, 2009; Handke, 2004).

Innovation is described as something that is new or done in a new way (Amabile, 1996; Porter, 1990). It establishes when the creative idea is recognized and successfully implemented by an individual or another unit of an organization (Porter, 1990).

Creativity refers to an organization's "ability to produce, combine and recombine knowledge and competences in ways which lead to something new […]" (Johnson, 2008, p. 147). With regard to creative industries, creativity is expressed through artistic imagination and unconventional thinking (Gwee, 2009). The output by creative industries in forms of new visions, ideas or products is intangible and subjective (KEA European Affairs, 2009). To have economic impact, creativity is required to reach a competitive advantage on the market. The aspect of creativity is not only important to industries which are rather related to classical sectors such as media and art, but has also reached an increasing importance in sectors dealing with design and content (Flew, 2002).

Creative industries as producers of intellectual property mostly relate to businesses dealing with creative content protected by copyrights (Throsby, 2001). Intellectual property is an immaterial and intangible property and represents the economic value of the produced good (Throsby, 2001) in creative industries. Sectors of music, advertising or the film industry are dealing with intellectual property. When creative goods are protected by copyrights or trademarks then it embodies the right to be traded which results in economic value (Throsby, 2001). For instance, the production of movies is based on intellectual property that is in turn protected by copyrights and created by the film industry. The difference to the definition above is that creativity is seen as an input used by creative industries in order to generate intellectual property as an output. This results in forms of goods and services (Potts & Cunningham, 2008). However, it is to argue that intellectual property is a wide term which is not only produced by creative industries. Intellectual property can also be produced by scientists and academics or biologists (O'Connor, 2000). Therefore, the generation of creative goods by creative industries needs to be defined more specifically.

The ability to generate 'symbolic meaning' expressed through creative goods and services are related to forms of intangible values such as meanings, experiences, or aesthetics (KEA European Affairs, 2009). Throsby (2001) differentiates between two markets named physical

market and idea market. Both of them contribute to creative goods and services in different ways.

He argues that:

> […] the physical market determines the work's economic value; the market for ideas determines its cultural value. It is the fact that the physical work is the vehicle for conveying the idea that transforms the work from an ordinary economic good into a cultural good (Throsby, 2001, p.104).

This means that not only the functional use of products is necessary, but also the associated value in order to contribute to economic wealth. For instance, consumers and organizations are more influenced in their decision making by intellectual perception and aesthetic appearance of goods and services (Yamamoto & Lambert, 1994). The exchange and communication of values of creative goods and services determines whether consumers can identify with it or not. Moreover, the way creative industries communicate and express ideas and visions contribute to innovation processes and to technological change (Throsby, 2001). This is supported by O'Connor (2000) who points out that economic value rest upon cultural values which need to be articulated through symbolic meanings. A widely used example related to symbolic meaning by creative industries is the design of Apple products, of which the music player iPod is one of the most well-known. The company is not only famous for the functions of their products. Apple mostly competes in the market by making the product attractive for consumers. This is related to its visual design and cultural values which are communicated through commercial activities and services.

To conclude, creative industries are producers of creative goods and services which are linked to various activities in the economy. The innovation output of creative industries is based on their ability of using creativity and generating symbolic meaning, both of which result in intellectual property, embodied in creative goods and services.

2.2 Creative industries and cities

2.2.1 Creative industries: driver of innovation in cities

Creative industries are identified as drivers of innovation in cities (Chapain et al., 2010; Stam, Jong, & Marlet, 2008) and tend to agglomerate in forms of creative cluster (Lazzaretti, Boix, & Capone, 2013; Maskell & Lorenzen, 2004). In the literature as well as on the governmental level, policy recommendations (Chen; Lange, Kalandides, Stöber, & Mieg, 2008; Potts & Cunningham, 2008) and regulations exist which support the cluster development of creative industries.

Clusters are often defined "as geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, associated institutions […] in a particular field that compete but also cooperate" (Porter, 2000, p.15). According to this definition, clusters are not limited to a certain geographic scope. It rather depends on the perspective and the actors involved in the cluster. Therefore, the range of a cluster may contain a country, region or a city (Porter, 2000).

Most creative clusters develop through the natural dynamics of creative industries (Lazzaretti, Boix, & Capone, 2009). In comparison to other clusters, creative industries are characterized as being not homogenously spread over a certain area, but concentrated in one location (Lazzaretti et al., 2009; Müller et al., 2009). In fact, creative cluster mostly develop in larger urban areas, because of the advantages cities offer such as larger markets of consumption, diversity of people and varies possibilities of activities (Lazzaretti et al., 2013) which has an influence on the novelty of creative industries innovation output (Maskell & Lorenzen, 2004).

Creative clusters are defined as an innovation system that consists of embedded and interconnected micro, small and medium-sized firms (Cunningham, 2002; Stam et al., 2008) in creative industries which foster the development of knowledge and creativity that leads to innovation (Gwee, 2009; Lazzaretti et al., 2013). Due to their comparably small size, firms from creative industries are more flexible and independent to interact than firms in other industries.

Besides that, researcher argue that firms which are part of a cluster gain a competitive advantage to those that are not (Schiele, 2008; Steinle & Schiele, 2002). This is related to several reasons. Inside creative clusters, formal and informal relationships exist which contribute to firm-specific knowledge exchanges on the one hand and to the access of specific local information on the other (Porter, 1998). The close proximity of embedded members in

clusters enhances network activities and social interactions (Kukalis, 2010). In general, members of a creative cluster benefit from better access to information concerning market developments and upcoming trends (Schiele, 2008). Thus, proximity and the development of cluster support knowledge spillovers and collaboration in the innovation process which has an impact on the innovation output of creative industries and leads to a competitive advantage.

The empirical study by Chapain et al. (2010) supports the argumentation that creative clusters are drivers of innovation. The researchers follow the theoretical approach of cluster development in cities and the proposition that firms in creative clusters gain a competitive advantage. Especially innovativeness is related to networking activities of creative industries and their interaction with other partners. Even in some cases so called urban buzz established and attracted employees and enhance collaboration activities. In the study, the authors demonstrate that creative clusters in cities in the UK are much more innovative in comparison to other sectors in the knowledge-economy such as financial services.

This argumentation is in line with the empirical study of Stam et al. (2008) who demonstrate that creative industries are more innovative than other sectors in the Netherlands. The authors investigated the innovation behavior of certain sectors defined as creative industries in cities. The study analyzed firms doing business in the Netherlands in the field of arts, media, publishing and creative services. In their investigation, Stam et al. (2008) differentiate between creative industries in urban and rural areas to explore their innovativeness. The results show that creative industries are more innovative in urban areas than in rural areas. Moreover, creative industries in urban areas indicate a higher activity in terms of process innovations and innovations related to their distribution system. The authors argue that the high innovation activity is related to their networking activities which contribute to knowledge-spillovers and are easier to access in urban regions than in rural areas.

Potts and Cunningham (2008) elaborate on creative industries' relationship to innovation in the economy. The authors argue that the contribution of creative industries is not only related to economic value, but also in the way they are involved in change processes. It is stated that the innovation behavior of creative clusters affect structural rather than operational changes in the economy. Moreover, they point out that creative industries are embedded in the innovation system and harness growth and knowledge processes that advance economic development. This is related to their influence in society and culture (Potts & Cunningham, 2008).

The importance of creative clusters as an driver for creativity, harnessing innovation and contributing to economic growth of cities (Flew, 2005) is also acknowledged by governmental institutions.

In the city of Shanghai the government has recognized the importance of art and culture, because they encourage economic activities and success of enterprises in today's economy (Chen,2012). Derived from this insight, the governance developed a policy that draws on experience from countries where creative industries have successfully established (Chen, 2012). The policy is related to a creative cluster strategy which encourages the development of creative industries in the city of Shanghai. This includes guidelines and five-year plans to determine and coordinate the development of creative industries (Chen, 2012). Furthermore, it supports various platforms for exchange such as conferences. The aim of these activities is to enhance creativity in creative industries which results into goods and services of this cluster (Chen,2012). However, Chen (2012) points out that this guidance from Shanghai's governance is different to the rest of China as well as to cities in Western countries. The governance monitors the progress of its creative industries and acts with guiding policies and regulations toward its development (Chen,2012). The freedom of Shanghai's creative industries is restricted to manage and operate with regard to the regulations (Chen, 2012).

In contrast, Lange et al. (2008) argue that the creative cluster strategy in Berlin is rather based on self-governance of creative industries and less on strict regulations by the governance (Lange et al., 2008). Within Berlin's creative cluster, there is high competition. Its self-governance is related to the dynamics to compete in the market. Therefore, in creative industries, capabilities establish that provide access to structural power (Lange et al., 2008). In particular, this is related to Berlin's creative industries' strong informal and extensive activities of networking (Lange et al., 2008). Lange et al. (2008) identified a growing type of culturepreneurship in Berlin's creative industries. It indicates characteristics of flexible working forms and spaces in which creativity establishes. Moreover, the term is related to the entrepreneurial spirit of creative industries. Similar to Chen (2013), Lange et al. (2008) explain that a creative cluster strategy cannot be separated from the rest of its environment in cities. It is rich of contrast and often challenging, meaning that "competition and collaboration, exchange and isolation, private and public, work and leisure coexist and are hard to tell apart" (Lange et al., p. 544).

To sum up, creative industries tend to develop in cities where creative clusters establish. Creative industries benefit in larger urban areas from the diversity and variety of their external

environment which contributes to their innovation output. Besides that the close proximity within a creative cluster offers firms a competitive advantage. Creative industries benefit from the easier knowledge and economic exchange with various partners which are relevant for their innovation activities. Hence, their networking activities contribute to knowledge spillovers which influence creative industries in their innovation process and that result into different innovation outputs. On the governmental level creative industries are recognized as important drivers of innovation and economic growth in cities. Thus, governmental institutions of cities are developing policies and guidelines which promote and support the development of creative industries.

2.2.2 The contribution of creative industries to Berlin's economy

The following section provides relevant statistical data and background information on businesses belonging to creative industries in the city of Berlin. Since a few years, Berlin's government has recognized the potential of these innovative sectors as a driving force in the city's economy. However, only a few studies regarding economic and firm characteristics of creative industries in the city of Berlin can be found, most of which are commissioned by the Berlin Senate Department of Economics, Technology and Research.

Berlin's strength is its high density of skilled professionals from various industries. This concerns universities, science and research institutes and businesses in the field of health economics, energy technology, transport, mobility and logistics, optics and creative industries (Senate Department for Economics, Technology and Research, 2012).

The development of a creative cluster in Berlin is promoted by the government and Chamber of Industry and Commerce as a successful model which became an important part of the city's innovation strategy (Chamber of Industry and Commerce, 2013). In particular, the Senate of Economics, Technology and Research is involved in fostering the creative cluster. With the innovation strategy, it encourages the dynamics of innovation and economic growth established by agents of creative industries. Berlin's creative industries include markets of books and press, advertising, film and broadcasting, music, art, architecture, design, entertainment, and software, game and telecommunication services. These sub-industries build the basis for the creative cluster in Berlin (Senate Department for Economics, Technology and Research, 2011). This definition of the creative cluster has been agreed on in 2008 at the conference of economic ministries and is adapted to European classifications of creative industries (Chamber of Industry and Commerce, 2013). Additionally, the creative

cluster concept includes extensive networks of producers, suppliers and training and research institutions among the value chain.

Besides other cities in Germany, such as Munich, Hamburg and Cologne, Berlin is one of the leading locations for creative industries (Senate Department for Economics, Technology and Research, 2011). Meanwhile creative people from all over the world have settled in Berlin. Most of them found businesses, invest in start-ups or open up branches (Berliner Senate, 2013). Creative people illustrate the current picture of the city which is characterized as one of the leading European metropolises for creative's (Kind & Meier zu Köcker, 2012). This is supported by networking and innovation programs which promote the interaction of certain sectors inside and outside of creative clusters in Berlin (Senate Department for Economics, Technology and Research, 2011).

According to the statistical report by the Senate Department for Economics, Technology and Research (2011) of 2010/2011, the creative cluster records around 29,300 small and medium sized enterprises (SME) and self-employed. In 2010, the creative cluster contributed to over 24.5 billion EUR to the total turnover of Berlin's economy, reflecting a share of 16 percent.

The largest sectors in the city of Berlin are information and communication technology (5,790 companies), design (3,660) and architecture businesses (2,540). This is followed by sectors of commercial and advertising, music and arts with an amount of under 1,500 companies (Senate Department for Economics, Technology and Research, 2011).

The employment factor of businesses in creative cluster records over 133,000 people measured by their social insurance. Additionally, the creative cluster shows a high density of freelancers and low earners (Senate Department for Economics, Technology and Research, 2011). Taking these three employment categories together are nearly 220,000 employees statistically recognized. In comparison to the total amount of employees in a permanent position 12 percent belong to creative industries. Businesses of information and communication technology indicate the highest share of employees (60,700 employees) (Senate Department for Economics, Technology and Research, 2011). This is followed by the sector of broadcasting (22,100 employees), music sector (around 11,800) and press market (around 11,700). Between 2008 and 2011, the number of people employed in creative industries in the city of Berlin has increased by 6 percent (Senate Department for Economics, Technology and Research, 2011). Two growing markets are denoted in the city of Berlin. These are the market of software and games, and architecture. The software and game sector

indicates a growth of 47 percent (11,842 employees) and the sector of architecture a growth of 15 percent (1,115 employees) (Senate Department for Economics, Technology and Research, 2011).

The newest results of the economic behavior of creative industries show that in 2010, the Berlin creative cluster created a turnover of more than 24.5 billion EUR (Senate Department for Economics, Technology and Research, 2011). However, it is to mention that in this statistical study only creative businesses were taken into account which are reported in the statistics of turnover taxes and make revenues of at least 17,500 EUR. Therefore, the authors assume that the share of turnover must be even higher (Senate Department for Economics, Technology and Research, 2011). Moreover, in this study only firms headquartered in the city of Berlin are measured. Therefore, firms could not be taken into considerations which only have a branch in the capital city, because the generated revenue is not reported (Senate Department for Economics, Technology and Research, 2011).

The Senate of Economics, Technology and Women published a report of cultural economics in which the cluster development of creative industries is elaborated (Senate Department for Economics, Technology and Women, 2008). It points out that overlaps in certain networks of creative industries exists which leads to a highly competitive market when creative sub-networks try to gain new network members, financial resources or sponsors (Senate Department for Economics, Technology and Women, 2008). Therefore, it is necessary to coordinate the networking activities of certain branches and to encourage collaboration inside the cluster. The government facilitates networking activities which supports the collaboration between various interests groups. Thus, the government encourages businesses of creative industries to involve in collaboration (Senate Department for Economics, Technology and Women, 2008). This concerns formal and informal networks. For instance, informal networking is fostered by means of get-together events where participants of creative industries exchange their experience and connect with each other. Additionally, certain platforms are provided for a joint project development (Senate Department for Economics, Technology and Women, 2008). Formal network projects support the collaboration between governmental institutions and private businesses. For example, representatives from companies and specialists are involved in the strategy planning of creative clusters. The aim of this measure is to make the coordination of various interests groups in a network easier (Senate Department for Economics, Technology and Women, 2008).

Besides networking promotions, to the best of the author's knowledge, no information is available that relate networking activities of creative industries in Berlin to their innovation behavior.

2.3 Innovation and innovation process

2.3.1 Definition of the term innovation

In the literature, various classifications of innovation can be found. However, for this research, it is to discuss only five types of innovations, which are determined by the data that the study builds on. These are product, process, technological, market and business model innovation. All of these forms of innovation may be the output of firms in creative industries.

Product Innovation

> A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics (OECD, 2005, p.48).

The term product innovation also includes intangible service innovations that are offered in addition to the product itself. This may refer to the software in the product or deal with the user friendliness (Edquist, Hommen, & McKelvey, 2001; OECD, 2005). Service innovations are defined satisfying needs of consumers (Edquist et al., 2001). Successful examples of products innovations related to services are online applications for users developed by software companies. For example, in these sectors, service applications have been developed that enables consumers to use it on smart phones, laptops or tablets.

Process Innovation

> A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software (OECD, 2005, p.49).

Process innovations refer to the operation system of an organization. They usually refer to the production of goods and services (Edquist et al., 2001). Advertising firms, for example, have been found to improve their processes through the close collaboration with both suppliers and clients (Miles & Green, 2008). Process innovations are decisive improvements in the process of organizational tasks, production or delivery (OECD, 2005; Popadiuk & Choo, 2006). New elements or changes such as in the information flow, equipment, software or techniques are

also involved in process innovation (OECD, 2005; Popadiuk & Choo, 2006; Utterback & Abernathy, 1975).

Technological Innovation

Technological innovations refers to technological changes in product and process innovations (OECD, 2001; Popadiuk & Choo, 2006). It includes technological components in the product or process that are linked with each other (Teece, 1996). In the software and video game industry technological innovations are found in their product and processes. A product innovation such as video games comprises technological innovations. For the development of video game consoles technological innovations of software and hardware are necessary for the functional use (Miles & Green, 2008; Stoneman, 2010).

Market Innovation

Market innovation specifically deals with customer needs by improving and identifying the potential market of the target group. Particularly, the digital market opened up new opportunities for creative industries to reach their customers through various channels which lead to market innovation. Moreover, market innovation is articulated by changing the way to better access the customer group of the referred business (Johne, 1999; OECD, 2005). This can be expressed by improvements in marketing mix as well as in products design (OECD, 2005). Thus, market innovation might emerge in the innovation processes during phases of idea generation and product design (Johne, 1999).

Business Model Innovation

Innovation in forms of a business model is described as a conceptual tool which based on a combination of elements that are related to each other (Osterwalder, Pigneur, & Tucci, 2005). "It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners […]" (Osterwalder et al., 2005, p.17). It is a decisive factor for all forms of organizations, because it decides about the competitiveness of the enterprise and its sustainability of business in the market. Furthermore, it concerns about the economic viability (OECD, 2012). Business models as a type of innovation are creating and capturing value (Chesbrough, 2007; Osterwalder et al., 2005; Teece, 2010). The value of the business model is expressed through the related profits, costs and revenues of the business. Creating value is articulated by knowing the product innovation and technology, the business model are related to the design, options and need of customers and clients (Teece, 2010). Firms in creative industries such as in the music sector developed

business models where the presented creative content used by consumers is financed through advertising activities (Miles & Green, 2008).

2.3.2 Innovation process: characteristics of development phases

To capture the notion of firms collaborating in order to generate innovations, open innovation is an often discussed concept. It suggests that firms, for example, in creative industries, should involve the internal and external environment in the innovation process to create innovation (Chesbrough, 2004). Business models build the basis of an open innovation process in order to create value and to achieve a competitive advantage on the market (Chesbrough, 2004). The concept of open innovation is applicable to each individual entrepreneur, to every startup such as in high-tech clusters like Silicon Valley or to spin-offs between emergent or mature firms (Chesbrough, 2004). Results of this open innovation process in which various actors are involved are products and services (Chesbrough, 2004; Cooper, 1990). Phases in the innovation process such as idea generation or R&D/construction are treated as an open system in which valuable ideas are generated from inside and outside of the company (Chesbrough, 2004).

The innovation process itself is subdivided in certain phases (Booz, Allen & Hamilton, 1982; Cooper & Edgett, 2008). These are: Idea generation, research and development (R&D)/construction, product design and market launch (Booz, Allen & Hamilton, 1982; Cooper, 1990; Ulrich & Eppinger, 2012). Nevertheless, the innovation process is complex and not every phase is applicable to every company which creates innovation (Cooper & Edgett, 2008). However, to provide a better understanding of the term innovation process, in the following the different phases of the innovation process are explained.

Idea generation

"Ideas are the feedstock to the new product process" (Cooper, Edgett, & Kleinschmidt, 2002, p.22). Thus, the first phase of the innovation process relates to idea generation concerning products and processes that is supposed to result in a collection of ideas that go along with the goal and objectives determined beforehand (Cooper et al., 2002; Utterback & Abernathy, 1975). Therefore, creative industries search for opportunities in their internal and external environment (Booz, Allen & Hamilton, 1982). Creative industries are known to focus on the needs of users such as customers, clients or suppliers (Miles & Green, 2008). In forms of brainstorming sessions or collaborations with buyers and suppliers creative industries generate new ideas (Ulrich & Eppinger, 2012). Afterwards, gathered ideas are evaluated and

screened concerning their potential to implement them (Booz, Allen & Hamilton, 1982; Cooper, 1999; Cooper et al., 2002). Screening and evaluation activities are crucial for organizations, because it influences the associated expenses and profits of product development (Booz, Allen & Hamilton, 1982; Cooper, 1999).

R&D/Construction

The next phase of the innovation process focuses on the research concept of the prototype of the product innovation (Booz, Allen & Hamilton, 1982). Creative industries are known for their R&D activities close in interaction with external partners, such as clients, suppliers or competitors (Miles & Green, 2008). When entering the phase of R&D/construction, firms in creative industries usually have a clear idea of the design of the product or service as well as the necessary requirements (Cooper, 1999). The function of R&D/construction includes primarily certain aspects concerning the technology, construction and operation to develop the product (Ulrich & Eppinger, 2012). This can be either by internal engineering groups or by the in-house R&D department (Tidd & Bessant, 2011). Moreover, potential partnerships for the execution of product ideas by means of technical and supplier assessment are also taken into account (Cooper & Edgett, 2008).

Product Design

Product design refers to the formation of the product. In particular, it concentrates on consumer needs. Product design is divided into engineering design (mechanical, electrical or software equipment) and industrial design (aesthetic, user interfaces or ergonomics) (Ulrich & Eppinger, 2012). Therefore, all necessary information to define the product is relevant. This includes "the project scope, target market, product concept, benefits and value proposition, target price and positioning" (Cooper & Edgett, 2008, p.53).

Testing

This phase is the final step before the market entry. Firms use the opportunity to test the developed prototype in order to prevent errors (Ulrich & Eppinger, 2012). In this step of the process, the innovation is usually available as tangible product. Therefore, laboratory or marketing tests are suitable in order to receive feedback in each of the development steps (Cooper & Edgett, 2008). However, when developing certain new services they are differently tested and prepared for the market than products, because of their intangible nature. This can be by using the feedback of certain amount of consumers, who test the prototype service in advance and provide feedback of their experience with it (Cooper

& Edgett, 2008). The feedbacks of the tangible and intangible new developed goods give creative industries the chance to adjust the new information from the feedback for market entry and afterwards prepare the product for market launch (Cooper & Edgett, 2008).

Market Launch

The final phase involves the commercialization of the new product or service by means of "sell or out-license already developed products where more value can be realized" (Cooper, 2009, p.56). It is also known as stage of launch or commercialization (Cooper, 2009). However, in order to sustain and compete in the market it is necessary to satisfy the consumer needs (Cooper et al., 2002). Therefore, the market implementation requires an ongoing adjustment of the good which bases on the feedback and experience of users of the product or service (Booz, Allen & Hamilton, 1982; Cooper & Edgett, 2008). Moreover, the monitoring of existing or new competitors is required to prevent infringement, to point out the differentiation and to keep the uniqueness (Booz, Allen & Hamilton, 1982).

2.4 The relationship between creative industries and innovation

To begin with the innovation output of creative industries, the study by Stoneman (2010) demonstrates the importance of soft innovation generated by creative industries. This concept is attributed rather to aesthetic changes of goods than to change of functional use. It stresses the importance of knowledge and information trade which results into innovation.

Soft innovation is related to the idea of symbolic meanings in forms of creative products and processes (Stoneman, 2010). Particularly, firms in creative industries are producers of soft innovation. This is related to different types of innovation such as product, process or market innovation. However, soft innovations are mainly recognized as an output in forms of product innovation. The study based on a quantitative analysis for which the researcher uses the Fourth Community Innovation Survey (Bakshi, 2009; Stoneman, 2010). Objective of the research are three sectors of creative industries: book publishing, record music and video games which are compared with the food and pharmaceutical industry. The results of the study show a significant impact of creative industries' soft innovation on economy when high market share of new product exists. This does not only affect product innovation by creative industries itself, but also contributes to other sectors such as the packages of pharmaceutical goods (Bakshi & McVittie, 2009). The study makes aware that intellectual perception and aesthetics of goods by means of its product design and services affects the way of consumer behavior. Coming back to the example of an iPod as mentioned in section 2.1.2 the author

argues that this product innovation influenced the way people consume music and that economic value results among an increase in music downloads. The study criticizes traditional guidelines of measuring innovation published by the Oslo-Manual, because it rather focuses on the functionality of product innovation and it does not consider indicators related to soft innovation. Therefore, in this study further indicators dealing with core creative employment inside and outside creative industries, design activities in all industries as well as copyright and trademark are used (Bakshi, 2009; Stoneman, 2010).

Another topic which is found in the literature of creative industries dealing with their innovation behavior is the one termed as hidden innovations (Miles & Green, 2008). The authors of this study use quantitative data from the UK's Community Innovation Survey and link their findings to a qualitative case study analysis to gain further insights (Miles & Green, 2008). Objective of their investigation are three sectors of creative industries namely product design, advertising and communications and broadcast production. The empirical study explores the innovation output of creative industries which are not related to traditional innovation indicators (Miles & Green, 2008). These are relations concerning innovations which deal with existing technologies or processes by means of further development and that are used in a another way. This could be for instance, market innovations such as TV programs which are now online available for users (Miles & Green, 2008). Moreover, the results show that new types of business models result out of the experience with users being involved in the innovation process of creative products. Moreover, researchers found out that innovations already establish due to creative industries' R&D investigations outside of laboratories mostly in interaction with consumers (Miles & Green, 2008).

Bakshi and McVittie (2009) deal in their study with the innovation process of creative industries and their linkages of innovation in other sectors in the UK. Similar to Stoneman (2010) use Bakshi and McVittie (2009) data from the Fourth Community Innovation Survey and investigate the relationship between creative industries and innovation and in particular their business-to-business linkages in the supply chain. The results of their probit regression analysis show that these linkages are positively related to innovation. Moreover, firms from other sectors which collaborate with creative industries during the innovation process show a higher innovation behavior in comparison to those which do not (Bakshi & McVittie, 2009).

To find further results of the innovation activity of creative industries, Müller et al. (2009) investigated the innovation behavior of creative industries in industrial innovation. Hereby the authors differentiate between creativity of employees and their creativity in forms of products

and processes. Their investigation is based on two parts. The first part focuses on the innovation activity of creative industries by investigating the type of innovation they produce. Müller et al. (2009) illustrate that creative industries concern a strong innovation performance of technological innovations and that there exist high involvement of own R&D activities. In the second part of their study the authors investigates the innovation performance of creative industries and their linkages to innovation in other sectors. Hereby they differentiate between upstream and downstream interactions of their network. Based on a probit regression analysis the results show that creative industries influence the innovation process of other sectors. This is related to the results of the study in which other sectors demand for creative industries, because of their innovative content and marketing support. On the other hand creative industries contribute to the wider economy due to their creative input. They point out that a demand of creative industries in other sectors exists when dealing with innovation. This concerns various demand for product and process innovation of creative industries for example, in fields of software (Müller et al., 2009).

To sum up, the examined studies demonstrate that innovation produced by creative industries occurs in various innovation outputs. These are not only possible to measure in forms of traditional innovation indicators defined by a widely used guideline published by the Oslo-Manual, but also related to non-traditional innovation indicators by means of aesthetic changes or innovation which influence market strategy of organizations based on business models.

Besides that soft innovation produced by creative industries gained an increasing importance with regard to product and process innovation (Bakshi, 2009; Stoneman, 2010). It stresses the importance to address the consumers' perception through aesthetic changes and to facilitate the differentiation of product and processes and not only to focus on innovation related to its functional use (Bakshi, 2009; Stoneman, 2010).

Next to product and process innovation are creative industries also producers of hidden innovations such as business models and market innovation. All of these studies indicate relations to network partners which result into knowledge spillovers and contribute to innovation. This is related to their linkages in the business-to-business supply chain (Bakshi & McVittie, 2009) and in industrial innovation by collaborating with other industries which realize the potential and contribution of creative industries for their own innovation performance (Müller et al., 2009).

III. HYPOTHESES DEVELOPMENT

3.1. Collaboration in creative industries

The literature review discussed the major linkages between creative industries, innovation and cities. In the following the theoretical perspectives between the relationship of vertical and horizontal collaboration in the innovation process of creative industries and the innovation output are discussed. Based on this framework hypotheses for Berlin's creative industries are developed.

Creative industries are faced with a highly competitive and rapidly changing environment. Their shorter life-cycles of product innovations (Bakshi & McVittie, 2009) leads to fast commercialization of the product on the market (Mowery, Oxley, & Silverman, 1996; Tracey & Clark, 2003). Therefore, firms in creative industries are forced to simultaneously compete and collaborate in order to gain a competitive advantage (Porter, 2000; Turok, 2003).

Due to network activities firms in creative industries are able to reduce their costs and create synergies, because of the different resources network partners offer in order to complement each other (Mowery et al., 1996; Tracey & Clark, 2003).

Collaboration with different partners in the innovation process supports interactive learning, because of the different knowledge, experiences and expertise firms own and use to accomplish innovation activities among the value chain (Baptista & Swann, 1998; Inkpen & Tsang, 2005; Tracey & Clark, 2003). Inside creative cluster networks take place either on the vertical or on the horizontal dimension. In the following both collaboration approaches are explained.

3.2 Vertical collaboration in creative industries

On the vertical dimension it is to differentiate between upstream and downstream partner (Silverman & Baum, 2002; Stuart, Ozdemir, & Ding, 2007). Firms in creative industries with vertical collaboration partners refer to organizations which either complement each other in the innovation process or are also linked to each other through a network among the value chain (Bathelt et al., 2004; Turok, 2003). These are partners of suppliers, buyers, clients, universities/research institutes and customers (Schiele, 2008; Bathelt et al., 2004).

Upstream partners

Upstream collaborations include interactions with research and educational institutions, think tanks (Kim & Higgins, 2007; Stuart et al., 2007) or governmental labs (Baum, Calabrese, & Silverman, 2000).

Creative cluster tend to establish close to places where universities and research institutions exists (Chapain et al., 2010; Wu, 2005). This is related to several reasons linked to their innovation process.

Universities and research institutions are seen by creative industries as an important source of innovation (Chapain et al., 2010), because they are places of knowledge which enhance the creativity and expertise that is necessary for the innovation process (Wu, 2005). Moreover, the knowledge hubs of local universities and research institutions enable businesses in creative industries to share information and to develop and strengthen their networks (Chapain et al., 2010).

For creative industries a high level of qualification is beneficial, because they mostly offer goods and services which are related to the employees' knowledge and creativity (Athey et al., 2008). Additionally, creative industries gain access to a high proportion of qualified labor and scientists (Chapain et al., 2010; Kimpeler & Georgrieff; Wu, 2005). This is important, because employees with a higher educational background are more able to absorb knowledge and apply it in the innovation process (Tsai, 2009).

In the city of London higher educational institutions are a relevant source of innovation for the cities design fashion sector (Athey, Nathan, Webber, & Mahroum, 2008). In particular, London's art colleges build the foundation for the education of designers and professionals (Athey et al., 2008). Therefore, firms in this sector benefit from the knowledge and expertise of employees coming from these educational institutions (Athey et al., 2008).

Moreover, creative industries collaborate during phases of the innovation process with universities and research institutions with the intention to find solutions of commercializing their products and processes (Wu, 2005). In Austria, for example, around a quarter of firms in creative industries collaborate in the field of R&D with scientists doing research for them as well as graduate students writing their thesis (Kimpeler & Georgrieff, 2009). Hence, universities and research institutions enable creative industries to generate new ideas, searching for solutions of problems, but also to create value to their product and process innovations linked to findings in research (Kimpeler & Georgrieff, 2009).

Networks play a decisive role for creative industries innovation activity such as in sectors of design and fashion, because they provide access to several resources in this business (Athey et al., 2008). Higher educational institutions build the foundation for it and encourage students to build up their career networks already during their education (Athey et al., 2008). Besides

that universities provide access to working spaces, promote spin-offs and entrepreneurship (Wu, 2005).

To conclude, upstream partners such as universities and research institutes are a source of innovation for creative industries, because they provide access to qualified labor and network partners as well as facilities for research and startups.

Downstream partners

Partners which are classified as downstream provide access to resources providing complementary capabilities for a successful development and implementation of product and process innovation (Baum et al., 2000). Downstream partners contribute to firm's viability and strengthen the position in the competitive market (Silverman & Baum, 2002). Due to cluster specialization certain resources are easier to access related to the development of the product (Porter, 1998).

Collaboration with downstream partners enables creative industries to identify needs and demands of customers (Silverman & Baum, 2002). In particular creative products and services of creative industries are known to be highly customized towards the requirements of their customer (Müller et al., 2009). This is attributed to the 'nobody knows' approach by Caves (2003). It describes that creative industries face the risk of product failure, because the reaction of consumers cannot always be predicted. Consumer tastes and choices becoming more sophisticated (Miles & Green, 2008) which leads to a high uncertainty of creative goods and powerful position of consumers (Caves, 2003). Thus, to share the risk of failure it is necessary to constantly collaborate with consumer during phases in the innovation process (Miles & Green, 2008; Turok, 2003). Therefore, a close position to customers enhances the information flow in the innovation process (Baptista & Swann, 1998). Moreover, information which contribute to the innovation process during phases of idea generation, product design, R&D/construction, testing or market launch can be constantly adjusted to the need of customers (Baptista & Swann, 1998; Cooper, 1990; Tsai, 2009). For instance, this is related to firms in the field of architecture or graphic design (Müller et al., 2009). The close interaction enhances the flexibility and capacity to respond to changes in the environment which affects their innovation process (Porter, 2000). Another example found in the literature is related to small businesses in the field of engineering. Those firms have to constantly fulfill the requirements of their customer. Therefore, close communication during phases of the innovation process is necessary so that the delivered product meets the requirements of their

customers (Müller et al., 2009). Hence, it supports the innovation process in creative industries.

The exchange with suppliers and partners contributes to the creativity of the product development because of the existing different backgrounds (Baptista & Swann, 1998). With regard to creative industries, linkages were found which refer to the strong integration through networks partners in their supply-chain. In particular collaboration with suppliers is an important source (Bakshi & McVittie, 2008). On the one hand creative industries act as suppliers in the wider economy by offering their products to other sectors. On the other hand creative industries collaborate with suppliers in order to develop their own product and process innovations (Bakshi & McVittie, 2008). Particularly, the access of information in close collaboration with suppliers and the delivered raw materials and equipment contribute to the innovation process and the formation of products and processes of creative industries (Bakshi & McVittie, 2009; Müller et al., 2009).

For example, creative industries indicate a high demand of technological equipment to create product and process innovation (Müller et al., 2009). This is related to technologies in the information and communication technology. Through the used technologies new innovation establish and have an influence on the different phases in the innovation process. For instance, firms in the video game, music, film, design and fashion industry are users with a high demand of technology supply (Müller et al., 2009). Those firms acquire technology in order to realize their own product and process innovation. Through the supply of technologies the film industry is able to create, produce and commercialize their films (Müller et al., 2009). Furthermore, technology supply enables the music industry to use new market channels and to develop new products and process for consumers (Miles & Green, 2008).

Besides that creative industries indicate a strong orientation of service and a close interaction with clients (Kimpeler & Georgrieff). In Austria researchers found out that almost every second company in creative industries collaborated with clients (Kimpeler & Georgrieff, 2009). This is related to brainstorming activities during phases of idea generation or collaborations in phases of R&D/construction, product design or market launch (Kimpeler & Georgrieff). Similar results are found in the UK. For example, creative industries in the segment of advertising support with their product innovations their client in the development of businesses and product-planning. Creative industries achieved a shared understanding due to their strong relationship with clients and therefore the products and processes firms in

creative industries offered meet the expectations of their clients (Kimpeler & Georgrieff; Miles & Green, 2008).

To conclude, downstream and upstream partners on the vertical dimension contribute to the innovation process of creative industries which results either into their product innovation or their process innovation. The innovation process is expressed through five phases: Idea generation, R&D/construction, product design, testing and market launch.

Thus, the hypotheses argue that:

H1: Firms belonging to creative industries of Berlin are more likely to come up with product innovations when they collaborate vertically in the innovation process during different phases (see Figure 1).

In this case the null hypothesis argues that:

$H1_0$: Firms belonging to creative industries of Berlin are more likely to come up with product innovations when they do not collaborate vertically in the innovation process during different phases.

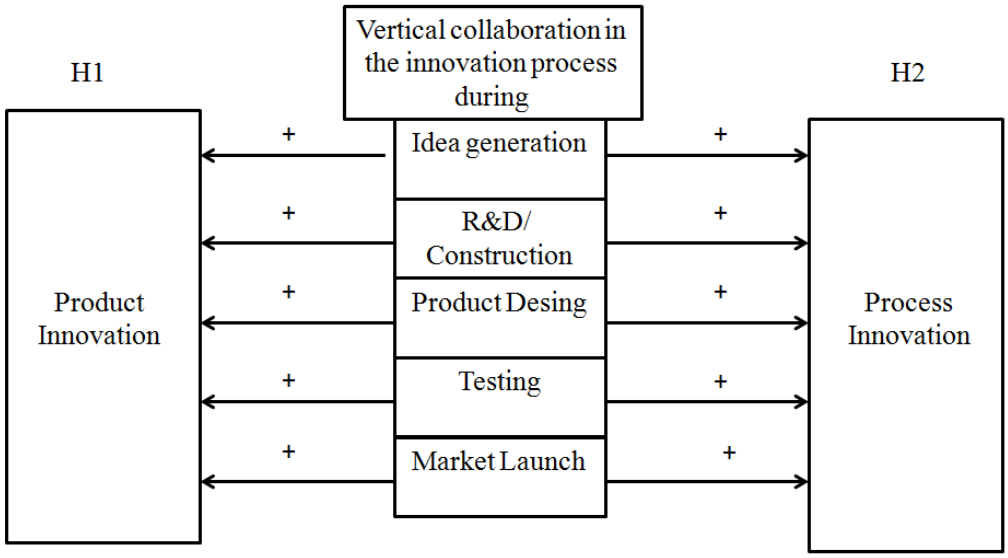

Figure 1: Illustration of hypotheses: vertical collaboration in product and process innovation

H2: Firms belonging to creative industries of Berlin are more likely to come up with process innovations when they collaborate vertically in the innovation process during different phases (see Figure 1).

In this case the null hypothesis argues that:

$H2_0$: Firms belonging to creative industries of Berlin are more likely to come up with process innovations when they do not collaborate vertically in the innovation process during different phases.

3.3 Horizontal collaboration in creative industries

The horizontal dimension of a creative cluster is characterized by social exchanges and information based on different forms of relationships. On the horizontal dimension is to differentiate between four types of relationships: competition, coexistence, collaboration, and co-opetition (Bengtsson & Kock, 1999). All of these relationships establish between firms and can change from time to time.

Competition between creative industries exists due to the close proximity which enables firms to constantly observe and compare each other (Bathelt, Malmberg, & Maskell, 2004). Firms are familiar with production and process factors, costs and quality of their competitors (Bathelt et al., 2004; Malmberg & Maskell, 1997). On the one hand the monitoring and comparison of competitors promotes learning and knowledge transfer by discussing and developing different solutions which results in the innovation process of their own products and processes (Bathelt et al., 2004; Malmberg & Maskell, 1997). On the other hand it enables competitors to directly follow with a similar product line (Bengtsson & Kock, 1999).

Besides that creative cluster are known for a high amount of freelance employees. This means that a personnel fluctuation within creative cluster exist and encourage competition (Kimpeler & Georgrieff). The easier access of qualified labor inside the cluster facilitate the access of new knowledge related to the products and process and therefore enhances the innovativeness of creative industries (Baptista & Swann, 1998; Chapain et al., 2010). Thus, close proximity increases the competition inside creative cluster which leads to innovation.

Next to competition are horizontal relationships also characterized by co-existence where firms are aware of each other, but no direct interaction between them takes place (Bengtsson & Kock, 1999). Coexistence establish mostly between firms in which one of them has more structural power than the other (e.g. smaller and larger firms). Researchers point out that particularly smaller firms which indicate a horizontal relationship of co-existence tend to

collaborate more with customers during their innovation process to create innovation (Bengtsson & Kock, 1999).

However, firms in creative industries which produce similar goods and services also collaborate with each other (Bathelt et al., 2004). Collaboration between firms in creative industries based on informal relationships which are related to trust and social norms and formal relationships which based on contract agreements between firms (Bengtsson & Kock, 1999).

For instance, freelancers and SMEs benefit from informal collaboration relationships to strengthen their position on the market. The collaboration with partners in the same industry creates synergies (Faems, van Looy, & Debackere, 2005) resulting into creative innovation processes which lead to innovation outputs (Chapain et al., 2010). According to Lange et al. (2008) the initiative 'CREATE BERLIN' promotes networking on the horizontal dimension. It enables firms and professions in the design and fashion sector to connect with each other and to strengthen their position in the economy as producers of product and process innovation.

Another example in creative cluster is the establishment of joint venture between partners on the horizontal dimension. Joint ventures based on formal relationships in forms of contract agreement in which two competing partners of creative industries benefit from each other (Caves, 2003). In this article of Caves (2003) is the contract between a visual artist and an art gallery dealer described. Within a certain period the artists are able to present their creative work (product innovation) in the gallery (Caves, 2003). Both parties benefit from this collaboration due the combined expertise which creates synergies and leads to innovation. Dealers are able to present the work from artists, communicate and value the creative content to art collectors and fans (Caves, 2003). Artists are able to create new ideas which derived from the feedback and interaction with the art dealer and art collectors and are expressed through their creative and innovative work. The interaction between artist and dealer contributes to the innovation process of the artist's product or processes (Caves, 2003).

Besides that the city of London and its broadcast industry also illustrates several examples of successful joint ventures in creative industries. One of the most famous is of the TV production company Wark Clements which collaborate with the major broadcasting house BBC and is explained in the article by Turok (2003). The formal collaboration contribute to Wark Clements innovation process and enabled the company to rapidly expand their product

portfolio by producing further genres such as drama, documentaries and educational programs (Turok, 2003).

Another example of collaboration is also known under the term co-opetition (Bengtsson & Kock, 1999) on the horizontal dimension. The film and music industry benefits from co-opetition with horizontal partners based on licensing agreements (Miles & Green, 2008). For instance, product innovations such as films often build on creative content derived from the literature. License agreements between publishing and film industry enable horizontal collaboration partners to create new product innovation, because they are allowed to use foreign product innovations for their own innovation process (Miles & Green, 2008).

Further co-opetition between horizontal network partners contributes to the development of standards in a cluster (Steinle & Schiele, 2002). Firms tend to be in co-opetition on the horizontal dimension in the innovation process during phases of R&D/construction, because it reduces costs and risks (Tsai, 2009). Besides that the collaborating firms benefit from the combined unique knowledge and expertise of both partners (Bengtsson & Kock, 1999). This could be related to their product or process innovation.

For example, horizontal collaboration for the development of standards in product innovation are used in the field of technologies or application in the digital market (Faems et al., 2005). Particularly, the software and video game industry cooperate on the horizontal dimension with the aim to develop technological standards for their innovation projects (Miles & Green, 2008). The video game sector faces increasing costs for the development of product innovations. It forces videogame producers to collaborate with middleware companies in this segment to outsource the development of computer software which links the components and applications of software with each other (Miles & Green, 2008). However, to solve this problem new process innovations establish which encourages standards inside this industry to be able to apply them to other innovation projects (Miles & Green, 2008).

To conclude, formal and informal relationships in forms of collaboration including co-petition between horizontal partners contribute to the exchange of knowledge and skills. It affects the whole innovation process from the idea generation to the market launch of the product innovation (Miles & Green, 2008). Moreover, horizontal collaboration can be seen as an incentive for the innovation process (Porter, 2000) of creative industries because it contributes to creativity and innovativeness.

Thus, the hypotheses argue that:

H3: Firms belonging to creative industries of Berlin are more likely to come up with product innovations when they collaborate horizontally in the innovation process during different phases (see Figure 2). The innovation process is expressed through five different phases: Idea generation, R&D/construction, product design, testing and market launch.

In this case the null hypothesis argues that:

$H3_0$: Firms belonging to creative industries of Berlin are more likely to come up with product innovations when they do not collaborate horizontally in the innovation process during different phases.

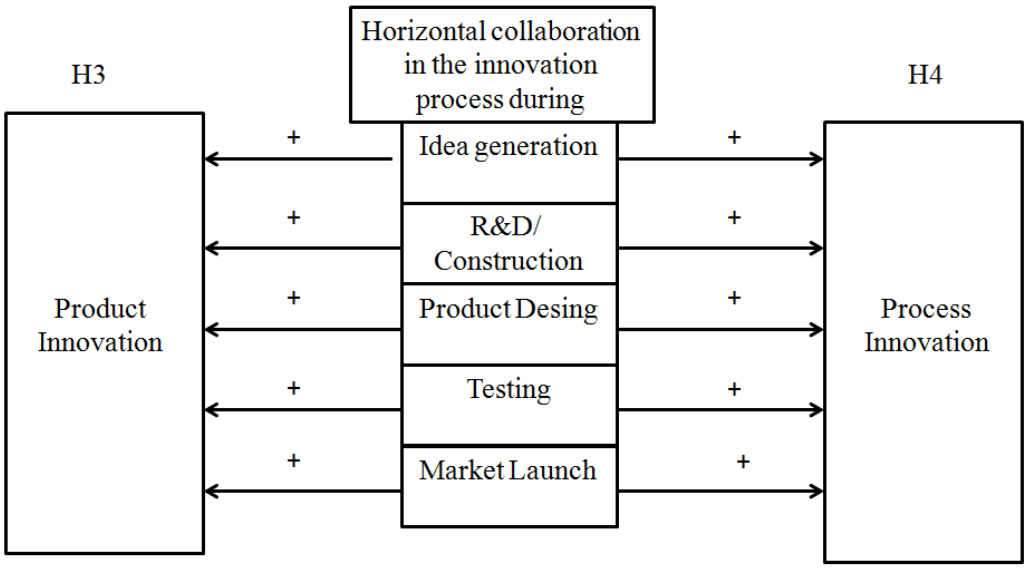

Figure 2: Illustration of hypotheses: horizontal collaboration in product and process innovation

H4: Firms belonging to creative industries are more likely to come up with process innovations when they collaborate horizontally in the innovation process during different phases (see Figure 2).

In this case the null hypothesis argues that:

$H4_0$: Firms belonging to creative industries of Berlin are more likely to come up with process innovations when they do not collaborate horizontally in the innovation process during different phases.

To conclude, networks are essential for firms to access knowledge from others in order to compete in the market (Mowery et al., 1996). In creative clusters, one needs to differentiate between two dimensions of networks. This can be either on the horizontal or vertical dimension (Inkpen & Tsang, 2005). On the vertical dimension it is to differentiate between upstream and downstream partners (Silverman & Baum, 2002). Upstream collaborations are related to research institutes and universities. Downstream partners are involved to economic businesses which have an influence on firms' revenues (Stuart et al., 2007). Horizontal collaboration involves partnerships between competitors and sub-sectors. In both cases firm's attempt to transfer knowledge and thereby access new knowledge and capabilities (Inkpen & Tsang, 2005). Moreover, it supports the innovation process of creative industries and contributes to innovation in forms of products, services and processes (Inkpen & Tsang, 2005). All in all, both dimensions are necessary and affect the dynamics and innovation process of creative industries.

IV. RESEARCH METHODOLOGY AND DATA COLLECTION

4.1 Research model

Derived from the theory Figure 3 illustrates the dependent and independent variables of this research. It illustrates the relationship between vertical and horizontal collaboration in the

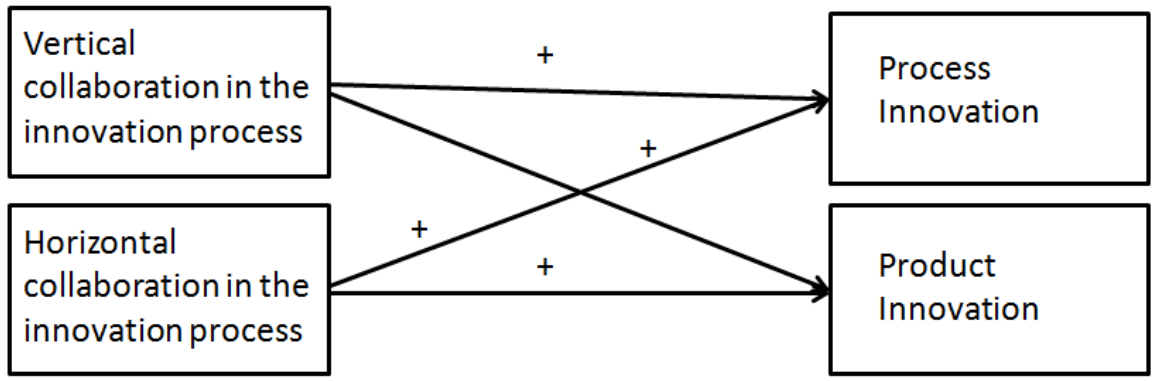

Figure 3: Research model

innovation process of firms in creative industries and the innovation output (product and process innovation). It is predicted that in the city of Berlin the collaboration activity of firms in creative industries contributes to their innovation output.

4.2 Variables

The dependent variable deals with the innovation output (product and process innovation) of creative industries in the city of Berlin. The independent variable concerns the collaboration activity in the innovation process in creative industries. Five phases are classified to the innovation process: idea generation, R&D/construction, product design, testing and market launch. At every phase of the innovation process the collaboration activity was investigated. Each of these variables was treated as dichotomous and a mutually exclusive categorization. The defined variables are based on a dummy-variable scoring (Weisberg, 1992). They were coded with 1 when the definition of variables was applicable and coded with 0 when it was not applicable.

Variable label	*Type of variable*	*Description*	*Measures*
Product innovation	Dependent variable	Innovation output in forms of product innovation	**Binary** 1 = firms' innovation output in form of product innovation 0 = no innovation output in forms of product innovation by firms
Process innovation	Dependent variable	Innovation output in forms of process innovation	**Binary** 1 = firms' innovation output in forms of process innovation 0 = no innovation output in forms process innovation by firms

Table 1: Description of dependent variable: innovation output (product and process innovation)

Dependent variable

The dependent variable which is derived from the literature is defined as innovation output (see Table 1).

The indicator innovation output was applied when firms in creative industries launched a product or process innovation on the market. Product innovation was classified as new or improved products or services which contained components or general features (Rammer & Horn, 2013). Process innovation was described as new or improved constructions or techniques of production, service or sales of products. Results of process innovation were related to product segments, product or service quality or production costs. This is similar to Bakshi and McVittie (2008) and Stam et al. (2008) where in both studies innovation output

was used as an indicator. However, they differentiated between three different types of innovation: product innovation, process innovation and products and services which were new to the industry.

Variable label	*Type of variable*	*Description*	*Measures*
Collaboration (vertical)	Independent variable	Vertical collaboration during the phases Idea generation; R&D/construction; product design; testing; market launch	**Binary** 1 = firms in creative industries with vertical collaboration in the innovation process during each phase 0 = firms in creative industries with no vertical collaboration in the innovation process during each phase
Collaboration (horizontal)	Independent variable	Horizontal collaboration during the phases idea generation; R&D/construction; product design; testing; market launch	**Binary** 1 = firms in creative industries with horizontal collaboration in the innovation process during each phase 0= firms in creative industries with no horizontal collaboration in the innovation process during each phase

Table 2: Description of independent variable: collaboration (vertical and horizontal)

Independent variable

Two main independent variables were identified and named as horizontal and vertical collaboration in the innovation process of creative industries (see Table 2). The innovation process includes the following phases: idea generation, R&D/construction, product design, testing and market launch. Vertical collaboration in the innovation process contains upstream and downstream. Upstream partners are universities and research institutes. Downstream collaboration includes organizational types of suppliers of raw materials, suppliers of equipment, clients and customers. Horizontal collaboration in the innovation process relates to the partners between firms in creative industries which are competitors. Therefore, independent variables were defined for each phase in the innovation process and for each type of collaboration meaning horizontal and vertical. External linkages in the innovation process

in creative industries were also used as an indicator by Bakshi and McVittie (2008) and Müller et al. (2009).

Variable label	*Type of variable*	*Description*	*Measures*
Firm size	Control variable	Number of employees of firms of creative industries	Metric scale
Non R&D innovation investment	Control variable	The amount of innovation investments in EUR	Metric scale
R&D investments	Control variable	R&D investments (internal and external) of firms of creative industries	Metric scale
Qualification	Control variable	Qualified personnel	Metric scale

Table 3: Description of control variables

Control variables

The following variables were used as control variables which captured general firm characteristics (see Table 3).

The variable firm size was defined as the number of employees of firms in creative industries. This definition is in line with the Oslo-Manual guideline (OECD, 2005). A widely used approach in the empirical literature predicted that large firms are more likely to engage in innovation and produce more innovation output than smaller firms.

However, small and medium enterprises are known as being more specialized in a certain field which might influence their innovation activities (Bakshi & McVittie, 2008; Jong, Fris, & Stam, 2007; Stam et al., 2008). Thus, a higher interaction with firms of other businesses or with institutions is more necessary for SMEs (OECD, 2005). For the regression analysis the variable firm size was used as a metric variable.

This variable Non-R&D investment contains all investments related to the innovation process and includes both tangible and intangible assets. However, this excluded investments in R&D. It is to point out that investment in innovation influences the innovation process and consequently the innovation output of firms in creative industries (OECD, 2005).

Another control variable includes the total amount of R&D expenditures for internal and external activities in the year of 2011. According to the Oslo-Manual (2005) expenditures in R&D are investments in innovation. Thus, it was to argue that expenditures in R&D were seen as innovation input.

The metric variable qualification includes the amount of employees with an university degree. In the innovation process education and in this case the related access of knowledge plays an important role. In the literature various studies of knowledge spillovers (e.g. Mowery et al., 1996) of firms, particularly in creative industries (e.g. Stam et al., 2008) are discussed. One indicator which is widely used for knowledge is qualification. It is related to the degree of education. A higher degree of education result in higher knowledge transfer which positively affects innovation output (Mowery et al., 1996; Tsai, 2009). Employees with a higher educational background are more able to absorb new knowledge, assimilate and integrate it with existing knowledge into organizations and are consequently able to develop successful innovation (Tsai, 2009).

4.3 Data collection and sample

4.3.1 Data collection

The choice of data gathering depends on the research question and research design. The data itself is defined as raw material for the analysis of interest (Lewis-Beck, 1995). However, the variety of data collection methods is very rich and needs to be carefully evaluated for this research conduction (Alasuutari et al., 2008). The research question already determines an appropriate way for investigation. However, the choice of data collection method leads to the way the data is analyzed. In the following paragraphs the reasons for choice of data are explained. It also argues on the sample and measurement, coding and checking of raw data to conduct this research.

Foundation of this research approach was an existing database of the BIS provided by the Centre for European Economic Research (CEER) and by the Department of Technology and Management from the Berlin Institute of Technology. The subject of this survey were the

innovation activities of enterprises in the German capital Berlin (Rammer & Horn, 2013). The BIS is a supplementary survey of the German Innovation Survey 2012. It deals with indicators such as share of innovation, innovation activities, expenses for innovation, innovation success, research and development activities, innovation plans for the coming years and innovation partnership of enterprises in the city of Berlin (Rammer & Horn, 2013). Information given in the database is based on a standardized questionnaire. The methodological characteristics are similar to the one used for the German Innovation Survey. Empirical research contains innovation indicators that based on guidelines published by the Oslo-Manual (Rammer & Horn, 2013). This simplifies the comparability of innovation behavior of firms in the city of Berlin to other cities in Germany as well as in Europe. The BIS provides information about firms in the city of Berlin with five or more employees in the field of manufacturing, energy, water supply and waste disposal, information and communication services as well as technical, scientific and creative services (Rammer & Horn, 2013). To the author's best of knowledge no other survey provided information about collaboration activities in the innovation process of organizations of the city of Berlin. Besides, the study examined innovation activities that were oriented on a reference period of three years. This included a multi-year period from 2009 to 2011 (Rammer & Horn, 2013). According to Rammer and Horn (2013) this period was chosen to consider several aspects of innovation of enterprises. This included the lifecycle of products and machinery, the development of innovation processes and the innovation success. All these indicators are less meaningful if only one fiscal year had been taken into account, because usually innovations developed through a period of time (Rammer & Horn, 2013).

The analysis of secondary data in social sciences research plays a tremendous role (Iversen & Norpoth, 1976). The difference between primary and secondary data results in the way of data collection and analysis. Primary research includes both data collection and analysis. Secondary research requires the ability of creative analytical skills in order to analyze the data that have been collected by others (Iversen & Norpoth, 1976). Moreover, the information given by secondary data and specifically survey data enables to gain access to information of a wide range of data sample. Two factors play a central role in the decision-making of selecting primary or secondary research. These factors are time and cost (Iversen & Norpoth, 1976). The advantage working with secondary data is the smaller costs as data collection is done already. Therefore, the research can focus on data analysis. This required less time (Iversen & Norpoth, 1976). With primary research the risks and costs are higher to obtain

relevant information which can be used for analysis. Therefore, and with regard to the short time frame of writing a master thesis an analysis of secondary data enabled to conduct this research economically with respect to time and cost (Iversen & Norpoth, 1976).

The Department of Technology and Management of the Berlin Institute of Technology offered to work with new and so far unique data. This unpublished data contains information about the innovation behavior of enterprises from different industries in the city of Berlin. Thus, it provided access to the relevant information of firms which belong to the sector of creative industries in the city of Berlin.

4.3.2 Sample

The population of BIS 2012 sample includes all legally independent companies with headquarters in Berlin (Rammer & Horn, 2013). It fits to the classification of national economic activities by the Federal Statistical Office (Federal Statistical Office, 2008). The database of the BIS 2012 included information of 773 firms.

Domain	Branches
Media and entertainment market	Printing, publishing, production, rent and distribution of film and music records, broadcasting
Software and information technology market	Software houses, hardware consultancy, databases, data processing, other services connected to data processing
Consulting services market	Consulting companies
Architecture and engineering	Architecture and engineering offices
Creative services	Advertising, manufacturing of fabrics, clothes, leather, leatherwear and shoes

Table 4: Classification of creative industries sub-sectors in the city of Berlin

For this research approach, creative industries' firms from 17 branches (see Table 4) were identified which operated in five different sectors. The selected enterprises elaborated for the research referred to the NACE code classification (see Appendix 1) used by the Federal Statistic Office for economic activity classifications (Federal Statistical Office, 2008). Moreover, this was also in line with the definition of creative industries in the city of Berlin defined by the Senate Department for Economics, Technology and Research (Senate Department for Economics, Technology and Research, 2011). The selection showed that firms in creative industries were not only identified in the field of art and media, but also in other fields such as services and engineering (Cunningham, 2002). The media and entertainment market included firms such as publishers, broadcast or print.

Sub-sector of firms in creative industries	*Frequency*	*Percentage*
Media and entertainment	86	23.82
Software and information technology	84	23.27
Consulting	63	17.45
Architecture and engineering	91	25.21
Creative services	37	10.25
Total firms in creative industries	**361**	**100**

Table 5: Sample: creative industries

Those firms mainly produce products in which their creativity is expressed through culture, aesthetic or entertainment. This is in line with the argumentation of Caves (2003) who deals with arts and entertainment industries and their contracts that link creative agents with other agents. Software and information technology market, consulting services market and architecture and engineering market were chosen by the fact that those branches offer products and services which are mainly based on their individual creativity by dealing with knowledge-intensive services. An important element in their products and services was related to symbolic values and content (Throsby, 2001). Creative services included firms in the field of advertising, technical design or fashion. The focus of these firms led on individual creativity of employees (Jong et al., 2007; Stam et al., 2008). However, creative content and

symbolic values as mentioned before are also relevant. The focus of this research is done on enterprises which used their diverse creativity to offer products and services based on commercial purpose. This was underlined by the argumentation by Caves (2003) who argued that commercial contracts build the basis to link certain agents with each other. The analysis of this research was restricted to firms in creative industries in the city of Berlin.

To conclude, the sample was stratified by sectors of media and entertainment (86 firms), software and information technology (84 firms), consulting services (63 firms), architecture and engineering services (91 firms) and creative services (37 firms) (see Table 5). Furthermore, each sector was allocated to branches. All in all, 361 firms were classified as firms in creative industries in the city of Berlin.

4.3.3 Validity of data

Nevertheless, an evaluation of this data was necessary by checking whether the relevant indicators could be used for this research approach. Therefore, the number of observations of firms in creative industries in total was verified. It was necessary to make sure that statistical power of the study was given and meaningful inferences could be made. Although the innovation survey has not been tailored for this study, it enabled to empirically investigate the innovation behavior of creative industries in the city of Berlin.

Therefore, for this survey the indicators regarding firm characteristics of creative industries, information regarding collaboration in the innovation process and their innovation output were relevant and suitable to apply. The survey is based on a questionnaire and is therefore unobtrusive (Babbie, 1992). Moreover, it was oriented on the Oslo-Manual guidelines for collecting and interpreting data on innovation (OECD, 2005). Thus, it was assumed that with this survey valuable information regarding innovation in creative industries could be assessed. Additionally, the questionnaire was structured according to a framework of the German Innovation Survey that is carried out annually. Due to the practice and experience of the institution which developed the framework of the questionnaire and conducted the study errors might be reduced. Hence, requirements of accuracy and sufficiency of this dataset were given.

The limitations of dataset were that it was only accessible with the statistic tool STATA. This required experience and skills to work with. Although no prior experiences working with this statistic tool existed, the researcher decided to overcome this barrier and learned working with it.

Moreover, the author was aware of the risk that errors might have been made when the information were converted into a data file. Although, next to the limitations it was known

that in general most data was not perfect. The author decided that the given data still offered the opportunity to be creative and open minded which was necessary when working with secondary surveys (Iversen & Norpoth, 1976).

4.4 Methodology

4.4.1 Descriptive analysis

The first part of data analysis contained descriptive statistics and was related to the sub-question of this study. It provided an overall understanding of the sample and of the variables which deal with the collaboration partners in the innovation process of creative industries and what kind of innovation output they achieved.

For all variables an univariate analyses was used to identify key characteristics. To receive an overall and unified picture of observation and to be able to interpret them measurements of central tendency were applied (Lewis-Beck, 1995; Walsh, 1990).

The dataset contained quantitative and qualitative variables. Variables which indicated an interval or ratio level were defined as quantitative. Qualitative variables were characterized to measurements of nominal and ordinal levels (Lewis-Beck, 1995; Walsh, 1990). In this research the variable firm size was quantitative, because it indicated a ratio level. The respondents were asked to provide information of the amount of employees in their company. The variables qualification, collaboration and innovation output indicated a nominal level. All of them were of qualitative nature. Moreover, they had dichotomous characteristics and were coded as dummies. Additionally, the variable innovation success was investigated, because it provided information of further types of innovation in more detail. Innovation success was ordinal structured in forms of a ranking (Borooah, 2002). It was to differentiate between fully (coded with 3), mostly (coded with 2), partly (coded with 1), not at all and was not a goal (both coded with 0). The last two ranked data were summarized as they both predict no innovation success. Therefore, the variable innovation success is also of qualitative nature.

With regard to the measurement of central tendency the mode was used to observe the most frequently distribution of variables (Lewis-Beck, 1995; Walsh, 1990). Reasons were that the mode was the only measurement which was valid for all score levels of this research, because nominal variables cannot be measure with mean or median. However, all of these three types (mean, median, and mode) indicated the frequency of raw data and can be used for descriptive analysis (Lewis-Beck, 1995).

4.4.2 Phi correlation analysis

A widely used measurement in the scientific literature is the correlation analysis. For this statistical method the correlation coefficient was used to encourage the reliability of this research. The purpose of this analysis was to determine whether a correlation between vertical and horizontal collaboration during each phases in the innovation process related to the innovation output was given (Taylor & Edd, 1990).

In this case both variables had shown dichotomous characteristics. Therefore, the requirements for the Pearson's correlation coefficient and the Spearman's test could not be applied. Pearson's correlation coefficient required variables to be scaled in an interval or as a ratio. Spearman's test addressed methods of ranked or ordinal data (Chen & Popovich, 2002). Nevertheless, two binary distributions (e.g. yes or no) were given in the research. Therefore, the phi coefficient correlation was applied. This type of measurement belongs to the product-moment coefficient of correlation and is similar to the approach of Pearson's correlation coefficient (Chen & Popovich, 2002). The phi indicated the coefficient determination and defined the strength of relationship. A correlation between two variables was given when phi equals ±1. However, no correlation was determined when the coefficient equals 0. Although it might be the case that dependent and independent variable are correlated it does not imply any causation or magnitude (Chen & Popovich, 2002). The phi-square is similar to the chi-square. However, it does not give any information regarding the unit of change in one variable to the other. Thus, the size of the phi-square is not a reliable indicator for the strength of correlation between two variables. Phi and phi-square only predicts that two variables correlates more likely or less likely with each other (Chen & Popovich, 2002).

4.4.3 Probit regression analysis

To test the hypotheses a suitable form of data analysis is required. Based on the characteristics of the identified variables collaboration in the innovation process and innovation output a suitable form was evaluated. Variables used for this investigation were either dichotomous (dependent and independent variable) or metric (control variable). A regression analysis was applied to quantitatively describe and make predictions of the relationships between the dependent and independent variable. It allowed developing conclusions in which way the independent variable (collaboration) influenced the dependent variable (innovation output). Three forms of regression analysis were taken into consideration: a linear regression, a logit regression and a probit regression.

Linear regressions are used for continuous dependent variables. The assumption of linear regression is on a normal distribution of dispersed errors. It allows the predictions of variables which values range outside of 0 to 1 (Liao, 1994; Pampel, 2000). However, the relevant change of dichotomous variables is on a dummy scale and ranges from 0 to 1. Therefore, a linear regression analysis was not applicable. Problems of normality and homoscedasticity might have emerged. The risk of using a linear regression might led to results which were less predictive (Pampel, 2000).

Another alternative which was taken into consideration was the use of logistic regression. This model is famous for simplifying errors of estimation. This means that predictors do not need to be transferred into a normal distribution. It allows interpreting results in forms of probabilities, logged odds and odds. For instance, if the form of probability is used the results would have been transformed into logits. However, logged odds and odds would not indicate limitations of range values (Pampel, 2000).

The logic regression is similar to the probit analysis. One of the slight differences between logit and probit regression is that probit regressions transforms values of variables into a cumulative standard distribution instead of logged odds (Pampel, 2000). With regard to the applied statistic tool STATA and the simplicity of the probit model this type of regression analysis was applied. Moreover, the study by Bakshi & McVitties (2009) also was investigated with a probit regression. It tested the linkage between creative industries and innovation in the wider economy. A similar approach of this research model was found in the article by Müller et al. (2009). The authors determined the effects of firms in creative industries in industrial innovation. In the following the probit model and its indicators of inferences are explained.

Probit model

One form of probit regression is the binary outcome model. The predicted probabilities are limited between 0 and 1. This means that the dependent variable has a binary response and concerns two options of choice (e.g. yes or no). Thus, the variable is coded with two values meaning 0 and 1.

$$y = \begin{cases} 0 \; if \; no \\ 1 \; if \; yes \end{cases}$$

The probit model measures the probability y=1 as a function of the independent variable x. Φ represents the standard cumulative normal probability. The parameter ß is defined as cumulative distribution function of the standard normal distribution. The predicted probabilities are limited to 0 and 1.

$$\Pr(y=1|x) = \Phi(x'ß)$$

With regard to the models the probit regression is calculated as follow:

$$\Pr(\text{innovation output}=1) = \Phi + ß_{\text{vertical collaboration}} + ß_{\text{firm size}} + ß_{\text{Non-R\&Dinvestment}} + ß_{\text{R\&Dinvestment}} + ß_{\text{qualification}}$$

$$\Pr(\text{innovation output}=1) = \Phi + ß_{\text{horizontal collaboration}} + ß_{\text{firm size}} + ß_{\text{Non-R\&Dinvestment}} + ß_{\text{R\&Dinvestment}} + ß_{\text{qualification}}$$

It is calculated for each of the phases in the innovation process. The results of the probit analysis are translated in several ways. To test the correlation and significance of hypotheses the coefficient determination, the z-score and p-value are assigned.

The coefficient provides an increase or decrease of the likelihood. The variable y=1 occurs when an increase in x is established. The magnitude of results of coefficients is not allowed to use as a sign of significance, because of its differences in scale. It might be that the coefficient (r) is higher than 1. The coefficient only displays a relationship when the values are either positive or negative correlated. No relationship is predicted when the value indicates 0. However, the outcome of investigation of y=1 can be interpreted as more or less likely (Liao, 1994; Pampel, 2000).

The z-score deals with the probability in the cumulative standard normal distribution. The probabilities of limited dependent variable (0 and 1) are translated into z scores into positive and negative infinity (Pampel, 2000). The interpretations of z-score are based on the assumption that each coefficient varies from 1. It tests the statistical significance whether or not the null hypothesis was rejected (Pampel, 2000). When using 95% confidence level the critical z-score values were again used to interpreted significance or insignificance. This is the case when values reach: + 1.96 and – 1.96. The two tail p- value tests that each coefficient is different from 0. To reject this assumption the p-value has to be lower than 0.05 to find significance (Pampel, 2000). The Pseudo R2 provides information concerning the degree of

valuable information of the explanatory variable. However, it does not provide any information regarding the quality of the model (Pampel, 2000).

In the following the results of this research are summarized. First, the descriptive analysis provides an overall understanding of the innovation activity of creative industries and its related subsector in the city of Berlin. Second, the results of the correlation and regression analysis provide insights into answering the research question.

V. RESULTS OF DATA ANALYSIS

5.1 Descriptive statistics: characteristics of Berlin's creative industries

The following results of descriptive analysis gives answer to the sub-questions of this study. It examines creative industries firm size, the innovation output (product and process innovation), the qualification of employees as well as the interpreted innovation success.

Firm size was measured by the amount of employees in a company. In Table 6 firm sizes were categorized according to the statistical classification for innovation by size (OECD, 2005). The results show the distribution of firms in creative industries and its sub-sectors in the city of Berlin.

Firm size	*Creative industries total*	*Media and entertainment*	*Software and information technology*	*Consulting services*	*Architecture and engineering*	*Creative services*
Small <=9	46.26 %	39.53 %	50.00 %	53.97 %	45.05 %	43.24 %
Middle >=10 &<=49	44.04 %	50.00 %	42.86 %	39.68 %	47.25 %	32.43 %
Large >=50	9.70 %	10.47 %	7.14 %	6.35 %	7.69 %	24.32 %
Total	100	100	100	100	100	100
N	361	86	84	63	91	37

Table 6: Descriptive statistics: creative industries firm size (in %)

The sample indicated that firms in creative industries mostly included small (46.26 %) and medium (44.04 %) size companies. In the field of creative services 24.32 percent had more than 50 employees in the company.

Firms With employees holding a degree of education	*Creative industries total*	*Media and entertainment*	*Software and information technology*	*Consulting services*	*Architecture and engineering*	*Creative services*
Educational degree	90.03 %	80.23 %	92.86 %	96.83 %	94.51 %	83.78 %
No educational degree	9.97 %	19.77%	7.14 %	3.17 %	5.49 %	16.22 %
Total	100	100	100	100	100	100
N	325	86	84	63	91	37

Table 7: Descriptive statistics: employees with an educational degree of firms in creative industries (in %)

325 out of 361 firms in creative industries in the city of Berlin gave information whether employees hold an educational degree or not. The results showed (see Table 7) that around 90 percent of employees in firms in creative industries had an educational degree. Comparing the total results with subsectors in creative industries than it showed similar outcomes. The lowest rate of employees with no degree in education existed in subsector of consulting services followed by architecture and software and information technology.

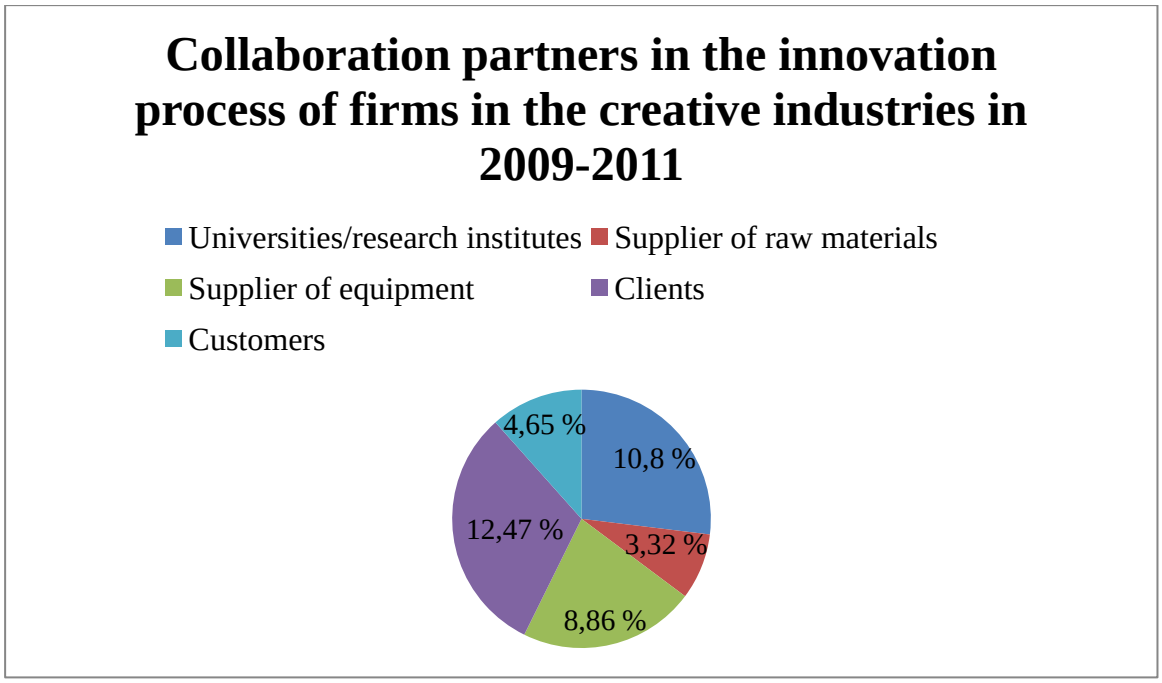

Figure 4: Descriptive statistics: collaboration partners in the innovation process of creative industries (in %)

The collaboration partners of creative industries were classified in categories of universities/research institutes, suppliers of raw materials, suppliers of equipments, clients, customers and competitors.

The illustration shows the frequency of firms in creative industries which collaborated with one of the mentioned partners (see Figure 4). This was restricted to the years of 2009 to 2011. The results showed that most firms in creative industries of the sample collaborated with clients (12.47 %). This was followed by collaboration activities with universities and research institutes (10.80%), suppliers of equipments (8.86%) and competitors (8.86%). The lowest frequency rate of collaboration partners was with suppliers of raw materials (3.32%) and customers (4.65%).

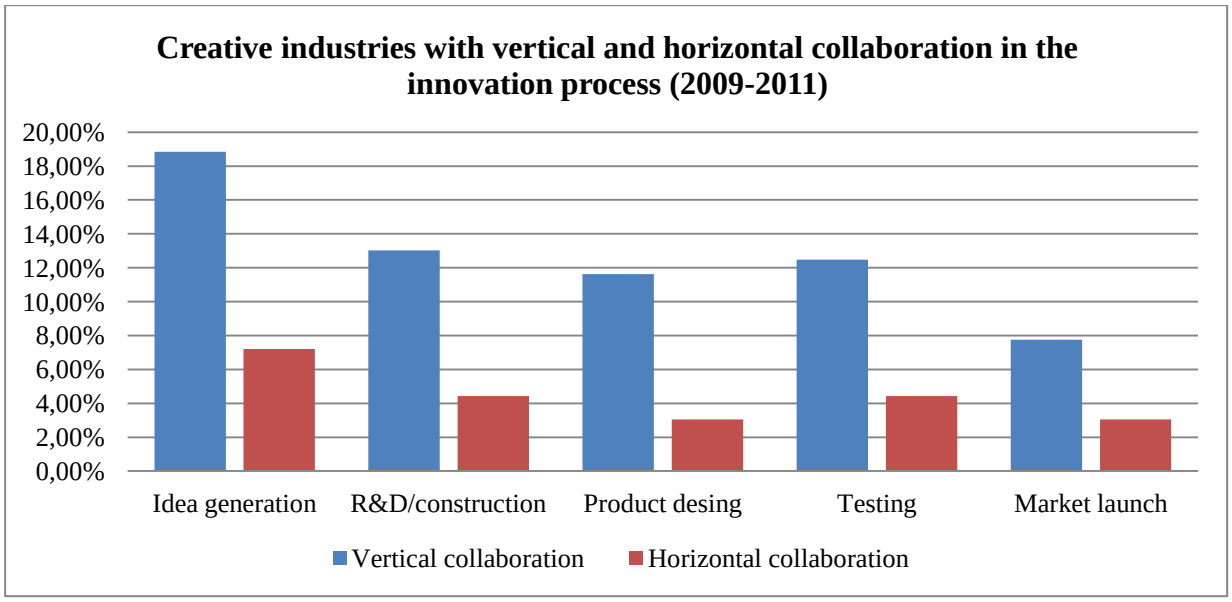

Figure 5: Descriptive statistics: creative industries collaboration activity during the innovation process

Furthermore collaboration of firms in creative industries was differentiated between vertical and horizontal. It was tested in which phase in the innovation process (e.g. idea generation, R&D/construction, product design, testing, and market launch) creative industries in the city of Berlin were involved in horizontal and vertical collaboration (see Figure 5). On the vertical dimension high results were shown in the innovation process during phases of idea generation (18.84 %), R&D/construction (13.02 %) and testing (12.47 %). In those phases collaborations of creative industries were the most.

On the horizontal dimension similar results were shown. 7.20 percent indicated to collaborate with competitors in the innovation process during the phase idea generation. Moreover, during the phase R&D/construction and testing indicated 4.43 percent to collaborate in the innovation process.

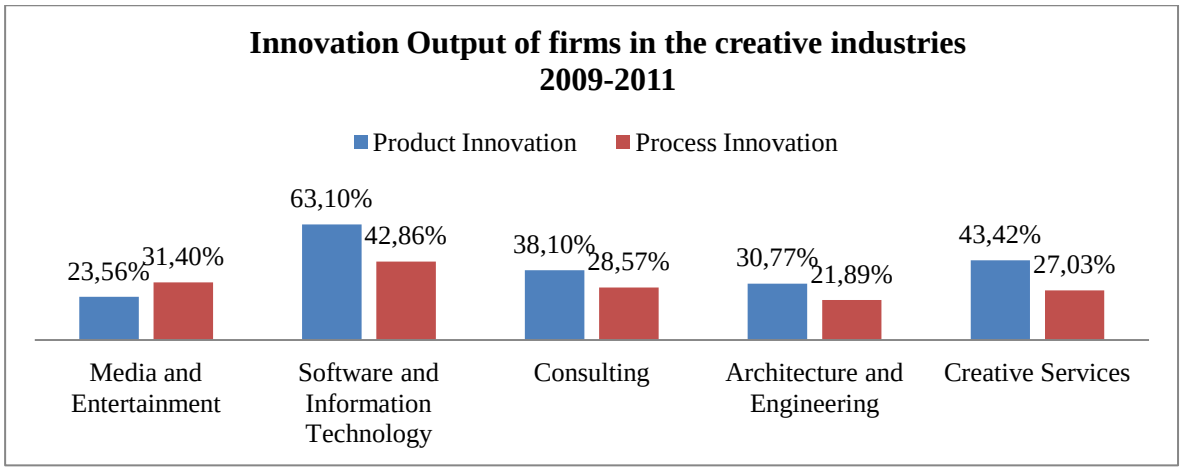

Figure 6: Descriptive statistics: innovation output of firms in creative industries

In the city of Berlin more firms in creative industries indicated to launch to the market product innovations rather than process innovations (see Figure 6). This was shown by results of innovation output. 41.27 percent of respondents launched to the market product innovation in the years of 2009 to 2011, while 30.75 percent generated process innovation.

Most product innovations were implemented in the sub-sector software and information technology (63.10 %). In the same branch 42.86 percent developed process innovation. This was followed by firms operated in creative services which showed 43.42 percent of product innovation. However, only 27.03 percent of process innovation was generated by creative services.

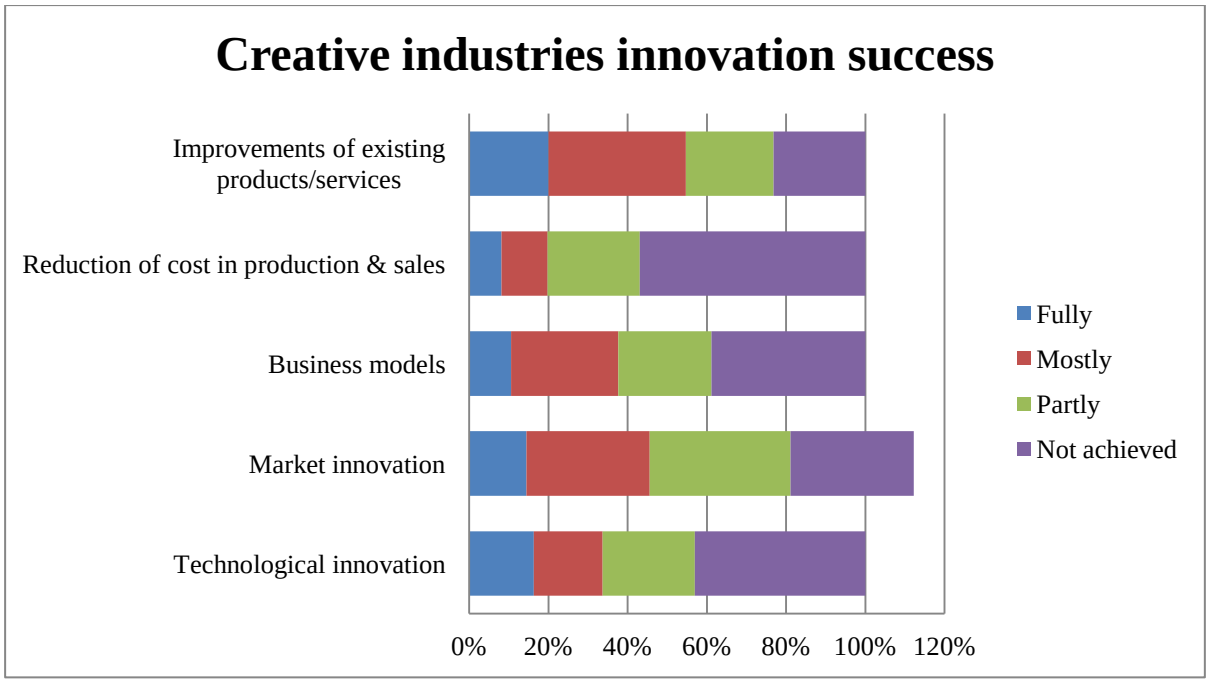

Figure 7: Descriptive statistics: innovation success in creative industries

The variable innovation success showed which types of innovation projects were interpreted as successful or not (see Figure 7). It was restricted to the timeframe 2009 to 2011 and contained five different types of innovation. To begin with technological innovation output the results showed that innovation success was partly achieved by 23.26 percent firms in creative industries, mostly achieved by 17.44 percent and fully achieved by 16.28 percent. However, 43.03 percent indicated no innovation success of technological innovation.

In the years of 2009 to 2011 market innovation were partly achieved by 35.56 percent of respondents, mostly achieved by 31.11 percent and fully achieved by 14.44 percent. No innovation success was answered by 18.89 percent. Business model innovation were mostly achieved by 27.06 percent, partly achieved by 23.53 percent and fully achieved by 10.59

percent. 38.82 percent reached no innovation success. Innovation success was also related to process innovation in forms of improved costs of production and sales. This was interpreted as innovation success by 23.26 percent with partly, 16.63 percent with mostly and 8.14 percent with fully. However, 56.98 percent had no innovation success in this field. 34.74 percent answered mostly to have achieved innovation in the field of process innovation in forms of improved existing products or processes. This was followed by 22.11 percent who answered with partly and 20.00 percent said innovation success was fully achieved. However, 23.16 percent gained no innovation success in this time frame.

To sum up, most firms in creative industries were classified as small and medium sized companies. Moreover, creative industries indicated a high employment rate of people with an educational degree. Regarding their collaboration activities in the innovation process the most creative industries collaborated with clients, followed by universities and suppliers of equipment. However, less collaboration took place with customers. Moreover, creative industries collaborated with vertical and horizontal partners in the innovation process the most during phases of idea generation, R&D/construction and testing. Regarding the innovation output creative industries rather generate more product innovation than process innovation. The highest frequency concerning innovation output by means of product innovation showed the sub-sector software and information technology.

5.2 Correlation results: validity and reliability of dependent and independent variable

The correlation coefficient contained 361 firms for each of the investigated cases. This means that for each of the phases in the innovation process the relationship between vertical and horizontal collaboration and the innovation output has been measured and always referred to 361 firms in creative industries in the city of Berlin. The results of correlation analysis showed that all independent variables and dependent variables used for this research approach were positively correlated to each other and indicated significant results.

Product innovation	*Phi coefficient*	
Vertical collaboration during phases of	phi	phi-square
Idea generation	.330***	.108
R&D construction	.260***	.068
Product design	.292***	.085
Testing	.296***	.088
Market launch	.219***	.048
N	361	.025

*Notes: Results printed for *p < 0.05, **p<0.01, *** p<.0.001*

Table 8: Results of phi correlation: vertical collaboration and product innovation

All of the tested relationships of hypotheses 1 showed a positive correlation and indicate significant results (see Table 8). This meant that there exist are relationship between the variable collaboration in the innovation process during each of the phases with regard to product and process innovation. In particular strong correlation in hypothesis 1 was shown in vertical collaboration in the innovation process during idea generation, product design and testing in relationship to product innovation. Moreover, all of them indicated a strong significance and therefore the correlation analysis supported the variables of hypothesis 1.

Process innovation	*Phi coefficient*	
Vertical collaboration during phases of	phi	phi-square
Idea generation	.201**	.040
R&D construction	.170**	.029
Product design	.226*	.051
Testing	.166*	.027
Market launch	.143**	.020
N	361	

*Notes: Results printed for *p < 0.05, **p<0.01, *** p<.0.001*

Table 9: Results of phi correlation: vertical collaboration and process innovation

Similar results showed hypotheses 2 (see Table 9). It predicted that firms of Berlin's creative industries in vertical collaboration in the innovation process during certain phases are more

likely to come up with process innovation. The phi correlation analysis showed positive and significant result of correlations between dependent and independent variable. In comparison to the vertical collaboration and product innovation the results of process innovation indicated a lower significance. For instance, vertical collaboration during idea generation and product innovation showed a phi of 33 percent and a high significance ($p<0.001$) whereas the same independent variable in relation to process innovation displayed a phi of 20 percent and a lower significance ($p<0.01$).

Product innovation	***Phi coefficient***	
Horizontal collaboration during phases of	phi	phi-square
Idea generation	.158**	.040
R&D construction	.202***	.021
Product design	.146***	.021
Testing	.147***	.021
Market launch	.146**	.040
N	361	.0290

*Notes: Results printed for *p < 0.05, **p<0.01, *** p<.0.001*

Table 10: Results of phi correlation: horizontal collaboration and product innovation

Hypothesis 3 argues that firms of Berlin's creative industries in horizontal collaboration in the innovation process during certain phases are more likely to come up with product innovation. The results of the correlation analysis have shown a positive and significant correlation with regard to each variable of the hypotheses (see Table 10). Moreover, creative industries in horizontal collaboration during three of these phases R&D/construction, product design and testing in the innovation process related to product innovation indicated a high significance ($p<0.001$). Thus, the relationship between the independent and dependent variable was supported.

Process innovation	*Phi coefficient*	
Horizontal collaboration during phases of	phi	phi-square
Idea generation	.162**	.026
R&D construction	.119*	.014
Product design	.161***	.026
Testing	.089	.008
Market launch	.126*	.016
N	361	

*Notes: Results printed for *p < 0.05, **p<0.01, *** p<.0.001*

Table 11: Results of phi correlation: horizontal collaboration and process innovation

In comparison to the variables of hypotheses 4 lower correlations are shown than in the latter results. Moreover, only creative industries in horizontal collaboration in the innovation process indicate only in four phase (idea generation, product design and market launch) a significant correlation to process innovations (see Table 11).

To conclude, mostly all variables used for the hypotheses indicated correlations. However, the results in relation to product innovation showed a higher correlation with regard to vertical and horizontal dimension than those in process innovations.

To sum up, the independent variables (dealing with the vertical and horizontal collaboration in the innovation process of creative industries) and the dependent variables (dealing with the innovation output of creative industries) indicated a positive correlation which supports the reliability of this research approach.

5.3 Regression results: hypotheses testing

The empirical results are based on the probit regression analysis. The hypotheses have been tested first without control variables and afterwards with them to find out whether a relationship between independent and dependent variable still existed. Moreover, they have been tested for significance to find out whether the hypotheses were valid for all firms in creative industries in the city of Berlin or only for firms of the sample. The results showed a correlation and significance of hypotheses that dealt with relationships with vertical collaboration in the innovation process and innovation output. However, firms in creative industries in horizontal collaboration indicated partly a correlation and significance. In some

cases no correlation and no significance was found. To reduce the complexity of the tested hypotheses the most relevant results are summarized.

Product Innovation	Idea generation 1		R&D/ construction 2		Product design 3		Testing 4		Market launch 5	
	ß	z	ß	z	ß	z	ß	z	ß	z
_cons	-1.266 (.223)	-5.67	-1.235 (.220)	-5.60	-1.223 (.22)	-5.55	-1.271	-5.37	-1.241	-5.62
Vertical collaboration	1.096*** (.281)	3.89	.823* (.292)	2.82	1.3** (.36)	3.81	1.241*** (.344)	3.61	0	
Firm size	.000 (.007)	0.05	-.001 (.007)	-0.16	1.394*** (.365)	3.81	.000 (.007)	0.09	.000 (.007)	.001
Qualification	.005* (.002)	2.03	.006* (.002)	2.31	.000 (.007)	0.04	.006 (.002)	2.92	.006 (.002)	2.35
Non-R&D investments	5.743*** (1.496)	3.84	5.831*** (1.487)	3.92	5.076*** (1.490)	3.41	5.793*** (1.516)	3.82	5.574 (1.501)	3.71
R&D investments	4.082** (1.378)	2.96	4.841***	3.51	5.473*** (1.409)	3.88	4.624*** (1.379)	3.35	5.596 (1.465)	3.82
Number of observations	232		232		232		232		219	
Pseudo R2	.326		.300		.331		.321		.0262	

*Notes: Results reports probit regression with standard errors in parentheses; *p < 0.05, **p<0.01, *** p<.0.001*

Table 12: Probit regression results: vertical collaboration and product innovation

Hypothesis 1

Hypotheses 1 stated that firms in creative industries in vertical collaboration in the innovation process are more likely to come up with product innovation (see Table 12). This was tested in each of the phase in the innovation process. The results have shown that firms in creative industries in vertical collaboration in the innovation process during phases of idea generation ($p<0.001$, $z= 3.89$), R&D/construction ($p<0.05$, $z=2.82$), product design ($p<0.01$, $z=3.81$) and testing ($p<0.001$, $z=3.61$) were more likely to come up with product innovation. Regarding these three phases the null hypotheses was rejected. However, creative industries in vertical collaboration in the innovation process during phases of market launch were less likely to come up with product innovation (see Table 13). This means that the null hypothesis of vertical collaboration in the innovation process during the phase market launch was supported.

Process Innovation	Idea generation		R&D/ construction		Product design		Testing		Market launch	
	1		2		3		4		5	
	ß	z	ß	z	ß	z	ß	z	ß	z
_cons	-.890 (.195)	-4.55	-.859 (.193)	-5.60	-.792 (.189)	-4.18	-.835 (.191)	-4.35	-.782 (.182)	-4.30
Vertical collaboration	1.030*** (.240)	4.29	1.055*** (.266)	3.96	1.264*** (.295)	4.28	.860** (.278)	3.09	.987* (.393)	2.51
Firm size	.001 (.006)	0.25	8.76e-06 (.006)	0.00	.001 (.006)	0.30	.001 (.005)	0.20	.000 (.004)	.002
Qualification	-.004* (.002)	-1.57	-.003* (.002)	1.36	-.005 (.002)	-1.82	-.003 (.002)	-1.24	-.003 (.002)	-1.31
Non-R&D investments	4.142*** (1.031)	4.02	4.387*** (1.032)	4.25	3.616*** (1.040)	3.47	4.052*** (1.026)	3.95	4.082 (1.027)	3.97
R&D investments	-.063 (.189)	-0.34	-.028*** (.132)	-0.22	-.038 (.121)	-.32	-.046 (.135)	-.34	-.315 (.182)	-4.30
Number of observations	**232**		**232**		**232**		**232**		**232**	
Pseudo R2	**.175**		**.164**		**.177**		**.140**		**.127**	

*Notes: Results reports probit regression with standard errors in parentheses; *p < 0.05, **p<0.01, *** p<.0.001*

Table 13: Probit regression results: vertical collaboration and product innovation

Hypothesis 2

Hypotheses 2 stated that firms in creative industries in vertical collaboration in the innovation process are more likely to come up with process innovation. This was tested with regard to each of the phases in the innovation process. The results indicated that firms in creative industries in vertical collaboration were more likely to come up with process innovation (see Table 13). Significant linkages were found during all phases in the innovation process by means of idea generation ($p<0.001$, $z=4.29$), R&D/construction ($p<0.001$, $z=3.96$), product design ($p<0.001$, $z=4.28$), testing ($p<0.01$, $z=3.09$) and market launch ($p<0.001$, $z=2.51$). In these phases the null hypotheses were rejected.

Product Innovation	Idea generation		R&D/ construction		Product design		Testing		Market launch	
	1		2		3		4		5	
	ß	z	ß	z	ß	z	ß	z	ß	z
_cons	-1.183 (.215)	-5.48	-1.159 (.213)	-5.43	-1.145 (.214)	-5.34	-1.157 (.214)	-5.41	-1.151 (.213)	-5.39
Horizontal collaboration	.747 (.442)	1.69	1.111* (.564)	1.97	0		.428 (.489)	.88	.501* (.667)	0.75
Firm size	-.002 (.007)	-0.31	-.002 (.007)	0.38	-.002 (.007)	-0.38	-.002 (.007)	-.32	-.002 (.007)	-.29
Qualification	.007** (.002)	2.49	.006** (.002)	2.39	.006* (.002)	2.29	-.006 (.002)	2.46	.006* (.002)	2.43
Non-R&D investments	5.545*** (1.457)	3.80	5.674*** (1.467)	3.87	5.585*** (1.461)	3.82	5.572*** (1.463)	3.81	5.354*** (1.461)	3.79
R&D investments	5.710*** (1.473)	3.88	5.364*** (1.453)	3.69	.613*** (1.506)	4.07	5.895*** (1.503)	3.92	5.965*** (1.495)	3.99
Number of observations	**232**		**232**		**226**		**232**		**232**	
Pseudo R2	**.286**		**.288**		**.263**		**.276**		**.275**	

*Notes: Results reports probit regression with standard errors in parentheses; *p < 0.05, **p<0.01, *** p<.0.001*

Table 14: Probit regression results: horizontal collaboration and product innovation

Hypothesis 3

Hypotheses 3 predicted that firms in creative industries with horizontal collaboration in the innovation process during each of the phases are more likely to come up with product innovation (see Table 14). The results showed that only firms in creative industries with horizontal collaboration during phases of R&D/construction ($p<0.05$, $z=1.97$) were more likely to create product innovation. A positive correlation of the sample was found during phases of idea generation, testing and market launch. However, no significant results were shown. Thus, in three cases the null hypotheses cannot be rejected. This refers to hypotheses collaboration during phases of idea generation, product design, testing and market launch.

Process Innovation	Idea generation 1		R&D/ construction 2		Product design 3		Testing 4		Market launch 5	
	ß	z	ß	z	ß	z	ß	z	ß	z
_cons	-.840 (.180)	-4.65	-.791 (.174)	-4.52	-.774 (.173)	-4.47	-.794 (.175)	-4.52	-.672*** (.173)	-4.39
Horizontal collaboration	1.113* (.367)	3.03	.857** (.394)	2.17	1.741** (.640)	2.72	.824** (.402)	2.05	1.051* (.553)	1.90
Firm size	-.000 (.007)	.003	-.005 (.002)	-0.21	-.000 (.002)	-0.25	-.000 (.003)	-.17	-.000 (.003)	-.13
Qualification	.002** (.002)	-0.83	-.002 (.002)	-.96	.002* (.002)	-1.07	-.002 (.002)	-.90	.002* (.002)	-1.02
Non-R&D investments	4.067*** (1.001)	4.06	4.202*** (1.00)	4.20	4.192*** (1.008)	4.16	4.151*** (1.001)	4.14	4.082*** (1.002)	4.07
R&D investments	-.418*** (.137)	-0.30	-.034*** (.125)	-.27	-.355*** (.130)	-.27	-.311*** (.117)	-.27	.029 (.112)	-0.26
Number of observations	**232**		**232**		**226**		**232**		**232**	
Pseudo R2	**.140**		**.121**		**.138**		**.119**		**.117**	

*Notes: Results reports probit regression with standard errors in parentheses; *p < 0.05, **p<0.01, *** p<.0.001*

Table 15: Probit regression results: horizontal collaboration and process innovation

Hypotheses 4

The hypotheses 4 stated that creative industries with horizontal collaboration in the innovation process during each of the phases are more likely to come up with process innovation. In five phases a positive correlation as well as significance was found. For example, a high significance (see Table 15) was shown during the phase idea generation ($p<0.01$, $z=3.03$) R&D/construction ($p<0.01$, $z=2.17$), product design ($p<0.01$, $z=2.72$) and testing ($p<0.01$, $z=2.05$) and market launch ($p<0.01$, $z=1.90$). Thus, the null hypotheses were rejected.

VI. DISCUSSION AND CONCLUSION

6.1 Discussion

Discussion of literature findings

This study intended to fill the research gap by answering the following research question: What is the relationship between the horizontal and vertical collaboration activities in the innovation process of firms in creative industries in Berlin and their innovation output? To give an appropriate answer to it and to achieve a better understanding of creative industries and their linkages to innovation, further questions were raised and answered: Which kinds of innovations are achieved by Berlin's creative industries? Which kind of collaboration networks exist in the innovation process of Berlin's creative industries? In which phases of the innovation process do firms in creative industries collaborate with network partners?

Creative industries in cities are described as heterogeneous (Lazzaretti et al., 2009), small-and medium sized (Cunningham, 2002; Stam et al., 2008), with a high proportion of employees having an educational degree (Stam et al., 2008) and as creators of various types of innovation (Miles & Green, 2008; Stoneman, 2010). This includes product and process innovation, but also innovative business models, market innovation and technological innovation.

The innovation output of creative industries is linked to different activities in the economy. Innovation is not only related to its functional use, but also to the appearance and to the value of creative industries goods and services (Stoneman, 2010). Findings in the literature demonstrate that firms in creative industries influence the consumers' perception through aesthetic changes and contribute to the differentiation of products and processes (Yamamoto & Lambert, 1994). Thus, the innovation output of creative industries is represented by the intellectual property which is embodied in their employee's ability of being creative and to generate symbolic meaning (O'Connor, 2000; Throsby, 2001).

The output of the innovation process of creative industries is mainly discussed in the context of product innovation. However, the findings in the literature have shown that further types of innovation already establish during the innovation process. For instance, in the innovation process of product innovation it is also possible that technological innovation, market innovation as well as business model innovation establish.

Five different phases are classified in the innovation process: idea generation, R&D/construction, product design, testing and market launch. It is discussed in the context of open innovation and argues that firms in creative industries should connect with the internal and external environment to create innovation, respectively (Chesbrough, 2004).

Furthermore, creative industries tend to cluster in larger cities, because the external environment - such as the diversity of people, the easier access of qualified labor as well as the variety of activities which urbanization entails - positively influences the innovation process and the respective innovation output (Lazzaretti et al., 2013). Prior findings demonstrate that the innovativeness of creative industries is related to the interaction with different partners and their networking activities (Chapain et al., 2010). This is related to the close proximity of firms which contributes to creative industries competitive advantage, because they benefit from the easier economic and knowledge exchange with various partners (Kukalis, 2010; Maskell & Lorenzen, 2004). Besides that product innovations of creative industries indicate a shorter life-cycle (Bakshi & McVittie, 2009). Hence, firms are forced to collaborate in the innovation process in order to compete and strengthen their position on the market (Porter, 2000; Turok, 2003).

In creative clusters two dimensions are identified in which creative industries collaborate - vertical and horizontal. Vertical collaboration in the innovation process of creative industries focuses on the economic exchange among the value chain and contributes to the innovation output (Baptista & Swann, 1998; Inkpen & Tsang, 2005; Maskell & Lorenzen, 2004; Tracey & Clark, 2003). On the vertical dimension upstream and downstream partners are identified (Silverman & Baum, 2002; Stuart et al., 2007). Upstream partners are classified as universities and research institutions (Kim & Higgins, 2007; Stuart et al., 2007) whereas downstream partners refer to clients, suppliers and customers (Bakshi & McVittie, 2009; Baptista & Swann, 1998; Müller et al., 2009; Silverman & Baum, 2002).

The findings show that upstream partners like universities and research institutions indicate a large landscape in the city of Berlin (Senate Department for Economics, Technology and Research, 2012) and are beneficial for the innovation process of creative industries in this city, because higher educational institutions provide access to qualified labor (Chapain et al., 2010; Wu, 2005). Moreover, it is to point out that knowledge and creativity are decisive capabilities of employees in creative industries to be able to create innovation (Athey et al., 2008). People with higher qualification such as students, graduates or scientists contribute to creative industries' innovation output as they are more able to absorb knowledge and

implement it into the innovation process (Kimpeler & Georgrieff; Tsai, 2009). Besides that universities and research institutions provide access to several resources including networks, working spaces and joint projects in R&D which contribute to idea generation, to solutions for identified problems, but also to the value creation of the innovation output of creative industries (Athey et al., 2008; Wu, 2005).

In the literature strong linkages are found which refer to the integration of downstream partners in the value chain like suppliers. Particularly suppliers of raw materials and equipment for technologies play an important role for creative industries and support firms to complete their product and process innovation (Bakshi & McVittie, 2009; Miles & Green, 2008; Müller et al., 2009).

Furthermore, creative industries are known for their strong service orientation and close interaction with clients (Kimpeler & Georgrieff). Close communication during phases of the innovation process are identified as an advantage which contributes to the development of product and process innovation of creative industries and is necessary in order to meet the clients' requirements (Miles & Green, 2008). Similar to this are the findings regarding the relationship to customers. Firms in creative industries are facing a high risk of uncertainty of creative goods and a powerful position of customers (Miles & Green, 2008; Turok, 2003). An interactive innovation process is important to minimize the risks and costs of failure related to the product development (Caves, 2003). This can be achieved through closer interaction which enhances the flexibility to respond to changes (Baptista & Swann, 1998). Phases such as idea generation, product design and testing are relevant, and can be used for the feedback and experience from consumers and clients to integrate them into the innovation process.

On the horizontal dimension different relationships exist. With regard to the related findings of the study competition and collaboration (including co-opetition) play a decisive role for the innovativeness of creative industries. The focus on the horizontal dimension lies mainly on the trade of information and knowledge between competitors (Bathelt et al., 2004; Bengtsson & Kock, 1999).

Due to the close proximity competition enables firms to constantly monitor and compare each other regarding their production factors, costs and quality (Bathelt et al., 2004; Malmberg & Maskell, 1997). Hence, learning processes and knowledge spillovers establish and flow into the innovation process of creative industries by developing different solutions for their

innovation outputs in order to differentiate from its competitors and to achieve a competitive advantage.

Nevertheless, the findings in the literature have also demonstrated that collaboration on the horizontal dimension exists. Hereby it is to differentiate between formal and informal relationships (Bengtsson & Kock, 1999). Informal relationships strengthen the position of competing firms on the market. Promoted networking activities create synergies between firms and professionals and enable them to connect with each other (Bengtsson & Kock, 1999). Thus, the information and knowledge exchange enhances the innovation process of creative industries. Foundations for this exchange are trust and social norms (Bengtsson & Kock, 1999).

Formal relationships rather base on contract agreements between competing firms (Bengtsson & Kock, 1999). For instance, licensing agreements enable firms in creative industries, for example, between the film and publishing industry, to create new innovation outputs based on the usage of foreign innovations (Miles & Green, 2008). Additionally, during phases of R&D in the innovation process formal relationships between competing firms in creative industries promote cost reduction, minimizes the risks of failure in the innovation process and combine the unique knowledge and expertise of both partners (Bengtsson & Kock, 1999; Tsai, 2009). This is particularly related to the development of new standards inside the industry and to the decrease of development costs of product innovations such as in the software and video game industry (Faems et al., 2005; Miles & Green, 2008; Steinle & Schiele, 2002).

However, very little was found in the literature regarding the influence of vertical and horizontal collaboration with regard to each of the different phases in the innovation process. Nevertheless, it is to argue that not every phase of the innovation process is applicable to every firm in creative industries (Cooper & Edgett, 2008).

Discussion of empirical findings

The propositions from the literature have mainly been confirmed in the empirical analysis based on a sample of 361 firms from five different industries that are part of Berlin's creative cluster. Statistical data were retrieved from the Berlin Innovation Survey 2012.

The results demonstrated that firms in Berlin's creative industries collaborate in the innovation process with partners on both (vertical and horizontal) dimensions. Vertical collaboration partner in the innovation process were universities/research institutes, suppliers

of raw materials and equipment, clients and customers. Horizontal collaboration partners were competitors by means of firms in the same sector in creative industries.

With regard to the innovation output of Berlin's creative industries the results showed that firms generated more product innovations than process innovation. This is supported by the findings in the literature which mainly characterized creative industries as producers of goods and services. Moreover, the results regarding the innovation success of firms in creative industries support the argumentation that other types of innovation are also achieved such business models, technological innovation and market innovation.

Further, firms in creative industries collaborated with vertical and horizontal partners during phases of idea generation, R&D/construction, product design, testing and market launch. These findings demonstrate the open and collaborative innovation process of Berlin's creative industries which are similar to the proposition in the literature. The results suggest that vertical and horizontal collaboration activities of creative industries in the innovation process might be linked to their higher results of the innovation output in product innovation.

Collaboration/ Innovation output	**Innovation process of creative industries**				
	Idea generation	Product design	R&D/construction	Testing	Market launch
Vertical collaboration/ Product innovation	+++	+	++	+++	**0**
Vertical collaboration/Process innovation	+++	+++	+++	++	+
Horizontal collaboration/Product innovation	**0**	**0**	+	**0**	**0**
Horizontal collaboration/Process innovation	+	++	++	+	+

Notes: insignificant: 0; significant: low + ($p < 0.05$), middle ++ ($p<0.01$), strong +++ ($p<.0.001$)

Figure 8: Matrix: vertical and horizontal collaboration in the innovation process of creative industries

In particular the findings of the regression analysis in this survey stress the relevance of collaboration in the innovation process of Berlin's creative industries with regard to their product and process innovation (see Figure 8).

Vertical collaboration in the innovation process of creative industries contributes to the development of product and process innovation. In four phases (idea generation, testing, product design, R&D/construction) of the product innovation process of creative industries a positive and significant relationship to vertical collaboration was found. However, interesting was that no linkages were shown with regard to the phase of market launch during the innovation process of creative industries. Nevertheless, process innovation in relationship to vertical collaboration during all phases of the innovation process of creative industries demonstrated a positive and significant link.

Other than expected horizontal collaboration revealed during four phases (idea generation, product design, testing and market launch) of the innovation process of creative industries no relationship to product innovation. This is explained by the findings in the literature which argue that a high competition inside creative cluster might exist. Firms in creative industries try to keep their competitive advantage and to differentiate with their product innovation from the others. However, it was interesting that one exception existed regarding horizontal collaboration which was during the phase R&D/construction in the innovation process of creative industries and reveals an influence on product innovation. This is supported by the findings in the literature of co-opetition on the horizontal dimension. Firms in creative industries develop joint-innovation projects during phases of R&D one the one hand to combine the knowledge and expertise and on the other hand to reduce the costs and risks of failure related to their own product innovation. However**,** horizontal collaboration in the innovation process of creative industries showed significant linkages to their innovation output mainly in relationships to process innovation. These finding might be linked to a stronger informal relationship on the horizontal dimension in which Berlin's creative industries aims to strengthen their position on the market and to develop standards inside the creative cluster.

To conclude, the study contributes to the existing literature and provides further insights of vertical and horizontal collaboration in the innovation process of creative industries in relationship to their innovation output. Furthermore, the study provides additional evidence of vertical and horizontal collaboration during various phases in the open innovation process of creative industries and their influence of product and process innovation.

6.2 Limitations

Limitations of this study are that the results are difficult to generalize for other cities in Germany or even Europe. Reasons are the heterogeneity of creative industries and the various classifications and definitions of businesses which belong to creative clusters. Additionally, Berlin's creative industries showed a large landscape of branches. Thus, the findings can only be generalized to sub-sectors in this study.

To define Berlin's creative industries several sectors are classified based on the finding in the literature. With regard to the amount of observations to each sector of creative industries the current limitation is that they do not indicate an equal amount so that less precise estimation have been made regarding the collaboration behavior in the innovation process and the innovation output.

Furthermore, the innovation output which was used as dependent variable for the regression analysis was limited to product and process innovation. However, the findings have shown that further types of innovation are generated by creative industries. Nevertheless, with regard to the sample and the correlation analysis only the variables product and process innovation were able to use as indicators for the innovation output.

Although not every phase of the innovation process is applicable to every business of creative industries the innovation process was subdivided in five phases: idea generation, R&D/construction, product design, testing and market launch. This might be an explanation for the finding of vertical collaboration during the phase market launch in the innovation process of creative industries in relation to product innovation in which no significant linkage was found.

Moreover, for the regression analysis the collaboration partners were summarized as vertical and horizontal partners. This can be seen as a limitation of this study, because each of the collaboration partners, particularly on the vertical dimension, might have different influence on the innovation process of creative industries in relation to their innovation output. However, to investigate the relationship of each collaboration partners in the innovation process in more detail larger sample size is required to be able to make powerful statements.

6.3 Recommendations

Recommendations for policies

As discussed in the literature review the government of Berlin has recognized the importance of creative industries for the capital city and thus, developed an innovation strategy that promotes the dynamics of innovation and economic growth established by firms in creative industries. Aim of these policies and guidelines are to create synergies between agents of Berlin's creative cluster. The comparisons of firms in creative industries which collaborate in the innovation process to those which do not collaborate have shown that particularly collaboration on the vertical dimension in the innovation process contributes to their innovation output.

Hence, this study encourages policy and decision-makers in the city of Berlin to further promote collaboration of creative industries through policies and guidelines. This is related to linkages in the supply-chain, to clients, customers and also universities/research institutes.

The empirical findings have demonstrated that vertical collaboration in mainly each of the phases of the innovation process of creative industries contributes to their innovation output. Therefore, it is recommended to further develop programs in which effective working and collaboration mechanisms are supported which contribute to each of the phases of the innovation process.

Moreover, policies and guidelines on the horizontal dimensions should be further promoted with regard to process innovations of creative industries. This could be for instance, through networking activities in which firms in creative industries are able to improve standards and license agreements which strengthen their position in the market and enhances their innovation projects. The approach of 'CREATE BERLIN' established by the government, which supports the informal and formal networking activities in the design and fashion sector (Lange et al., 2008), should be expanded to other sub-sectors in creative industries. In particular dialog and practical oriented events which build trust between collaborating partners might be important and encourage more firms to collaborate on the horizontal dimension during phases of R&D/construction which enhances the development of product innovation of firms.

However, due to the diversity of Berlin's creative cluster characterized by a large landscape of subsectors it is suggested that policies and guideline need to be developed for each sector to address the needs of these firms and to promote their innovation potential.

Recommendation for practice

The literature and empirical findings have demonstrated that an interactive process with customers is important for the innovation output of creative industries. Firms in creative industries in the city of Berlin satisfying consumer needs through their innovation output should by now be aware of the importance of collaboration with customers. Thus, firms in Berlin's creative industries are missing a chance of earlier interaction with customers if they do not pay enough attention to their customers and integrate them into their innovation process.

Further practical implications for firms in creative industries are that they should by now be clear of the advantage and disadvantages of vertical and horizontal collaboration in the innovation process for their own product and process innovations. Thus, it suggests that firms in creative industries which are not open to collaborate particularly with vertical partners in the innovation process should change their innovation strategy to a more collaborative innovation process.

Moreover, the empirical findings regarding the horizontal dimensions and its influence on the innovation process of creative industries with regard to process innovation suggests that firms of creative industries should recall their position inside the creative cluster and their existing relationships. In order to increase their network and to improve their innovation process in relation to process innovation, firms of creative industries should engage in informal and formal relationships which contribute to the exchange of information and knowledge.

Recommendations for further research

Scientists and academics who deal with creative industries and in particular with those in the city of Berlin gained through this survey a further understanding of their collaboration behavior in the innovation process in relationship to their innovation output. Derived from the findings in the literature and the empirical analysis several implications for future studies in this field are strongly recommended.

The methodological framework can be used as a basis and adopted to other aspects in the context of creative industries and its linkages to innovation. Information used from the BIS 2012 build a solid foundation to extend this research to a longitudinal study in the future, because this study concentrated on the timeframe from 2009 to 2011. Additionally, a descriptive and probit regression analysis is applicable to further research due to the

codification of the data from the BIS 2012. It is recommended that further investigations apply the empirical concept to other cities in Germany or even to cities in other countries within or outside Europe which indicate similarities to Berlins' creative industries.

Furthermore, the author of this thesis encourages researchers to make adjustments to this study either with regard to the data analysis or by dealing with the context of this investigation. For example, to support this thesis a qualitative case study analysis is recommended to elaborate more on the interaction between creative industries and their vertical and horizontal partners in the innovation process. It is also suggested to subdivide the content of this study to gain detailed insights of each of the sectors of creative industries and its linkages to innovation as well as its collaboration behavior.

Besides that the literature and descriptive statistics dealing with the innovation success of firms provided an outlook that Berlin's creative industries generated also other types of innovation. Thus, further research should investigate the contribution of collaboration in the innovation process regarding types of business models, technological innovation and market innovation of creative industries. In addition to that further investigations could explore in how far the different types of innovation of Berlin's creative industries contribute to the innovation process of other sectors.

The results of the empirical analysis indicated that Berlin's creative cluster has a high amount of people with an educational degree. As pointed out in the literature knowledge and creativity are important aspects for the development of innovation in creative industries (Kimpeler & Georgrieff; Throsby, 2001; Throsby, 2001). Thus, further research could deal with the importance of high educational qualification for Berlin's creative industries to generate innovation. This could be also linked to the universities and research institution in the city.

Additionally, further research might investigate the interaction and collaboration of creative cluster with other clusters such as health care, optics, logistic and mobility in the city of Berlin. In the context of innovativeness it would be interesting to compare whether Berlin's creative cluster is more innovative than other clusters in the city.

REFERENCES

1. Alasuutari, P., Bickman, L., & Brannen, J. (Eds.). (2008). *Social Research Methods*. Thousand Oaks, CA: Sage Publication Ltd.
2. Amabile, T. M. (1996). Creativity and Innovation in Organizations. *Harvard Business School*, 1–15.
3. Athey, G., Nathan, M., Webber, C., & Mahroum, S. (2008). Innovation and the city. *Innovation: management, policy & practice*, *10*, 157–169.
4. Babbie, E. R. (1992). *The practice of social research*. Belmont, Calif: Belmont, Calif. : Wadsworth.
5. Bakshi, H. (2009). *Soft Innovation: Towards a more complete picture of innovative change*. London.
6. Bakshi, H., & McVittie, E. (2009). Creative supply-chain linkages and innovation: Do the creative industries stimulate business innovation in the wider economy? *Innovation: management, policy & practice*, *11*, 169–189.
7. Bakshi, H., & McVittie, S. (2008). *Creative Innovation: Do the creative industries support innovation in the wider economy*. London.
8. Baptista, R., & Swann, P. (1998). Do firms in clusters innovate more? *Research Policy*, *27*, 525–540.
9. Bathelt, H., Malmberg, A., & Maskell, P. (2004). Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation. *Progress in Human Geography*, *28*(1), 31–56.
10. Baum, J., Calabrese, T., & Silverman, B. S. (2000). Don't go it alone: Alliance network composition and startups' performance in Canadian biotechnology. *Strategic Management Journal*, *21*, 267–294.
11. Bengtsson, M., & Kock, S. (1999). Cooperation and competition in relationships between competitors in business networks. *Journal of Business & Industrial Marketing*, *14*(3), 178–193.
12. Booz, Allen & Hamilton. (1982). *New products management for the 1980s.* New York.
13. Borooah, V. (Ed.). (2002). *Logit and Probit: Ordered and Multinomial Models: Sage Universities Papers Series on Quantitative Applications in the Social Sciences*. Thousand Oaks, CA: Sage.
14. Caves, R. E. (2003). Contracts between Art and Commerce. *The Journal of Economic Perspectives*, *17*(2), 73–84.
15. Chamber of Industry and Commerce. (2013). *Branchen der Kultur- und Kreativwirtschaft*. Retrieved from http://www.ihk-berlin.de/servicemarken/branchen/Kreativwirtschaft/Branchen_der_Kultur-_und_Kreativwirtschaft/
16. Chapain, C. Cooke, P., De Propis, L, MacNeill, S., & Mateos-Garica, J. (Eds.). (2010). *Creative cluster and innovation: Putting creativity on the map*. London.
17. Chen, P. Y., & Popovich, P. M. (Eds.). (2002). *Correlation: Parametic and Nonparametic Measures.* Sage University Papers Series on Quantitative Applications in the Social Sciences (07-139). Thousand Oaks, CA: Sage.
18. Chen, Y (2012). *Developing creative cities through creative clustering strategy: the case of Shanghai*. Track 5. Cities and Innovation In the Knowledge Society, presented at EURA 2013 Conference, Enschede.
19. Chesbrough, H. (2004). Managing open innovation. *Industrial Research Institute*, 23–26.

20. Chesbrough, H. (2007). Business model innovation: it's not just about technology anymore. *Strategy & Leadership*, *35*(6), 12–17.
21. Cooper, R. (1990). Stage-Gate Systems: A New Tool for Managing New Products. *Business Horizons*, (44-54).
22. Cooper, R. (1999). From Experience: The Invisible Success Factors in Product Innovation. *Journal of Product Innovation Management*, *16*, 115–133.
23. Cooper, R. (2009). How companies are reinventing their idea-to-launch methodologies. *Industrial Research Institute*, 47–57.
24. Cooper, R., Edgett, S. J., & Kleinschmidt, E. (2002). Optimizing the Stage-Gate Process: What best-practices companies do--I. *Industrial Research Institute*, 21–27.
25. Cooper, R. G., & Edgett, S. J. (2008). Maximizing productivity in product innovation. *Industrial Research Institute*, 47–58.
26. Creative Metropole. (2011). *How to support creative industries: Good Practices from European Cities*, *2011*.
27. Cunningham, S. (2002). From Cultural to Creative Industries: Theory, Industry, and Policy Implications. *Quarterly Journal of Media Research and Resources*, 54–65.
28. DCMS. (2001). *Creative Industries Mapping Document*. London.
29. DCMS. (2007). *Staying ahead: the economic performance of the UK's creative industries*. London.
30. Edquist, C., Hommen, L., & McKelvey, M. D. (2001). *Innovation and employment: Process versus product innovation*. Cheltenham, UK, Northampton, MA: Edward Elgar.
31. Faems, D., van Looy, B., & Debackere, K. (2005). Interorganizational Collaboration and Innovation: Toward a Portfolio Approach. *Journal of Product Innovation Management*, *22*, 238–250.
32. Federal Statistical Office. (2008). *Klassifikation der Wirtschaftszweige (WZ 2008)*. Retrieved from https://www.destatis.de/DE/Methoden/Klassifikationen/GueterWirtschaftklassifikationen/Content75/KlassifikationWZ08.html
33. Fesel, B. & Söndermann, M. (2007). *Culture and creative industries in Germany*. Bonn.
34. Flew, T. (2002). *Beyond ad hocery: Defining Creative Industries* (Presented at Cultural Sites, Cultural Theory, Cultural Policy, 2nd International Conference on Cultural Research). Queensland University of Technology, Wellington.
35. Flew, T. (2005). *Creative Cities and Creative Clusters: Presentation to Creative Articulations: Creative Research Network*. Workshop, Brisbane, Australia.
36. Gwee, J. (2009). Innovation and the creative industries cluster: A case study of Singapore's creative industries. *Innovation: management, policy & practice*, *11*, 240–252.
37. Handke, C. W. (2004). *Defining the creative industries by comparing the creation of novelty: Creative Industries - Definitions in scientific and political discourses*. A measure for urban development? Paper presented at Workshop Creative Industries, Vienna, Austria.
38. Howkins (2001). The Creative Economy: How people make money from ideas, Allen Lane, The Penguin Press, In: Cunningham, S. (2002). From Cultural to Creative Industries: Theory, Industry, and Policy Implications. *Quarterly Journal of Media Research and Resources*, 54–65.
39. Hutton, T. A. (2003). Service industries, globalization, and urban restructuring within the Asia-Pacific: new development trajectories and planning responses. *Progress in Planning*, *61*(1), 1–74.
40. Inkpen, A. C., & Tsang, E. W. K. (2005). Social Capital, Networks, and Knowledge Transfer. *The Academy of Management Review*, *30*(1), 146–165.

41. Iversen, G., & Norpoth, H. (Eds.). (1976). *Analysis of Variance: Sage University Paper series on Quantitative Applications in Social Sciences*. Beverly Hills: Sage Publication.

42. Johne, A. (1999). Successful market innovation. *European Journal of Innovation Management, 2*(1), 6–11.

43. Johnson, B. (2008). Cities, systems of innovation and sustainable development. *Innovation: management, policy & practice*, *10*, 146–155.

44. Jong, J. de, Fris, P., & Stam, E. (2007). *Creative Industries.Heterogeneity and connection with regional firm entry* (No. H200714). Zoetermeer.

45. KEA European Affairs. (2009). *The impact of culture on creativity: A study prepared for the european commission*.

Retrieved from http://www.keanet.eu/docs/execsum_creativity_english%20.pdf

46. Kim, J. W., & Higgins, M. C. (2007). Where do alliances come from? *Research Policy*, *36*(4), 499–514.

47. Kimpeler, S., & Georgrieff, P. The roles of CI in regional innovation and knowledge transfer - the Case of Austria. *Measuring creativity. Proceedings for the conference "Can creativity be measured", Brussels, 28 and 29 May 2009 Edited by Ernesto Villalba, Luxembourg: Publications Office of the European Union, 2009 − XXIV + 474 pp*, 207–219.

48. Kind, S. & Meier zu Köcker, G. (2012). *Developing Successful Creative & Cultural clusters: Measuring their outcomes and impacts with new framework tools.*

49. Kukalis, S. (2010). Agglomeration Economies and Firm Performance: The Case of Industry Clusters. *Journal of Management*, *36*(2), 453–481.

50. Lange, B., Kalandides, A., Stöber, B., & Mieg, H. A. (2008). Berlin's Creative Industries: Governing Creativity? *Industry & Innovation*, *15*(5), 531–548.

51. Lazzaretti, L., Boix, R., & Capone, F. (2009). *Why do creative industries cluster an analysis of the determinants of clustering of creative industries*. Summer Conference 2009, Copenhagen.

52. Lazzaretti, L., Boix, R., & Capone, F. (2013). Why do creative industries cluster? In L. Lazzaretti (Ed.), *Creative industries and innovation in Europe concepts, measures and comparative case studies* (pp. 45–64). Abingdon, Oxon, New York, N.Y: Routledge.

53. Lewis-Beck, M. S. (Ed.). (1995). *Data Analysis: An Introduction*. Sage University Paper series on Quantitative Applications in the Social Sciences (07-103). Thousand Oaks, CA: Sage.

54. Liao, T. (Ed.). (1994). *Interpreting propability models: Logit, probit and other generalized linear models: Sage University Paper series on Quantitative Applications in the Social Sciences*. Thousand Oaks, CA: Sage.

55. Malmberg, A., & Maskell, P. (1997). Towards an explanation of regional specialization and industry agglomeration. *European Planning Studies*, *5*(1), 25–41.

56. Maskell, P., & Lorenzen, M. (2004). The cluster as market organization. *Urban Studies*, *41*(5-6), 991–1009.

57. Miles, I. & Green, L. (2008). *The hidden innovation in the creative industries*. London.

58. Mowery, D. C., Oxley, J. E., & Silverman, B. S. (1996). Strategic Alliances and Interfirm Knowledge Transfer. *Strategic Management Journal, 17,* 77–91.

59. Müller, K., Rammer, C., & Trüby, J. (2009). The Role of Creative Industries in Industrial Innovation. *Innovation management policy & practice*, *11*, 148–168.

60. O'Connor, J. (2000). The definition of the 'Cultural Industries'. *The European Journal of Arts Education*, *2*(3), 15–27.

61. OECD. (2001). *Technological Innovations: Glossary of Statistical Terms*. Retrieved from http://stats.oecd.org/glossary/detail.asp?ID=2688

62. OECD. (2005). *Oslo Manual: Guidelines for collecting and interpreting data*. The measurement of scientific and technological activities.

63. OECD. (2012). *The Future of Eco-Innovation: The Role of Business Models in Green Transformation*. OECD Background Paper. Copenhagen.

64. Osterwalder, A., Pigneur, Y., & Tucci, C. (2005). Clarifying Business Models: Origins, present, and future of the concept. *Communication of AIS, 15*.

65. Pampel, F. (Ed.). (2000). *Logistic Regression: A Primer.: Sage University Papers Series on Quantitative Applications in the Social Sciences*. Thousand Oaks, CA: Sage.

66. Popadiuk, S., & Choo, C. W. (2006). Innovation and knowledge creation: How are these concepts related? *International Journal of Information Management, 26*(4), 302–312.

67. Porter, M. E. (1990). The competitive advantage of nations. *Harvard Business Review*, 73–93.

68. Porter, M. E. (1998). Clusters and the New Economics of Competition. *Harvard Business Review*, 77–90.

69. Porter, M. E. (2000). Location, Competition, and Economic Development: Local Clusters in a Global Economy. *Economic Development Quarterly*, *14*(1), 15–34.

70. Potts, J., & Cunningham, S. (2008). Four models of the creative industries. *International Journal of Cultural Policy*, *14*(3), 233–247.

71. Rammer, C. & Horn, N. (2013). *Innovationsbericht Berlin 2013 - Innovationsverhalten der Unternehmen im Land Berlin im Vergleich zu anderen Metropolstädten in Deutschland: ZEW Dokumentation 1302*. Mannheim. Retrieved from http://www.inno.tu-berlin.de/menue/berliner_innovationspanel/

72. Schiele, H. (2008). Location, location: the geography of industry clusters. *Journal of Business Strategy*, *29*(3), 29–36.

73. Senate Department for Economics, Technology and Research. (2011). *Cluster IKT, Medien, Kreativwirtschaft: Auswertung der Berliner Wirtschaftsdaten für die Jahre 2010/11*. Retrieved from http://www.berlin.de/sen/wirtschaft/abisz/cluster_kmk.html

74. Senate Department for Economics, Technology and Research. (2012). *Wirtschafts- und Innovationbericht: Berlin 2011/2012*. Berlin. Retrieved from http://www.berlin.de/imperia/md/content/sen-wirtschaft/konjunkturberichte/wab2012.pdf?start&ts=1345449832&file=wab2012.pdf

75. Senate Department for Economics, Technology and Women. (2008). *Kulturwirtschaft in Berlin: Entwicklung und Potenziale*. Projekt Zukunft.

76. Silverman, B., & Baum, J. (2002). Alliance-based competitive dynamics. *Academy of Management Journal*, *45*(4), 791–806.

77. Stam, E., Jong, J. P. de, & Marlet, G. (2008). Creative Industries in the Netherlands: Structure Development, Innovativeness and Effects on Urban growth. *Human Geography*, *90*(2).

78. Steinle, C., & Schiele, H. (2002). When do industries cluster? A proposal on how to assess an industry's propensity to concentrate at a single region or nation. *Research Policy, 31*, 849–858.

79. Stoneman, P. (2010). *Soft innovation: Economics, product aesthetics, and the creative industries*. Oxford, New York: Oxford University Press.

80. Stuart, T. E., Ozdemir, S. Z., & Ding, W. W. (2007). Vertical alliance networks: The case of university–biotechnology–pharmaceutical alliance chains. *Research Policy*, *36*(4), 477–498.

81. Taylor, R., & Edd, R. (1990). Interpretation of the Correlation Coefficient: A Basic Review. *Journal of Diagnostic Medical*, *9*(1), 35–39.

82. Teece, D. J. (1996). Firm organization, industrial structure, and technological innovation. *Journal of Economic Behavior and Organization*, *31*, 193–224.

83. Teece, D. J. (2010). Business Models, Business Strategy and Innovation. *Long Range Planning*, *43*(2-3), 172–194.

84. Thomas, D. R. (2006). A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation*, *27*(2), 237–246.

85. Throsby, D. (2001). *Economics and Culture*. Cambridge: Cambridge University Press.

86. Throsby, D. (2008). *From Cultural to Creative Industries: the specific characteristic of Creative Industries*. Troisième Journées d'Economie de la Culture: Nouvelles Frontières de l'Economie de la Culture,, Conference held at Musée du quai Branly, Paris.

87. Tidd, J., & Bessant, J. (2011). *Managing innovation: Integrating technological, market and organizational change* (4. ed., reprinted). Chichester [u.a.]: Wiley.

88. Tracey, P., & Clark, G. L. (2003). Alliances, Networks and Competitive Strategy: Rethinking Clusters of Innovation. *Growth and Change*, *34*(1), 1–16.

89. Tsai, K.-H. (2009). Collaborative networks and product innovation performance: Toward a contingency perspective. *Research Policy*, *38*(5), 765–778.

90. Turok, I. (2003). Cities, Clusters and Creative Industries: The case of television and film in Scotland. *European Planning Studies*, *11*(5), 549–565.

91. Ulrich, K. T., & Eppinger, S. D. (2012). *Product design and development* (5th ed., international ed). New York, N.Y: McGraw-Hill.

92. Utterback, J. M., & Abernathy, W. J. (1975). A Dynamic Model of Process and Product Innovation. *International Journal of Management Science*, *3*(6), 639–656.

93. Walsh, A. (1990). *Statistics for the social sciences: with computer-based applications*. New York, N.Y: Harper & Row, Publisher, Inc.

94. Weisberg, H. F. (Ed.). (1992). *series no. 07-083*. *Central Tendency and variability: Sage universitiy paper series on Quantitative Applications in the social sciences*. Newbury Park, CA: Sage.

95. Wu, W. (2005). Dynamic Cities and Creative Clusters. *World Bank Policy Research Working Paper 3509*, Feburary 2005.

96. Yamamoto, M., & Lambert, D. R. (1994). The Impact of Product Aesthetics on the Evaluation of Industrial Products. *The Journal of Product Innovation Management*, *11*, 309–324.

APPENDICES

Appendix 1: Classification of Berlin's creative industries

Domain	*Industries*	*NACE code*	*Description*
Media and Entertainment	**Media**	921 (5911)	Film and video production, distribution, rentals, cinema
		922 (6020)	Radio and television activities
	Publishing	222 (1813)	Printing industry
		221 (5819)	Publishing (journal, newspaper, press agencies, books, news agencies, other types)
		223 (1820)	Publishing and duplication of sound recording, pictures and data carrier
Software and information technology	**Software**	722 (6201)	Software house
		721 (6202)	Hardware consultancy
	Information technology	724 (6312)	Databases
		723 (6311)	Data processing
		726 (6209)	Other data processing
Consulting services		741 (7022)	Business consulting
Architecture and engineering	**Technical design**	742 (7112)	Architecture and engineering services, related technical design and consultancy
Creative services	**Advertising**	744 (7311)	Advertising services, public relations, market research,
	Textile	173 (1330)	Textile finishing
		182 (1413)	Manufacturing of clothing
		175 (1396)	Other textile manufacturing
		192 (1512)	Leatherworking

Appendix 2: Extract Berlin Innovation Survey 2012

A. Questions related to the dependent variable

1. During the years 2009 to 2009 was your company in any innovation partnership involved?

   Yes…….○

   No…….○ → If no, please go to the next section of the questionnaire

2. Please, indicate the type of your collaboration partner and during which phase in the innovation process the collaboration has taken place.

Collaboration with		Idea generation	Product design	R&D/ construction	Testing/ Preparation	Market launch
Universities/ Research institutes	Yes ○ No ○	○	○	○	○	○
Supplier of raw materials	Yes ○ No ○	○	○	○	○	○
Supplier of equipment	Yes ○ No ○	○	○	○	○	○
Clients	Yes ○ No ○	○	○	○	○	○
Customer	Yes ○ No ○	○	○	○	○	○
Competitor	Yes ○ No ○	○	○	○	○	○

B. Questions related to the independent variable

3. During the years 2009 and 2011 did your enterprise introduce any new or significantly improved product or service innovation on the market?

   Yes……. ○

. No……. ○

4. During the years 2009 and 2011 did your enterprise introduce any new or significantly improved process innovation on the market?

   Yes……. ○

   No……. ○

C. Questions related to the control variables

5. What was your enterprise's number of employees on annual average in 2011?

   Total number of employees….

6. With regard to you most important innovation project to what extend achieved your company the following results?

	fully	mostly	partly	not achieved	No goal
Development of new technologies ...	○	○	○	○	○
New markets or target groups…..	○	○	○	○	○
Establishment of new business models……	○	○	○	○	○
Reduction of production and sales costs…	○	○	○	○	○
Reduction of existing products/ processes……	○	○	○	○	○

7. Please estimate the amount of expenditures for the innovation activities of your enterprise in the year of 2011 (incl. personnel and related material costs, third party services and investments)

   Total innovation expenditures…ca. …. .000 EUR No innovation expenditures...

   From that: innovation investments...ca. …. .000 EUR No innovation investments...

8. Please estimate the amount of total expenditure for R&D (internal and external) of your enterprise in the year of 2011?
   R&D expenditures in the year of 2011 (internal + external)….ca. …. .000 EUR
   No innovation R&D expenditure in the year of 2011...