Westfälische Wilhelms-Universität/ Univeristy of Twente
Green Light Version
Bachelor Thesis
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Are Clusters effective systems for Regional Innovation in North Rhine Westfalia?

- illustrated on the AutoCluster.NRW -

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Summary

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This paper aims at analysing the main ingredients of innovation of the state North Rhine Westphalia and the states innovation potential for future economic growth. To get a better insight of how the ingredients of innovation in NRW can be characterized the paper provides a general definition of „innovation" by describing the preconditions of economic developments according to Schumpeter´s theory. After that introduction a closer look at the ingredients of innovation will be given by Cooke´s theory of „regional innovation systems" (RIS). Cooke´s theory divides the ingredients of regional innovation in an infrastructural and a superstructural concept. This separation makes it possible to describe in detail which ingredients the state NRW provides and how they are transferred into a successful RIS. For the definition of the superstructural concept a link will be made to Porter´s „Cluster approach" (1998). The inclusion of Porter´s „Cluster approach" (1998) to Cooke´s theory of „regional innovation systems" (2001) offers a precise extraction of the ingredients for regional innovation the state NRW provides. After the theoretical framework of the paper is established the models will be used as an analytical tool to examine the data and facts which can be found about the state NRW. The research question, we would like to examine within the analytical part of the paper is; Are Clusters effective systems for Regional Innovation in North Rhine Westfalia? – illustrated on the AutoCluster.NRW

1. Introduction and Methodology

1.1. Introduction

This paper aims at analysing the main ingredients of innovation in North Rhine Westphalia (NRW) and the region´s innovation system for future economic growth illustrated on the Auto.Cluster.NRW. To get a better insight of how the ingredients of innovation in NRW can be characterized the paper provides a general definition of „innovation" by describing the preconditions of economic developments according to Schumpeter´s theory. After the general introduction of the term a basic assumption is given which divides new economic developments or in Schumpeter´s words "new combinations" into five main aspects. Furthermore it will be shown how these aspects can be transferred into a successful innovative development system. For this the paper illustrates several adjustment policies, strategies and funding systems the German Government and the EU have established to support research and development in certain areas (e.g. Europe 2020, Horizon 2020, High-tech- Strategy

2020). After the introduction of different development strategies the paper takes a closer look at the available ingredients of innovation in NRW by using Wittkämpers (2006) „Instruments of Adjustment Policies“ and Cooke´s (2001) theory of „regional innovation systems“ (RIS). To get a better understanding of the regions structure the RIS NRW will be introduced. As showed in Cooke´s theory (2001) the paper divides the ingredients of regional innovation in an infrastructural and a superstructural concept. This separation makes it possible to describe in detail which ingredients the state NRW provides and how they are transferred into a successful RIS. The infrastructural issue is separated into three different financial concepts. These concepts represent financial spending systems, which support infrastructures of regional development systems.

The financial support in NRW will be separated into national and European support. The separation provides an inside view on how much funding systems are operationalised. Later Cooke´s (2001) definition of infrastructural and superstructural levels are used to illustrate the regional development potential. To give an example of a successful regional development system the Auto.Cluster.NRW will be looked at more closely. For this Porter´s „Cluster approach“ (1998) is linked to Cooke´s theory (2001) of „regional innovation systems“. As the title of this paper and the summary already suggests, this study aims at analysing the regional innovation potential of NRW and the role they play in the future development of the state. To give an answer to the question the connection of both theories will offer a precise extraction of the ingredients that are useful for regional innovation in NRW. The most useful ingredients for the regions development are the regional University & Education System and the successful High Tech-Strategy NRW. Finally, after a detailed description about how these ingredients support the regional innovation, a main conclusion on the region’s future development potential will be drawn.

1.2. Methodology

The methodology that will be applied for this thesis uses different approaches to analyse the overall research topic. On the one hand a theoretical framework is established to define the term innovation in general and to give an insight of what the ingredients of innovation are and how they can be integrated into reality . The second part of the thesis follows a qualitative methodological concept. In this approach the collected data which will be used to illustrate if NRW´s innovation

strategies are comprises what the theoretical approaches considers as relevant for regional innovation.

In the first part of the thesis a basic terminology and a theoretical framework will be constructed. At the beginning Mackinnon´s and Cumbers (2011) is used to define the terminology of innovation. After that Schumpeter´s (1911) pre-conditions of economic development will be explored focussing on the creation of „new combinations“. Following Schumpeter´s approach it gives an insight of how new innovation strategies occur. In terms of Germany as a member of an economic union (EU) Schumpeter´s approach is extended with a level of endogenous enactment. After that the next part of the theoretic framework is focussing on the ingredients for regional innovation introduced by Philip Cooke (2001). Cooke´s theory (2001) delivers an overview of what the necessary ingredients of innovation are and creates a concept which can be used in the analytical part to point out if NRW provides some of these ingredients for regional innovation. In his approach (2001) he divides the ingredients for regional innovation in infrastructural and superstructural issues which helps to get an overview of how the ingredients for regional innovation can be combined most effectively. The conclusion of this paragraph provides a tool which is considered as an instrument to characterize the innovation potential and to implement strategic innovation policies. For a better understanding of how adjustment policies are operationalised to benefit innovation, Wittkämper´s (2006) „Instruments of Adjustment Policies“ are introduced. With these instruments in mind, the last part of the theoretical framework introduces a concept which assembles strategies and ingredients of regional innovation. Using Porter´s „cluster approach“ (1998), cluster´s seem to provide a strategical framework to implement adjustment policies and the available ingredients of regional innovation to successfully increase regional development.

As the first part of analysing Strategies of Regional Innovation in North Rhine Westphalia and how they are operationalised, the general conditions of regional innovation in Germany will be described. After the introduction the conditions are separated in two strings of adjustment programs. The first string is focussing on German adjustment policies, for this different strategies are illustrated, like the *High-tech Strategy* and the *Exzellenzinitiative des Bundes*. The data used for the analysis is drawn from the *Bundesministerium für Bildung und Forschung*, the coalition agreement 2005 (Koalitionsvertrag CDU, CSU, SPD, 2005) and the Exzellence Initiative of the Federal State of Germany. The second string has its focus on European Adjustment policies. To analyse European adjustment policies, first it is illustrated how the concepts for regional innovation in Europe are integrated

into European law. After that some European innovation strategies are introduced (Europe 2020, Horizon 2020). Most data used in the analysis is extracted from reports of the European Commission, The Treaty of the Functioning of the European Union and several Ministries of the Federal State of Germany. Following the concept developed in the theoretical framework the analysis of the different strategies on both dimensions (Germany and the EU) helps to extract the regions development potential and the ingredients of innovation NRW provides. According to that, following section illustrates how the financial support on both dimensions is operationalized.

The second part of the thesis will be a case study of Strategies of Regional Innovation in North Rhine Westphalia and how they are operationalised, illustrated on the Auto.Cluster.NRW . As an overview of the state NRW as an industry location and some facts and figures about NRW will be illustrated – its main actors and the economic, cultural and scientific situation of the state. Then an overview of the innovation strategies in NRW will be given. Following the specific regional identity of NRW´s different strategies (Leitmarktstrategie) and concepts (Exzellenz NRW) will be explored, by using data from the *Bundesministerium für Bildung und Forschung, the Ministerium für Wirtschaft, Mittelstand und Handwerk des Landes NRW and Exzellenz.NRW.* This data will be used to show that NRW provides potential for sustainable regional innovation and development. Furthermore this section provides data that support the theoretical suggestion, that clusters are a beneficial instrument for regional innovation. Therefore in the last section, the Auto.Cluster.NRW. serves as an example for one of NRW´s successful cluster projects. To illustrate the benefits and maybe some of the Auto.Cluster.NRW a study on the structure of the cluster on behalf of the Autocluster.NRW was executed by expert's under the patronage of Garrelt Duin (2014). The data gained from the study supports the effectiveness of clusters but also claims that there are still risks of regional innovation systems like clusters that have to be solved.

The state NRW is located in the west of the Federal Republic of Germany. Currently NRW has a population of about 17 Mio. which is nearly the size of the population of the Netherlands (statista, 2014). The state is characterized by several attractive cities (Köln, Münster) and a great variety of cultural landscapes, industries and a high number of relevant historical places and areas. These facts makes it interesting to figure out, which strategies of innovation are available in NRW and how it can be used to develop the future economic growth of the regions.

In most papers about “Regional Innovation” the term innovation is not clearly defined. For this reason it seems to be an appropriate approach to get a clear definition of the term before analysing the functioning of a Regional Innovation System (RIS).

2. Theoretical Framework

2.1. 2.1. Definition and Preconditions of innovation

2.1.1. General definition of innovation

In science a variety of definitions for the term of innovations can be found. The definition of the European Commission for innovation is:
„Innovation can be defined as the development or adoption of new concepts or ideas, and/or the new or adopted ideas themselves as well as the successful exploitation of new ideas. Creativity is having the ideas, and innovation is its application. Creativity only emerges when the innovator takes the idea and does something with it. Successful exploitation of new ideas can lead to any form of increased organizational or social benefit. (European Commission, 2013

Innovation is a “key theme of knowledge-based economic development” (Mackinnon et al, 2011, p. 246) and generally has a primarily competitive character. Furthermore, an innovative system is characterized by creating new artefact, services or the modification of the existing ones to gain competitive advantages on the markets (Mackinnon et al., 2011).

2.1.2. Preconditions of economic development

The founder of systemic economy is Joseph Alois Schumpeter (1883-1950), who first dealt with the term innovation (Wittkämper, 2005). In his „theory of economic development“ (1911), the term innovation is described more precisely. In general innovation is described as a product of the economic history, which has to be seen as a product of an overall concept. This concept consists of a systematic circulation and continuity, which creates new combinations. Schumpeter´s (1911) concept splits up from the general definition and follows the question;

How do these new combinations arise and which economic phenomena do they create?

To find an answer to these questions Schumpeter presupposed some conditions which are necessary for economic development. At first it has to be determined that economic development does not arise autonomously as a cause of present conditions. If that would be the case, development would only be a process of adjustment. As a result of that Schumpeter divides development into two categories:

1. Effects on development (clear casualties)

2. Repercussion on development (unpredictable effects)

Schumpeter's theory of regional development tries to focus on the effects and repercussions of development which explains the term of innovation and can be used as a method to identify the problems of innovative development. As a basic requirement Schumpeter points out that the productions side has to take the initiative to solve the demand for new innovations. According to Schumpeter (1911) without knowing of a new product or method or idea, there is no demand to be innovative. Furthermore he assumed that new innovations differ from continuous developments. Continuous development is more like a continuous adaption and new developments are the result of creating new combinations.

2.1.3. Basic assumptions to create new combinations – Schumpeter (1911)
Schumpeter has divided the creation of new combinations into five main aspects.

1) The production of goods which consumers are not familiar with or the production of goods which have developed a new quality.
2) Introduction of a new method of production (process innovation), with practical use, which producers are not familiar with. This invention is not necessarily connected to a new scientific break-through and furthermore this new method can produce already existing goods by using a new commercial production process.
3) Opening up a new market (market innovation), even if this means opening up a new market in a sector of industry which the relevant country has not been introduced to. It does not matter if the sector of industry already exists.
4) The conquest of a new source of supply for raw materials or half-manufactured goods (supply chain innovation). In that case it is irrelevant if a source already existed or if it was not noticed by producers or if it was not easily accessible.
5) Carrying out a modern way of organization for a modern industry by bursting an already existent monopoly.

At the beginning of an economic development period „new combinations“ do exist next to „old continuities“, these “old continuities” are a part of „old combinations“ which are owned by a state or an entrepreneur, Schumpeter describes. Without this condition an innovation would not be able to advance economic development. In fact only a production owner or state is capable of controlling all continuities, discontinuities and their processes. The control of these processes is a necessary component to reach the anticipated demands to create new combinations. The state or the production owner need to use the power from “old combinations” to be able to reach the full potential of “new combinations”. It is called the alternative usage of production goods in the economy. At this point Schumpeter´s theory is limited. It is not clear if it is possible that a state can create new combinations in collaboration with an entrepreneur, which could be an acceptable method as well. In addition to that a main aspect of the creation of new combinations is to develop an alternative method for the usage of the capital, without saving it or expanding the available volumes of human capital. A state or production owner can independently decide if he wants to use existing money-capital or human-capital to develop new combinations. This condition makes it possible for entrepreneurs and states to change the economy through their own actions (Schumpeter, 1911).

Considering a state as a member of the European Union an extension of Schumpeter´s approach seems necessary. As it was already mentioned Schumpeter´s theory does not make it clear if it is possible for a state to create new combinations in collaboration with an entrepreneur. Several Examples have shown that this collaboration is possible in reality, e.g. Auto.Cluster NRW. The reality shows that being a Member of the European Union has opened up further levels of cooperation. Using the approach of Stegmaier, Kuhlmann and Vissers work “Governance of the Discontinuation of Socio-Technical Systems” as an inspirational approach (2012). The European Union has to be seen as a framework or concept of cooperation. As Stegmaier, Kuhlmann and Visser (2012) have quoted in their paper: “Generally, in any product market there are periods of continuity, when the rate of innovation is incremental and major changes are infrequent, and periods of discontinuity, when major product or process changes occur. Radical changes create a new business and transform or destroy existing ones.” The cooperation’s within the EU, national governments and different entrepreneurs can improve their enactments in regional innovation systems and serve as an instrument to significantly increase changes in the regions development. The changes occurring in periods of discontinuity can be initiated by endogenous enactment. Endogenous

enactment means that new combinations are caused by supranational policy instruments used by an endogenous institution like the European Union. This endogenous inference can open up new markets and be a trigger of a new level of innovation.

In conclusion Schumpeter (1911) defines a general theory of innovation in which an entrepreneur or state has the ability to create new combinations through the investment of its available capital. In consideration of that Schumpeter (1911) defines the input of capital by an entrepreneur or state as the engine of an innovative development system.Furthermore, an extent of Schumpeter´s theory to a level of innovation through endogenous enactment can activate innovative developments even more. A more detailed definition of what the main ingredients are and how these ingredients keep a regional innovation system running, was defined by Philip Cooke (2001)

2.2. Regional Innovation Systems – Philip Cooke (2001)

2.2.1. What are the ingredients for regional innovation?

Philip Cooke (2001) has presented „a systematic account of the idea and content of regional innovation systems following the discoveries made by regional scientists, economic geographers and innovation analyst. “ (Cooke, 2001, p.1) The aspects mentioned in the following section are an extract of the required ingredients for regional innovation which can be found in Philip Cooke´s paper „Regional Innovation Systems, Clusters and the Knowledge Economy“(2001).

According to Cooke (2001) a reason why regional innovation systems are successful is: Stability and maybe a moral issue – like a certain kind of responsibility of the entrepreneur for that particular region. Stability means that a region meets the conditions and criteria which are necessary to fulfil the structural issues of a RIS. Cooke (2001) has divided them into infrastructural and superstructural issues. In his paper Cooke (2001) presents both structural issues and has worked out which concept of infrastructural and superstructural issues can provide a higher or lower RSI potential.

2.2.2. Infrastructural issues

The infrastructural issue includes a certain regional financial competence which should preferably be based on a regional public credit system. The initiator of a regional public credit system is usually the local governance. As a result this system suggests lower risks for private investors, which can cause positive effects on regional innovation. Philip Cooke (2001) refers to three kinds of budgetary competence where regional administration is involved.

A) Decentralized spending: governmental expenditures on certain items which flow through a region
B) Autonomous spending: regions have autonomous competence on spending
C) Taxation authority: regions have taxation and autonomous authorities

Oriented on Philip Cooke´s (2001) findings „the strongest base for the promotion of regional innovations can be in regions where they have established regionalized credit facilities and administrations with autonomous spending and/or taxation authority. In reference to that a federal system like Germany has great impact on regional innovation. The competences of regional authorities can positively influence investments in harder infrastructure, such as transport and telecommunication or softer like universities, research institutions, science parks and technology transfer centres, claims Cooke (2001).

B. +C.
Combinations of different infrastructural levels including an autonomous spending and a taxation authority are mostly found. These combinations provide regional private funding, high policy influence on infrastructure and a regional university-industry strategy. It is to mention, that these combinations do not necessarily rise to a development potential of a RSI.

A.
On the other hand Cooke (2001) illustrates that a region with decentralized authority usually provides a national financial organization with limited influence on infrastructure and a small amount of regional innovation projects.

2.2.3. Superstructural issues

With these infrastructural conditions in mind Cooke (2001) has advanced his work with a superstructural issue. In regards to an infrastructure with a decentralized authority or an autonomous spending and taxation authority he has added three relevant dimensions of a superstructural issue.

Superstructural levels are:

1. An institutional dimension,
2. A organizational dimension (firms) and
3. An organizational (policy) dimension which can lead to a higher or lower RSI potential.

In case of higher regional innovation potential Philip Cooke (2001) says that on the institutional dimension the ingredients such as a Co-operative culture, interactive learning and associative-consensus are given. The organizational dimensions of firms and companies provide harmonious labour relations, worker mentoring, externalization and interactive innovation. Added to these dimensions is the organizational dimension oriented on policies which supplies a region with monitoring and consulting network.

According to Cooke (2001) a lower regional innovation potential is connected to a competitive, individualistic culture and institutional dissension which can be found on the institutional dimension. The organizational dimension of firms here is characterized by antagonistic labour relations, self-acquired skills, internalization and an individualistic R&D system. The organizational policy dimension contains attributes of an exclusive, reacting, authoritative hierarchy.

In conclusion it can be said that a RIS needs governmental support through autonomous spending and taxation authority connected to favourable conditions of the superstructural issue. Philip Cooke (2001) illustrates in his paper that a lack of innovation potential has to be filled with federal budget and support programs. This means that a great deal of responsibility is resting on the shoulders of government functionaries. If this is the case it is going to be interesting to figure out how to identify a region which can provide these ingredients and in which dimension it can be classified.

Following Cooke's approach (2001) and adding the extended version of Schumpeter´s theory seeing a state as a member of an economic union (e.g. European Union) it seems possible to rise the innovation potential to an even higher level. As it was said in the conclusion a RIS with high innovation potential needs governmental support through autonomous spending and taxation authority connected to favourable conditions of the superstructural issues, a new dimension can be added to this approach. According to the extension of Schumpeter´s theory (1911), endogenous enactment can possibly increase the innovation potential of a region. Endogenous enactments by external authorities seem to be likely to reduce the pressure and lower the risks of private and governmental investors within certain regions. To implement the dimension of endogenous enactment to increase the innovation potential of a region a number of adjustment policies are necessary.

2.3. Adjustment policy

To meet the requirements of the infrastructural and superstructural issues the regional adjustment policy offers a variety of instruments to characterize the innovation potential of a region and to implement strategic policies to improve a region's economic growth. Regional government functionaries use four different groups of instruments to increase the innovation potential of their region.

2.3.1 Instruments of Adjustment Policies (Wittkämper, 2006, p. 281)

1. Instruments of Analysis, especially for monitoring and analysing locations i.e. diagnosis of economic potential and location factors

2. Instruments of Development and Strategy, which are introduced in a certain area to secure existing industries, to develop commercial space and infrastructure

3. Instruments resulting from information and public affairs, e.g. provision of local industries with information regarding public construction projects or public support programs and to make information available for non-residential groups

4. Instruments of Financial Support, e.g. financial competence and funding

These four instruments have to be adjusted depending on the dimension which will receive the treatment. According to that, the adjustments will differ depending on which institutional or organizational dimension is involved. On the EU level adjustment policies are considered a instruments to generate a strong incentive for horizontal and vertical coordination and cooperation, which benefits regional innovation and has significant impact on the interregional level (EU, MS, State, Region), as mentioned by Maier, Tödtling and Trippl (2006).

2.4. Cluster - more potential for regional innovation

A theoretical foundation for the effectiveness of clusters has been developed by Michael Porter (1998) and Philip Cooke (2001). Cooke (2001) defines clusters as an appropriate instrument to implement the ideas of regional innovation. To strengthen a cluster for a long period public funding serves as a useful instrument. That could be the instrument to start the evolution of public innovation, even though it is not sure if the investment turns out successful. Following Cooke´s question (2001):

Are clusters “the special ingredient” for the development of regional innovation?

To give an answer to that question Cook (2001) has quoted Porters definition (1998) of clusters:
Geographic concentration of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions . . . in particular fields that compete but also co-operate. (Porter, 1998, p.197)

The aspect of geographic proximity is necessary condition a cluster to establish. Clusters were established to close gaps in supply chains between geographic concentrated and interconnected institutions and companies, which were generally implemented through/in regional innovation systems.

2.4.1. Cluster and the new economics of competition – Michael E. Porter (1998)

After we have figured out what the necessary ingredients for regional innovation are we are taking a closer look at Porter´s „Cluster approach“ (1998). As already mentioned clusters promote competition and cooperation of geographic concentrated companies from one particular field or related industries. Cluster represents a linkage between...

- Suppliers (machines, service)
- Providers of special infrastructure
- A company itself
- Companies of complementary products or related fields
- Government
- Universities
- Think tanks
- Vocational training providers
- Education
- Trade associations
- Research and technical support

In his paper „ Porter figured out „three way´s“ (Porter,1998, p. 959) how clusters can affect competition and why clusters can be critical to competition.

2.4.2. Clusters and Productivity

In the first part of his paper Porter (1998) describes how clusters can increase the productivity of companies based in one area. He points out that cluster „operate more productively in sourcing input, accessing information and technology“. Furthermore he discovered that coordinating with related companies has a measurable positive effect on improvements and motivation of a Cluster. Another positive effect is that in most clusters a pool of experienced and specialized people from related companies or industries work together, which can lower the search and transaction costs remarkably. Clusters are an alternative to vertical integration, which means that small companies with low reputation but new inventions, new inputs and new ideas can get easily integrated, which can lead to a more effective and responsive production in a fast changing environment. Furthermore, Porter (1998) points out that a good company performance can boost other members of the cluster. In addition to that it can benefit all members when the reputation of a cluster is good. A good reputation does not only attract new customers, but it can make it more likely that private and governmental investments are made. Porter mentioned (1998), even though co-operation has great benefits for a cluster a little amount of local rivalry can be highly motivating, because the results of the others are always right in front of you.

2.4.3. Clusters and Innovation

In section two Porter (1998) describes how clusters benefit innovation in an area of production. He claims that cluster members have a „greater window on the market". Given the transparency of the market it opens doors for a cluster to learn more about all needs and trends to evolve new technological components and to create and develop new service and marketing concepts. Furthermore, it provides more flexibility and more efficient actions. In addition to that, it can be a positive aspect for an innovation system that companies in a cluster are usually located in a close surrounding which makes it possible to find solutions and new concepts in a face-to-face environment, he adds.

2.4.4. New business formation

The third section brings up some key aspects of how cluster can affect the formation of new businesses. One aspect Porter (1998) points out is that working in a cluster can show off gaps in an economy, which sometimes brings up the idea for new business formations. Furthermore a cluster provides lower entry barriers to enter new markets, because they dispose over great amount of knowledge, available staff and input. According to Porter (1998) clusters have smaller risks to enter new markets, which can be beneficial for all members and be a chance to gain success.
After pointing out how clusters can theoretically affect competition, it might be helpful to figure out how a region can benefit from establishing them. Regarding this Porter (1998) delivers a great overview in his work „*Cluster and the new economics of competition"* how they arise and affect a region.

2.4.5. Why clusters?

A cluster usually results from several determinants, for example the historical developments of a region. In general it is the demand of a region for a product or the co-operation of two innovative companies which causes the establishment of a cluster, says Porter (1998).
This leads to the question: What are the possible advantages of developing a new cluster in an area?

A cluster represents a home base for regional innovation. The main activities at the so called home base are strategy development, working on the core product, creation and renewing of companies and services and business calculations. All

decisions made at the home base must be thought through and future-orientated. Therefore the geographical proximity of cluster members is in perfect condition. Porter (1998) argues, „social glue binds clusters“ which is a key aspect of why clusters are globally successful. Furthermore, the social aspect can bring up local investors who like to develop the prosperity of their local environment and additionally benefit local institutions, utilities and research groups. Porter (1998) adds that the extension of clusters can keep the innovative engine running for decades.

In conclusion it can be said that it is highly important for all members of the cluster to keep up with competitors and to maximize their high standards immediately otherwise it can turn into a loss of reputation for the whole cluster. For that reason it is essential to create innovative forums to collect information or investigate solutions and to establish institutions which are aiming on creating RIS.

3. Analysis: General Conditions of Regional Innovation in Germany

3.1. Innovation and Structural Support

The following section will provide an insight which strategies have been introduced and coordinated to increase the innovation potential in Europe and Germany in general and more specifically in North Rhine Westphalia since 2005. Later it will be illustrated how clusters were used to solve this task and if clusters are an appropriate instrument to realize long term sustainable and economic growth in NRW.

According to Schumpeter´s „theory of economic development“ (1911) investment of entrepreneurs and states cause „new combinations“, which are the motor of innovation and economic development. Based on that theory the following section will show how European Union, the Federal State of Germany and the State NRW are strategically using adjustment policies and funding systems to create new combinations and bring up economic development as a result.

To keep up in the global economy it is important for the European Union and single states like Germany to invest in R&D (research & development). In fact the „High-Tech-Strategy“ and the ten future projects (Zukunftsprojekte) of Germany and further the guidelines of the European Union (EU) are growing ever since. In the last ten years financial investments in RIS all over Germany have increased. In 2012 the

state invested about 13.475 Mio. Euro in R&D, moreover the German economy has supported R&D with more than 54 Mio. Euro (Bundesministerium für Bildung und Forschung, 2014). With these numbers Germany almost invested 3% of its Gross Domestic Product (GDP), which is the expected value of the EU program „Europe 2020“ (European Commission, 2010).

For a better overview of the next section German and European adjustment programs will be separated in two strings.

String 1: German Adjustment Policy - High-tech-Strategy since 2005

3.1.1. High-tech-Strategy 2005

The High-tech-Strategy (Bundesministerium für Bildung und Forschung) 2005

In 2005 the governing coalition (CDU, CSU, SPD) of Germany has decided to introduce a national „High Tech-Strategy Germany“ for all resorts to reach a front row position on future market economies. In the coalition agreement of 2005 the governing parties have relaunched a chapter for “cluster and highly innovative lighthouse projects” (1.7. Cluster und hochinnovative Leuchtturmprojekte). In this section of their coalition agreement their economic policy strategy focused on sustainable growth and higher employment rates. Their aims were to strengthen networks of practical research and innovative development to create new products, new companies and more employment with a sufficient distribution of the available capital. The development of cluster will solve the transfer of technologies between economy and R&D in close proximity. To support already existing clusters the coalition has planned a thought out funding system. The “High Tech-Strategy Germany” was intended to serve as concept of support for advanced and cross-sectional technologies to provide German companies with fair conditions on the competitive global market. Moreover, the coalition's plan was to consolidate Germany's international competitiveness and to increase the efficiency of clusters, to expand the technology standards in Germany (Koalitionsvertrag CDU, CSU, SPD, 2005). The concept of technological development can be classified as one of Wittkämper´s (2006) “Instruments of Adjustment Policies”. Technological expansion according to Wittkämper (2006) is an Instrument of Development and Strategy. To solve their demands of technological development “innovative lighthouse projects” were introduced in the coalition agreement (Koalitionsvertrag CDU, CSU, SPD,

2005). The concept the coalition has followed in the “High Tech-Strategy“ was subdivided into four thematic focusses.

1. Strategic initiatives in 17 future fields; with the aims of increasing wealth and providing labour.
2. Concentration on Cluster Management and joint projects to enhance cooperation’s between Science and Economy.
3. Development of Support Instrument for realizing Ideas and Research Projects on products, services and procedures more efficiently.
4. Improvement of the conditions for start-ups and entrepreneurs.

Before the “1) Strategic initiatives” have been introduced a report was prepared in which the strengths and weaknesses of the national economy were analysed. The idea was to use the knowledge gained from the report to develop strategies which were able to open up new markets for products and services and to advance Germany's position on leading markets (Bundesministerium für Arbeit und Soziales, 2007). This instrument of analysing the innovation potential is according to Wittkämper (2006) a general “Instrument of Adjustment Policies” (2.3.1. No. 1.).

The analysis of strengths and weaknesses can also be linked to what Schumpeter (1911) calls „a process of adjustment“. Focussing on the developments that innovative programs have made since Schumpeter has introduced his approach, it seems that many governments have set themselves in a position of an “Initiator of Innovation”. Considering the fact that in Schumpeter's approach the production owner was primarily able to take the initiative to solve the demand for new innovations. A steady input of innovative strategies, support and a sophisticated funding system, by the national government or further the European Union, seem to provide even more incentives for innovation. The extension of Schumpeter's theory can be consolidated with the results of a scientific discussion between members of the GWK (Gemeinsame Wissenschaftskonferenz) and experts of innovation policies. Within their discussion they have pointed out several factors for the success of Germany's High Tech Strategy. According to these experts Germany's success is a result of a constant increase of innovative activities, an efficient cooperation between governments, economy and R&D and initiative programs which gave impulse to create new products, new companies and more employment e.g. the High Tech Strategy (Gemeinsame Wissenschaftskonferenz, 2013)

A further development of the High Tech Strategy was introduced in 2010. The aims of the renewed program was to keep with the consistency of the old strategy and to add new highlights at the same time (Bundesministerium für Forschung und Bildung, 2010).

3.1.2. High-tech-Strategy 2020 (Hightech-Strategie 2020)

The High-tech-Strategy 2020 (Bundesministerium für Bildung und Forschung) is a program of the Federal State of Germany, which was established to provide a better position for the german economy on international markets. The main task of the strategy is persisting against recent challenges like climate change. The German government supports the High Tech-Strategy 2020 through an overall concept, which provides innovative policy goals/objectives. These goals include topics like climate/energy, health/nutrition, mobility, safety and communication. These five key topics, technologies and their innovative policy frameworks are actively supported by the national government. The idea of the state is to convince companies, universities and research institutions to ambitiously work on the project to release a rewarding “4th industrial revolution”. In NRW the program has sponsored several *Excellence Initiatives*.

3.1.3. Exzellenzinitiative des Bundes (Excellence Initiative of the Federal State of Germany)

This *Excellence Initiative* (Exzellenzinitiative Bielefeld, 2014) was established to support science and research programs in German universities. In 2005/06 the initiative was founded and from then on it has its key objectives in future concepts (Zukunftskonzepte), Excellence Clusters (Exzellenzcluster) and graduate schools (Graduiertenschulen). The target of the *Excellence Initiative* is to promote *Excellence Cluster* at university locations in Germany as visible and competitive research and education institutes. With these targets in mind the government is focussing on strengthening the sustainability of Germany's scientific location on the international markets. (In the first period (2006/07-2012) the state of Germany provided 6, 5 Mio. Euro for the Initiative. For the second period (2012-2017) a sponsorship of 3 to 8 Mio. Euro is planned (Deutsche Förderungsgemeinschaft, 2015).

String 2: European Adjustment Policy since 2010

3.2.1. European Adjustment Policy

According to Art. 3 § 3 TEU the targets of the European Union are, to work for economic and social progress aiming at full employment and to generate balanced and sustainable development within the Member States. With respect to Art.3 § 3 TEU and according to the economic and social diversities of the 28 Member States of the European Union it seems to be necessary to use policies which support economic and social cooperation to increase regional innovation potential. To solve the problem of inequalities within regions the European Union targets on decreasing the backwardness of regional innovation and economic growth in certain areas. For this purpose the European Union has established several funds and financial support programs (S. 291) (Wittkämper, 2006). The cohesion and adjustment policy of the European Union is seen as an expression of solidarity within the Member State of the Union. European adjustment policy is closely connected with the aims of the strategy - *Europe 2020*. The strategy *Europe 2020* aims on developing smart, integrative and sustainable growth within the European Union (European Commission, 2010). European adjustment policy can be seen as a part of general economic policy, which is introduced as a support for national regional policies, e.g. EU adjustment policy supports the development of new products or production methods by connecting the transfer of technologies within companies and research institutes. The legal basis of European adjustment policy is addressed in the Art. 174 to 178 of the Treaty of the Functioning of the European Union (TFEU). Referring to Art. 175 TFEU the European Commission has to "submit a report to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions every three years on the progress made towards achieving economic, social and territorial cohesion" (Art. 175 §1 TFEU). The European Commission reports the inventions in growth and employment and consequences of the European economic crisis on regional disparities (BMWI.de , 2015). According to the report the access to the European Union and the Single market delivers more potential for specialisation and spatial clustering. In terms of that, clusters can be beneficial for less developed Member States to maintain a large share of employment in industry. The accessibility to affordable labour and new products and production methods create attractiveness of regions for manufacturers (European Commission, 2014).

3.2.2. Europe 2020

The goal of the EU program "*Europe 2020"* is to control and support a smart, sustainable and inclusive economic growth all over Europe. One of the key points of the program is that every member of the European Union spends 3% of its GDP on research and development (R&D). All in all the entire program has seven guidelines, which are definite for all members. These guidelines represent an *Innovative Union,* which is capable of supporting the economic development of Europe (European Commission,2010). The program serves as a support for national innovation programs, like the High-tech-Strategy 2020 (Bundesministerium für Bildung und Forschung) which is realised in Germany.

3.2.3. Horizon 2020

The framework program for R&D of the European Union is called *Horizon 2020 and* was introduced in January 2014. *Horizon 2020* has control for about 77 billion Euro grants for R&D. This program was established to build up a competitive economy in Europe and to introduce R&D systems to the European public society (horizont 2020, 2014). Furthermore, *Horizon 2020* aims stabilising the position of the European Union on the global economic market. For reaching the objectives the program bundles the research emphasis and works on the effectiveness of inter cooperative actions between the MS (bmbf, 2014). With a grounded strategy *Horizon 2020* is directed on combining research and support in key areas for universities, research institutes and companies (horizont 2020, 2014).

After general innovation strategies and programs in Germany and within the European were introduced, the next section will concentrate on how their funding system is operationalised.

4. Financial Support

4.1 Operationalisation of Financial Support - Germany

The instrument of financial support is according to Wittkämper (2006) an instrument of adjustment policies which can be classified as an infrastructural issue.

Following Cooke's approach (2001) a combination of autonomous spending and taxation authority is an appropriate issue to positively influence regional innovation. The authorities, in terms of structures of a funding system in Germany with regards

spending and taxation, can be found within the federal government and the states government. An efficient research and innovation focussed funding system requires cooperative authorities from both levels. For this reason a funding system has to be integrated within several institutional and legal dimensions.

Legal Dimension:

The funding of R&D is a joint task of state and society. The freedom of science and research is secured in the German constitution (Art. 5 Abs. 3 GG), but to implement, the law a framework of financial support is required. According to Art. 91 b GG a general definition for cooperative support of the federal and states government is given, which includes that both institutions are able to work jointly under the conditions of an associative consensus on transregional funding projects.

Institutional Dimension:

On the institutional dimension the ministries of Research and Science work together with several other resorts of the federal and states governments. A joint conference (Gemeinsame Wissenschaftskonferenz) is used as a forum of communication and coordination of related policy areas. The conference also serves as an instrument to organise transregional funding projects (e.g. Excellence Initiatives). Another institutional instrument is a science council (Wissenschaftsrat), which serves as an advisor on content and structural issues for the federal and state governments. The council consists of a group of researchers and public officials (Bundesministerium für Bildung und Forschung, 2014).

The ingredients of a German system of research and innovation with its focus on funding are almost equal to the ingredients Cooke (2001) has pointed out in his theory. According to the description of the German funding system mentioned above a link can be drawn to Cooke's (2001) infrastructural and superstructural issues. Analysing the regional innovation potential of the funding system for innovation and research under the conditions of Cooke's (2001) approach Germany provides a high innovation potential. As we have suggested in the theoretical framework (2.3.) it seems to be possible that a state covering all beneficial infrastructural and superstructural issues is most likely to increase his innovation potential being a Member of an economic union. In terms of Germany, as a Member of the European Union, it is interesting to see how European funding of research and innovation is operationalised and how it benefits the work of the MS.

4.2. European Regional Development Fund (ERFD)

The European Structural and Investment Funds were established in 2006 and integrated in the Europe 2020 Strategy. The funds were established to improve coordination and to ensure consistent implementation of European innovation strategies (European Commission, 2014). The Member States administer the funds through shared management which excludes the problems of decentralized spending Cooke (2001) has illustrated (2.2.2. A.). The structural fund for regional innovation is *European Regional Development Fund (ERFD).* The ERFD provides financial aid with the goal of enforcing economic and social consistency by equalizing regional differences. The key points of the fund are known as “thematic concentrations” (European Commission, 2014). The fund supports structural changes and supports development of regional economies. Another main focus of the fund is a transformation of less-developed regions and regions with a declining industry through cross-border support and inter co-operations between the MS (MESRS, 2014). Depending on the size and economic capacity of the region and under agreements between European Commission/MS and MS/regions the funds are operationalised. Furthermore, it is a clear ambition of the fund to support less developed regions with a higher percentage of funding than regions with a strong economy (Förderbank, 2014). In the Official Journal of the European Union (Regulation (EU) No. 1301/2013) the directives of the ERFD are defined. According to Cooke's approach (2001) the directives of the ERFD fulfils almost all requirements to increase a region's development potential.

After the general conditions for regional innovation within the European Union and the Federal State of Germany have been analysed. The next section focuses on illustrating innovation strategies and programs followed in NRW and how clusters make use of these conditions to increase the regional development potential.

5. Analysing NRW as an industry location

The following part will give an overview of the benefits of NRW as an industrial location. In addition to several geographical and industrial benefits the state NRW offers a great variety of innovation programs. By using the introduced theoretical framework it will be illustrated how the State takes advantage of their beneficial location to improve the innovation potential of the region. With a practical usage of the introduced theoretical framework it will be analysed how the strategies of the European Union, the Federal State of Germany and the State North Rhine

Westphalia serve to increase regional innovation potential in North Rhine Westphalia.

5.1. Facts and Figures about North Rhine Westphalia (NRW)

In the North the State NRW frontiers Niedersachen, Hessen in the East, Rheinland-Pfalz in the South and Belgium and the Netherland in the West. The great number of neighbours provides the State with great potential for economic and social relationships. NRW industrial and social landscape is characterized as one of the major economic centres in Europe, including the Rhine-Ruhr Region known as the greatest conurbation in Europe. Currently, more than 17 Million (2013: 17,57) people live in NRW on an area of about 34.000 Square Meter. Most of NRW´s inhabitants live in one of the 28 major cities, which supplies the region with a wide range of cultural diversity in a close surrounding. The metropolitan region Rhein-Ruhr offers living space for more than 10 Mio. people. NRW is the most populous State in Germany and obtains 21,9 Percent of the German GDP, which is the highest proportion of all States (land.nrw).

These numbers show that NRW is equipped with high economical capacities and strengths. For decades NRW is considered the industrial core region of Germany. More than a quarter of the net value of the region is earned by the production industry. This branch of industry offers jobs for more than 1.3 Million people in NRW. The industry is the motor of innovation, growth and success in NRW. Besides the success of NRWs industry the slump of the European Financial Crisis (EFC) has not been overcome completely (Ministerium für Wirschaft, Mittelstand und Energie NRW, 2010)

During the year 2014 most companies in the industrial sector have dropped their economic expectations, according to the annual report of the IHK NRW in 2015. In addition to that, they forecast a decrease of 15 percent of the business developments in NRW. Nevertheless 19 Percent of companies questioned in the report have planned to increase their investments in 2015. The expectations for 2015 are not as well as the development before the crisis in 2009 but there is still potential for innovation in the region. Facing several risks of slumps in demands most industries now focus on the benefits of NRW´s location. The benefits, which were identified by industrial companies in NRW, are the integration of the value chain, the quality of labour and social piece in the State (IHK Bochum, 2015).

After the climax of the crisis in 2009 the European Union and the German government have developed several projects to supply regional industries with policies and funds. Both, the European Union and the Government have seen a sustainable economy and an expansion of innovation capacities in response to the challenges of the crisis. For short terms the government has managed the consequences of the crisis with different stability mechanisms, which helped solving the current problems (Ministry of Economy, SME and Energy of NRW, 2010). However, these mechanisms could not hide the long-term goals of the German government, which are now more important than ever. An example is the High-Tech Strategy of the German government, which has been introduced in 2005.

For NRW it is a moral issue to serve as a model for other regions in Germany and Europe. Since the industrial revolution started, 150 years ago, NRW stands on the frontline of development and innovation in Germany. „Innovation is their tradition"(Ministry of Economy, SME and Energy in NRW, 2010)

A positive argument for the region is that their future belongs to a creative, multicultural society which grew up in an industrial environment. Cooke (2001) and Porters (1998) theoretical approaches support that argument. Cooke (2001) sees a reason for successful RIS in the stability of a region and maybe some moral issues. According to that Porter (1998) claims that "social glue binds clusters". It is the proximity of the States society to productions, to scientific and research institution that will become more important in the future.

5.2. Strategies in NRW

To fulfil these ambitions the ministry of Economy, SME and Energy in NRW follows „five maxims" (2010).

1) Orientation on a creative society through a combination of traditions, talents, technologies and tolerance

2) Consideration of the State NRW as a socio-economical unity. It is the goal of the states government to manifest their position as creative metropole.

3) „Economy Plus Society". Finding the balance between economic growth and social stability.

4) Cooperation and Communication. Both aspects are very important in terms of economic development. For economic growth and the promotion of prosperity and well-being an active contribution of all units within a State are a necessary condition.

5) Cluster are the motors of innovation. Innovation; defines the connection of theory and practise, research and development, creative thinking and future oriented industrial performances.

Since 2014 the Federal State of Germany and the single states have focussed their work more extensively on the leading markets. The strategy is a result of the „New High Tech-Strategy“. Analysing the funding systems for innovation and research in Germany and Europe it became clear that all institutional levels work in close cooperation’s exchanging knowledge and support (Bundesministerium für Bildung und Forschung, 2014). A strong network of cooperation and communication makes it possible that most policies and strategies are compatible and integrated within the different institutions. Taking a closer look on NRW´s innovation potential it makes sense to take a look at how these strategies and programs are used in practise. As it was mentioned the new High Tech-Strategy has brought the state's focus lays on eight leading markets. The leading market strategy (strategie) corresponds to Wittkämpers “Instruments of Development and Strategy” (2006), which were adopted to secure existing industries in specific areas. In general the strategy is offering NRW´s economy great chances to reach a front row position on the future economic markets. For the industrial state NRW it is a high priority to keep up on the global markets and solve the challenges of the current economic developments.

The states government participates in several support programs to support companies, research institutes and other actors with the challenges of the leading markets. These programs are supported by resources of the EFRE.NRW and the state (Ministerium für Wirtschaft, Mittelstand und Handwerk des Landes Nordrhein-Westfalen, 2014). The operational program of the EFRE.NRW is an extract of the ERFD of the European Union, the state NRW and public and private investors. For the funding period 2014-2020 the fund supports the NRW´s regional innovation with 2,4 billion Euro (efre.nrw, 2014). A program supporting the „Leitmarktstrategie“ is the program „Exzellenz NRW“ (Ministerium für Innovation, Wissenschaft und Forschung NRW, 2014).

Under the „Exzellenz NRW“strategy 16 „state-clusters“ (Landescluster) are organised. The clusters develop their strategies within the framework of the leading

markets „engineering and plant construction“, „mobility and logistics“, „information and communication“, „energy and environment“, „media and creative science“, „health and Life science“. In the single fields several a joint structure of clusters is operationalised (exzellenz.nrw, 2014). Clusters in NRW promote, according to Porter´s approach (1998), the necessary ingredients for regional innovation. NRW´s cluster cover all superstructural issues claimed by Cooke (2001) with a great variety of competition and cooperation of geographic concentrated companies of one particular field or related companies, research and public institutions. The benefits of the cluster seem equal to Porter´s argumentation (1998) of why clusters are „the special ingredient“ for innovation. According to ExczellensNRW (2014) their clusters help to identify and profile future topics and support the joint work of the various actors. Furthermore, NRW´s cluster are causing a special dynamic of innovation and growth of the region (exzellenz.nrw, 2014).

5.3. AutoCluster.NRW

An example for NRW´s successful cluster projects is the „Autocluster.NRW“. NRW is a one of the primary locations of the automobile industry in Germany. Roughly 700.000 automobiles and commercial vehicles are annually produced within the state's borders. The major OEM´s (Original Equipment Manufacturers) in NRW are the Adam Opel AG, Ford Werke GmbH and Daimler AG besides these company NRW provides approximately 800 supplier companies in all with a total of more than 200.000 employees. Furthermore, the AutoCluster.NRW is subdivided into nine regional and branch clusters which connect suppliers and service companies all over the state. According to these details the cluster includes several scientific institution (Universities, research institutions) mainly located in areas around Aachen, Bochum, Gelsenkirchen and Duisburg/Essen (exzellenz.nrw, 2014).

The tasks and objectives of the AutoCluster.NRW are to serve as a link between automotive business, government research and science. Furthermore, the cluster identifies highly capable partners on a specifically targeted basis to collaborate with the development of innovative products, technologies and processes. In regard to this tasks and objectives the cluster provides much more opportunities and potential. The AutoCluster.NRW cluster is managed by experts from the agiplan GmbH and the Forschungsgesellschaft Kraftfahrtwesen mbH Aachen (fka).The AutoCluster.NRW is one of 16 economic clusters which were introduced in 2008 by “Exzellenz.NRW” after the financial crisis shocked the international banking sector in 2007. Cluster management operations focus on the market participants and their demands for information and innovative technologies

(AutoCluster.NRW.de) These aspects match with Porter´s approach (1998) and his „three way´s“ (2.4.2.) in which he claims that cluster „operate more productively in sourcing input, accessing information and technology“ (Porter, 1998).

The cluster promotes its own interests and the interests of their members through a system of information and communication. An advisory board comprising representatives of OEM´s and supplier companies, research institutes, universities, state government, trade and service, chambers of industry and commerce and regional cluster members support the cluster management committees (Auto.Cluster.NRW.). The transparency within the cluster opens doors for a cluster with the ability to evolve new technological components and to create and develop new service and marketing concepts, which is another aspect that confirms Porter´s approach (1998).

Having pointed out the ingredients and instruments of NRW´s cluster network and using the AutoCluster.NRW as an example, it might be interesting to see if a study on the structure of the AutoCluster.NRW. supports the approach that clusters are beneficial for the regional innovation potential.

A study on the structure of the cluster on behalf of the AutoCluster.NRW was executed by several experts under the patronage of Garrelt Duin (Minister für Wirtschaft, Energie, Industrie, Mittelstand und Handwerk des Landes NRW) in 2014. The results of the study on the effectiveness and innovation potential of the cluster can be summarized by an analysis of the strength and weaknesses and an analysis of the risks and chances. According to the report the most beneficial ingredient for the AutoCluster.NRW is its remarkable research enviroment (universities, research institutes, cluster) with their great international network. The cluster also provides an effective network between industry and science through regional and transregional cooperations and cluster activities. On the level of competences the cluster´s ability to connect companies of different branches is extremely well managed. On the policy level the cluster is equipped with efficient adjustment and cluster policies. On the other hand there are some weaknesses of the cluster that have to be mentioned. According to the study the clusters position on the EU level weak. Furthermore the activities of the OEM´s have decreased. In addition to that the development of whole vehicle is limited to a small number of actors. The weaknesses of the instrumentation of the cluster are influenced by a low access possibilities on financial support for specific investments in the location development and assistance to the administration of funding and transregional cooperations.

Summarizing the strength and weaknesses of the AutoCluster.NRW. provides sufficient potential to develop the prosperity of NRW´s local environment for future years. The strong alliance of supplier companies provide great potential for regional innovation and promise access to a front row position on the global market. Furthermore, opportunities for regional innovation lie in extending the strong network between universities and research institutions. These are only a few changes of innovation the Auto.Cluster.NRW. provides. However, there are some risks that have to be mentioned. A risk is that the high number of companies reduces the attractiveness of the region for international companies and investors. Another risk factor is that technology negatively influence the changes of the value chain. Only taking a look at some of the changes and risks it seems obvious that the region still provides a great innovation potential and that the cluster supplies the region on a long-term with a system of sustainability and security (AutoCluster.NRW, 2014). Based on a final report analysing their work and progress from December 2008 till March 2015, the cluster has already reached several milestones for regional innovation. The AutoCluster.NRW is constantly integrating new technological developments and trends in the automobile industry. Furthermore, the cluster served as an important instrument by mastering the economic crisis. According to the introduction of the “Leitmarktstrategie” of the state, it seems that the cluster was able to manage and adapt to all necessary conditions of the new strategy. The AutoCluster.NRW is now following several main task, like electro mobility, security and comfort which are results of the “Leitmarktstrategie” The AutoCluster.NRW has a number of programs and projects which keep the members informed about the activities and actions planned to reach new milestones for the project. After the cluster was introduced it has helped to improve the communication between national and international experts, companies, public administration and politics. Moreover, the great number of events the cluster has organised has increased the quality of the network and has established a network of trust and companionship. Another focus of the cluster is internationalisation. This focus supports the cluster members to enter foreign markets and advise them in foreign affairs (AutoCluster.NRW report, 2015).

6. Conclusion

After the general definition of innovation was discussed the preconditions of economic development were observed by using Schumpeter´s approach on regional development (1911). The next sections aimed at finding the ingredients of regional innovation following Cooke´s paper about „Regional Innovation Systems“ (2001). Through Cooke´s approach the ingredients of regional innovation were divided into infrastructural and superstructural issues. To meet the conditions of the infrastructural and superstructural issues Wittkämper´s approach about „Instrument of Adjustment Policies“ (2006) was used. After the ingredients of regional innovation were integrated in the theoretical framework of this paper, Porter´s Cluster approach (1998) was introduced to provide the framework with an instrument which could increase the regional development potential.

The analytical part of the paper gave an insight of the innovation strategies which have been introduced within the European Union, Germany and the state NRW. For a better understanding how adjustment policies have been operationalised to increase the regional development potential an overview of the German and European adjustment programs was given. In addition to that the next section focussed on the instruments of financial support within the European Union, Germany and the state NRW. Analysing the adjustment policies and funding systems several connections to the theoretical framework have been drawn.

After the general conditions for regional innovation within the European Union and Germany have been analysed the last section focussed on NRW as a industry location. With the theoretical framework and the general conditions of the European and German innovation strategies in mind the aim of the last section was to give a clear insight of the state´s ingredients of innovation.

In the first part of this section the benefits of NRW as an industry location were described. As an example for the ambitions to increase the regional development the „five maxims“ of the Ministry of Economy, Middle Class and Energy was quoted. According to that the strategies (High Tech Strategy NRW), projects (Exzellenz NRW) and funding system of the state have been illustrated. In the last section The Auto.Cluster.NRW. served as an example of a successful cluster in NRW. The cluster was portrayed to show how the instruments and strategies of regional innovation are used in practise. To get a convincing answer to the question about the regions development potential the main aspects of strengths and weakness of

the Auto.cluster have been illustrated. After that a short summary gave an overview of the chance and risks for the cluster´s future.

In conclusion it can be said that NRW provides many of what Cooke (2001) claims as the ingredients for regional innovation. The paper has shown that the region combines many factors for regional innovations and a system of governmental support, which is able to adjust their strategies on behalf of a future orientated sustainable development. The proximity of several leading industry location and cluster networks, the size of the population, NRW´s industrial history and the variety of different states and countries in a close surrounding supply the region with a great number of benefits for sustainable growth and innovation potential.

As the example (AutoCluster.NRW) shows, the cluster has increased the region´s innovation potential and has supported sustainable growths. After the climax of the financial crisis the strategies of the state have primarily focussed on the establishment of clusters. Analysing the data gained from the reports published to illustrate the functioning of the AutoCluster.NRW (report AutoCluster,2015), the cluster has contributed to increase intercorrelation between companies, internationalisation, communication and information. It has also had positive effects on the economy solving the impacts of the financial crisis. Another aspect the analysis has shown is that the cluster has positively influenced regional innovation in NRW. It also illustrates that the AutoCluster.NRW is able to adjust their policies and strategies immediately, when necessary. An example for the adjustability is the affiliation of the “Leitmarktstrategie” which has changed the objectives of the cluster and has required flexibility and cooperation.

Using Schumpeter´s approach (1911) for a final statement the idea of using „old combinations“ to develop „new combinations“ is equal to the fact that the already existing ingredients of regional innovation just need the right instruments and objectives to reach their full potential. A cluster provides a great variety of knowledge and capital combined with the proximity of companies, research institutes and governments, which makes their work most effective for regional innovation.

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Clarification

(Ich versichere an Eides statt, dass ich die nachstehende Arbeit eigenständig und ohne fremde Hilfe angefertigt und mich anderer als der in der Arbeit angegebenen Hilfsmittel nicht bedient habe. Alle Stellen, die sinngemäß oder wörtlich aus Veröffentlichungen übernommen wurden, sind als solche kenntlich gemacht.)

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Unterschrift: