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Innovation cooperation in East Germany - only a half-way success?

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**Innovation cooperation in
East Germany - only a half-way success?**

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Abstract

The paper informs about innovation cooperation in East Germany. Besides a description of the cooperation behavior in general, it focuses on the question whether cooperating enterprises are more innovative and thus more productive than non-cooperating firms. A comparison between East and West German firms is being made. It can be shown that there are no deficiencies in cooperation frequency or cooperation continuity in East Germany compared to West Germany, and differences in cooperation partner priorities only reflect the given structural differences. Cooperating enterprises in East and West Germany are indeed more innovative than non-cooperating firms, but there remains a clear productivity gap between East and West German cooperating firms. Furthermore, within East Germany non-cooperating firms are slightly more productive than cooperating firms. Possible reasons for these rather unexpected findings are being discussed in this paper.

1. Introduction

Despite the progresses in restructuring and modernization, East Germany today still lags clearly behind West Germany, especially with respect to labor productivity. In the year 2001, overall labor productivity (gross value added per employee) in East Germany accounts for 68% of West Germany (IWH, 2002). It is the backward level of productivity, but even more the slowed down pace of catching-up that is being regarded as problematic. There are several reasons for the productivity gap between East and West Germany, such as deficiencies in infrastructure, lower capital intensity, unfavorable composition of branches within manufacturing industry etc. (Ragnitz/Müller/Wölfl et al, 2001). Furthermore, East Germany is characterized by a lack of big industrial companies. That means a dominance of small and medium sized enterprises, which are generally less productive than their big counterparts. Besides these issues that are all relevant to explain the complex problem of backward productivity, recent literature and policy discussion also emphasizes the absence and deficiencies of innovation networks as another obstacle for East Germany's catching-up (e.g. Müller, 2002, 40ff; Ragnitz/Müller/Wölfl et al, 2001, 216ff; Ragnitz/Wölfl, 2001). It has led policy makers to introduce several programs in support of the foundation of innovation networks, especially within East German industry.¹ The idea behind is that catching-up is favored by innovations, and innovations can best be carried out within joint projects - especially in the face of the fact that the development and market introduction of new products requires substantial investments, and innovations within business enterprises rely increasingly on scientific research generated outside the firm.

The central characteristic of innovation networks is cooperation; cooperation among business enterprises and with further partners, such as universities and research institutes. Empirical research on enterprise cooperation, carried out e.g. by Brussig/Dreher (2001) and based on a representative enterprise survey in Germany's investment goods industry, shows that East German enterprises are more often involved in cooperation activities than West German firms.² However, there is no evidence for a positive relation between cooperation and productivity in East Germany although it is possible to show that the immediate goals of the different types of cooperation do appear, for example cost reduction in the case of purchasing cooperation, increase of

¹ Many of these network policy programs are designed to bring together small or medium sized business enterprises and universities or research institutes within so-called *Verbundprojekte* (cooperative projects). In Germany, network policy is part of the overall innovation and technology policy, launched by the Federal Ministry of Economics and Labor and the Federal Ministry of Education and Research respectively. For an overview of the actual programs at federal level see appendix.

² Further empirical studies that point to the same direction are Fritsch/Franke/Schwirten (1998) and Semlinger (1997).

capacity utilization as a result of production cooperation etc. (Brussig/Kinkel/Lay, 2003). While these studies deal with various fields of cooperation, e.g. joint distribution, purchasing, production, services etc., this paper focuses explicitly on cooperation activities that are aimed at innovation, so-called innovation cooperation. It is the intention of this paper, first to describe East German enterprise's general behavior with respect to innovation cooperation and then to investigate in how far the goals of innovation cooperation are attained. Before turning to the theoretical background of this paper and empirical results, some important terms will be distinguished in order to specify the subject of analysis.³

2. Clusters, networks, and cooperation

The terms cluster, network and cooperation are often mentioned in one breath, but they actually should be distinguished in order to avoid misunderstandings.

Clusters are usually referred to as the geographical concentrations of firms of a certain branch or related branches, usually connected through the value added chain (e.g. Porter, 1990; Priewe, 2002, 93). Due to the geographical proximity of firms, clusters are expected to generate agglomeration advantages, such as easier access to human capital or intermediate products and exchange of information.⁴ While it is reasonable to assume that there is communication between the firms that build a cluster, direct and frequent cooperation is not necessarily a typical feature of clusters. That means, ties are loose in the sense that they are usually confined to business contacts. Agglomeration advantages are expected to mainly appear anonymously in the sense of positive external effects. According to Porter (1999, 51), clusters are a typical and rather "natural" characteristic of advanced economies.

In contrast to that, **networks** are regarded as initiated and coordinated institutions with close and collaborative ties between the participating enterprises and possibly non-business organizations. They are in any case characterized by active cooperation – not just business contacts – between the partners. Three independent partners are usually considered the minimum for having a network. Networks usually have a medium or long term perspective, and they are mostly based on a written contract, which specifies the common goals and details of collaboration (Ragnitz/Müller/Wölfl et al, 2001, 234). Many networks are characterized by spatial proximity of the participants, especially

³ I wish to express my thanks to Dr. Martin Brussig from ZSH (Zentrum für Sozialforschung Halle e.V.) for the fruitful discussions and exchange of research experience on the subject of enterprise cooperation.

⁴ The phenomenon of agglomeration advantages was first described by Marshall (1952, 267ff) and later put forward by Krugman (1991). They emphasize that it is labor market pooling, easier access to intermediate products, and information flow that generate agglomeration advantages.

when regular face-to-face contacts are regarded as important (Fritsch, 1999, 10f). In that respect, networks can resemble clusters and thus additionally generate the above described agglomeration advantages. Nevertheless, it is also possible to have networks without spatial proximity between the partners as it is the case, e.g. with networks on international level. Apart from the aspect of spatial proximity, the crucial difference between networks and clusters is that clusters are associated with rather general advantages as mentioned above while networks are established in order to pursue very particular goals, often in the field of research and development (R&D) or innovation projects.

As mentioned earlier, **cooperation** is the typical and inherent feature of networks, but not every cooperation between business enterprises is automatically a network. Cooperation as such can exist between just two firms as a single event without any long-term perspective, for example two enterprises that once in a while organize their purchasing together. Enterprise cooperation plays a growing role in practice and can refer to many different fields of business activities, such as purchasing, production, distribution, marketing, and education (Corsten, 2001; Kaiser/Kaiser, 2000; Staudt/Kriegesmann/Thielemann/Behrendt, 1995).⁵

Different from such forms of cooperation that are primarily aimed at cost reduction, this paper is about innovation cooperation; that means, cooperation between economically independent enterprises or between enterprises and non-business organizations with the intention to generate new products, services or production processes.

3. Theoretical background and path of analysis

Technological progress is essential for the process of economic growth and productivity increase. Within the process of technological progress, research and development (R&D) plays a significant role, but R&D is, however, only part of the story. In order to translate R&D results – be it own or external R&D results – into economic growth, the new developments have to be introduced onto the market in the form of marketable goods or services, which is usually being done by business enterprises within the innovation process. The “classical” breakdown of technological progress into ‘research – development – innovation’ is widely acknowledged although in practice not every innovation requires R&D. Innovations – be it with or without previous R&D – can be carried out within a single company, but when it comes to pioneering innovations, e.g. in modern biotechnology or information technology, normally several organizations in

⁵ The distinction between cluster, network, and cooperation has been made for economic reasoning and with a focus upon business enterprises. The author is aware that in other contexts and disciplines, for example in sociology, completely different definitions of network and cooperation can be used.

terms of number and type become involved. The collaboration of the relevant institutions can be regarded as a “knowledge added chain”, and the functioning of that chain, especially with respect to communication and cooperation at the interfaces, is important for the innovation process or rather the innovation potential of an economy or region.⁶

These considerations are central to the theoretical concept of “national innovation system”, which stresses the need for a close interconnection between the organizations that are relevant to innovation, especially business enterprises, universities and research institutes as well as bridging institutions such as technology transfer centers, science parks etc. (Lundvall, 1992; Nelson, 1993). A similar perception is put forward within the concept of “triple helix”, which emphasizes the importance of university-industry-government relations for successful innovation (Etzkowitz/Leydesdorff, 2000). The crucial and common message of these interdisciplinary concepts is that in modern societies cooperation of various partners within adequate networks is of high importance for innovation and thus for economic development.

An individual firm does, of course, not care about these macro-considerations on “innovation system” or “triple helix”. Business enterprises for their part engage in cooperation with external partners when they expect advantages that they would not experience without cooperation. First of all, cooperation partners expect that direct production (or development) costs will be reduced, e.g. through the common use of technical equipment, exchange of personnel etc. Such advantages especially gain importance when cooperation partners are located close to each other. Furthermore, cooperation may help to reduce costs for searching, costs for the initiation and control of contracts etc. (transaction costs). Actually, there is a smooth transition between these two cost reducing effects, and finally it is the combination of reduced production (or development) and transaction costs that makes enterprises benefit from cooperation in the sense that the overall performance (productivity) increases. Cost reduction is first of all a motive to engage in such forms of cooperation that are primarily aimed to realize economies of scale, e.g. production, purchasing, or distribution cooperation. Further motives – especially in the case of innovation cooperation – may play a role, among them the intention to make use of synergy effects due to a mutual exchange of information and ideas. In practice, it is hardly possible to exactly calculate the costs and benefits of cooperation, especially in the face of the fact that non-quantifiable aspects also matter.

Whatever the crucial motive for cooperation is and how ever the decision to cooperate or not to cooperate is finally made, it is assumed in this paper that enterprises, which

⁶ The same holds true for the „knowledge added chain“ within business enterprises, research institutes etc. This paper, however, will refer to inter- not intra-organizational cooperation.

engage actively in innovation cooperation, are able to reduce costs and to introduce innovations, and that this finally translates into higher productivity. Within the following empirical study, cooperating enterprises will be compared to non-cooperating enterprises with respect to innovations and productivity. Furthermore, a comparison of East and West German enterprises will be included.

Empirical data presented in this paper stems from the Mannheim Innovation Panel (MIP). The MIP is an annual innovation survey carried out by the Center for European Economic Research (ZEW) in Mannheim/Germany. Cooperation is subject to the survey every fourth year. The MIP included the question about “active participation in joint innovation projects” in the years 1997 and 2001, and answers refer to the previous three years period, that means 1994-1996 and 1998-2000 respectively. In 1993, the question about cooperation in the MIP refers to joint research and development (not innovation) projects, and answers refer to the previous year (1992). The MIP is representative for the German manufacturing sector, and it is the German contribution to the EU wide “community innovation survey” (CIS). The terminology used in the questionnaire corresponds to the international guidelines for innovation surveys, the so-called Oslo-Manual (OECD/Eurostat, 1997).⁷

4. Empirical results: innovation cooperation in East Germany

The first section (4.1) introduces into the topic by giving an overview of East and West German enterprises’ general cooperation behavior, including the cooperation frequency, priorities given to different cooperation partners, and cooperation continuity. The second section (4.2) sheds light on the results of East German enterprises’ cooperation success in terms of innovations and productivity. All descriptive statistics presented below are projected figures and refer to mining and quarrying, manufacturing, as well as electricity, gas and water supply.

4.1 Frequency, partners, and continuity of innovation cooperation

Box 1: Definition of cooperation

According to the questionnaire used in the MIP, cooperation is defined as the active participation of enterprises in joint innovation projects, either together with other business enterprises or non-commercial organizations. The sole awarding of a contract to another company does not count as a cooperation.

Different from what one might expect and in accordance with other empirical studies (e.g. Brussig/Dreher, 2001; Brussig/Kinkel/Lay, 2003), in East Germany enterprises are

⁷ For further information on the MIP see Janz/Ebling/Gottschalk/Niggemann (2001).

clearly more often involved in innovation cooperation than in West Germany. According to the MIP, 15.9% of the East German and 9.2% of the West German enterprises stated that they were actively participating in innovation cooperation during 1998-2000 (see table 1). One might assume that the comparatively high frequency of cooperation in East Germany is a result of the several innovation policy programs, which were introduced in East Germany in support of the foundation of innovation networks. But cooperation frequency in East Germany had nearly been the same during the previous survey period (1994-1996). Very remarkable is the fact that the frequency of innovation cooperation in West Germany decreased strongly from one survey period to the next, namely from 17.7% (1994-1996) to 9.2% (1998-2000). Policy changes cannot be made responsible since there were no major changes in West Germany's network or innovation policy. A possible but only preliminary explanation is that cooperation frequency is on a decrease in general and only remains as high as 16% in East Germany, because of the several network policy programs that were introduced exclusively in East Germany in recent years, such as InnoRegio (see appendix). The decrease of innovation cooperation in West Germany calls for further research, but since this paper focuses on the results of innovation cooperation no deeper investigations will and can be made at this point.

Table 1:
Cooperation frequency in East and West Germany
- number of firms engaged in innovation cooperation (%) -

	1994-1996 (n=1946)	1998-2000 (n=1732)
East Germany	16.6 (n=587)	15.9 (n=552)
West Germany	17.7 (n=1359)	9.2 (n=1180)

Data source: Mannheim Innovation Panel 1997 and 2001 (own calculations).

Looking at who the cooperation partners of business enterprises are (see chart 1), it becomes clear that **universities** are by far the most important cooperation partners to firms in East and West Germany. 62.4% of all firms that engaged in innovation cooperation at all in East Germany stated that they cooperated with universities. In West Germany it were 59.9% of the cooperating firms.⁸ The second most important cooperation partner in East Germany are **commercial research institutes**.⁹ 36.4% of all cooperating firms in East Germany cooperated with commercial research institutes. In

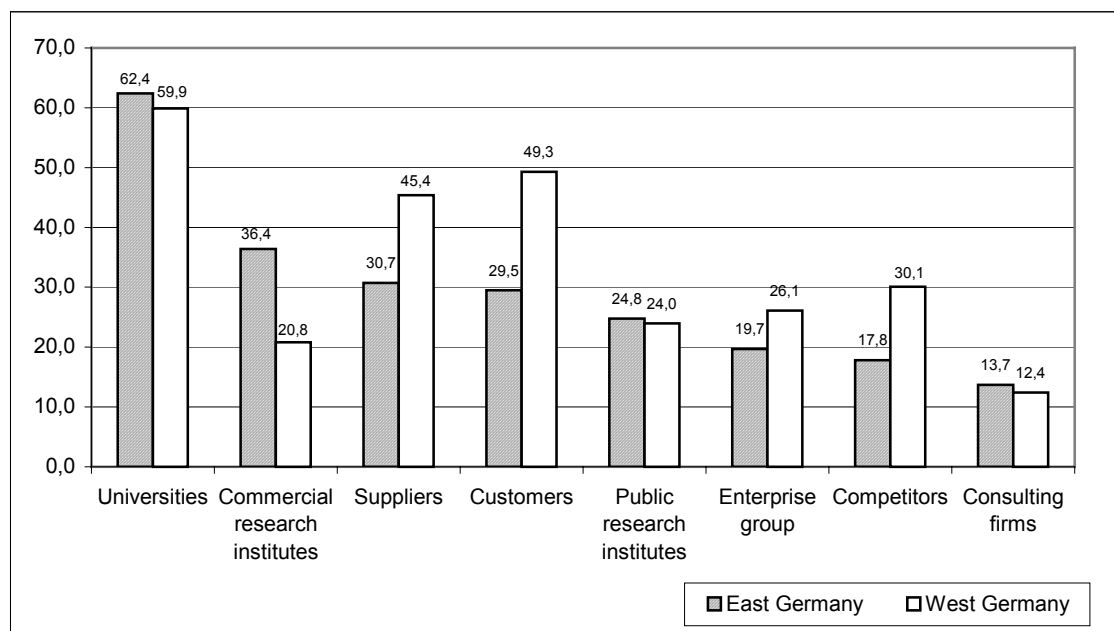
⁸ According to the questionnaire, the category "universities" includes universities (*Universitäten*), universities of applied sciences (*Fachhochschulen*), and other institutes of higher education.

⁹ In the questionnaire, this category is entitled "commercial research institutes/R&D-companies".

contrast to this, in West Germany commercial research institutes rank much lower. Only 20.8% of the cooperating firms said that they cooperated with commercial research institutes. This is certainly due to the fact that commercial research institutes are much more common in East Germany. During transition, many researchers that were employed in state-owned companies “survived” by founding commercial research institutes or R&D-companies.¹⁰ At third and fourth place in East Germany come **suppliers and customers** with 30.7% and 29.5% respectively. However, it stands out that in West Germany, suppliers and customers have a clearly stronger significance as cooperation partners with 45.4% and 49.3% of all cooperating firms. This is owed to the lack of industry clusters in East Germany. The absence of agglomerations of firms that belong to the same branch or related branches (Ragnitz/Wölfl, 2001) points to the fact that within East Germany production networks are much less developed than in West Germany. Accordingly, East Germany offers less favorable preconditions for innovation cooperation with suppliers and customers. With respect to the category of **public research institutes** it was found that 24.8% of the cooperating enterprises in East Germany and 24% in West Germany did actively cooperate with state research institutes or non-profit private research institutes.

Chart 1:

Innovation cooperation according to type of cooperation partners 1998-2000^a
- in % of all firms that engaged in cooperation at all -



^a Multiple answers were possible. Therefore the sum of percentages is not equal 100.

Data source: Mannheim Innovation Panel 2001 (own calculations).

¹⁰ There are about 300 commercial research institutes and R&D companies in East Germany today (BMBF, 2002, 198f).

Cooperation within the **enterprise group** is of minor significance, especially in East Germany. Not very surprisingly, in East Germany fewer companies cooperate within their enterprise group (19.7%) than in West Germany (26.1%). This corresponds to the fact that East Germany is dominated by independent small and medium sized enterprises, which are simply not being part of an enterprise group.¹¹ Unlike West Germany, cooperation with **competitors** is less important in East Germany. Only 17.8% of all cooperating firms in East Germany but 30.1% of all cooperating firms in West Germany worked together with competitors. This is explainable by the fact that in West Germany competition is stronger than in East Germany. Different from West Germany, East Germany has a much lower export rate. That means, international markets where competition is high are less important to East German firms (IWH, 1999, 145ff). West German firms, especially big and multinational companies, face a stronger need to cooperate with their competitors. Least important to both East and West German companies are consulting firms. Consulting firms are probably stronger associated with management improvements than with technological product or process innovations.

Table 2:
Significance of cooperation partners in East Germany compared to
West Germany 1998-2000

	Rank order of cooperation partners		Difference of cooperation frequency ^a
	East Germany	West Germany	
Universities	1	1	2.5
Commercial research institutes	2	7	15.6
Suppliers	3	3	-14.7
Customers	4	2	-19.8
Public research institutes	5	6	0.8
Enterprise group	6	5	-6.4
Competitors	7	4	-12.3
Consulting firms	8	8	1.3

^a In percentage points (East German percentage minus West German percentage)

Data source: Mannheim Innovation Panel 2001 (own calculations).

To give an overview about the parallels and differences of East and West German firm's cooperation partner priorities, table 2 sketches the rank order and differences of cooperation frequency. Disparities are most striking with regard to commercial research institutes and competitors (very divergent rank orders as well as differences of cooperation frequency). Furthermore, differences stand out with respect to suppliers and

¹¹ In East Germany, the enterprise group is an important cooperation partner only for external (foreign and West German) investors. 58.4% of all external investors that engaged in cooperation did so within their enterprise group.

customers, i.e. much more cooperating firms in the West choose suppliers or customers as cooperation partners.

A further aspect, which goes beyond pure quantitative aspects of cooperation behavior, is the continuity (or discontinuity) with which enterprises engage in innovation cooperation. Although the MIP does not provide information about innovation cooperation for every single year, tendencies can be outlined with the available figures.¹² The analysis of cooperation continuity includes those firms that responded to the questionnaire in all three survey waves and answered the question on cooperation (n=227). In the following, the expression “continuously cooperating” refers to firms that indicated cooperation in all three time periods (1992, 1994-1996, and 1998-2000) while “discontinuously cooperating” refers to firms that indicated cooperation in only one or two of the three survey periods.

As depicted in table 3 below, in East Germany clearly more firms engaged in innovation cooperation continuously, that means in all three survey periods (7.3% in East and 3.7% in West Germany). With respect to discontinuously cooperating firms the differences are small (28.9% in East and 27.9% in West Germany) while the number of non-cooperating firms amounts to 63.8% in East and 68.5% in West Germany.¹³

Table 3:
Cooperation continuity (1992^a, 1994-96, 1998-00) in East and West Germany
- number of enterprises in % -

	East Germany (n=84)	West Germany (n=143)
Continuously cooperating	7.3	3.7
Discontinuously cooperating	28.9	27.8
Not cooperating	63.8	68.5

^a Data for 1992 refers to R&D (not innovation) cooperation

Data source: Mannheim Innovation Panel 1993, 1997, 2001 (own calculations).

¹² As mentioned earlier, the MIP included the topic of cooperation in 1993, 1997 and 2001. In 1993, the question refers to 1992, in 1997 and 2001 it refers to the previous three years periods. Accordingly, the years 1993, 1997 and 2001 are not covered at all. Furthermore, nothing is known about the (dis)continuity of cooperation within the relevant time periods (especially within 1994-1996 and 1998-2000). Firms that indicated a cooperation during 1994-1996 or 1998-2000 do not necessarily say that they did so during the entire three years periods. In addition, it has to be mentioned that in 1993 cooperation refers to R&D (not innovation) cooperation. Though R&D and innovation cooperation are related activities, they cannot be regarded as the same (see chapter 3).

¹³ It has to be mentioned that enterprises that were newly founded after 1992 are automatically excluded from the analysis which is a drawback. In addition to the figures above (table 3), a further investigation that refers only to the second and third wave of the survey should and will follow.

4.2 Performance of cooperating and non-cooperating enterprises

To find out whether there exists a positive relation between cooperation and the generation of innovations and market novelties, a comparison will be made between cooperating and non-cooperating firms in the following section. Chart 2 below shows how many of the cooperating and non-cooperating firms in East and West Germany carried out an innovation or market novelty within 1998-2000.

Box 2: Definition of innovation and market novelties

According to the MIP questionnaire and thus OECD/EU nomenclature, an **innovation** is a new or significantly improved product or service that has been introduced by the relevant company (product/service innovation), or a new or significantly improved process that has been introduced within the relevant company (process innovation). When talking about “innovation” the product or process at least has to be new to the company, but not necessarily new to the market. Accordingly, “innovation” can also include imitation.

In any case, product or process innovation is based on new technological developments, new combinations of existing technologies or based on the use of externally acquired knowledge. Pure aesthetic modifications of products (e.g. color, style) are not considered an innovation.

Market novelties, by contrast, are products or services that are definitively new to the market. That means, the relevant company is the first one offering the product or service on the market. The definition of “market”, however, is up to the company. Market novelties are also referred to in this paper as “innovations in the narrow sense”.

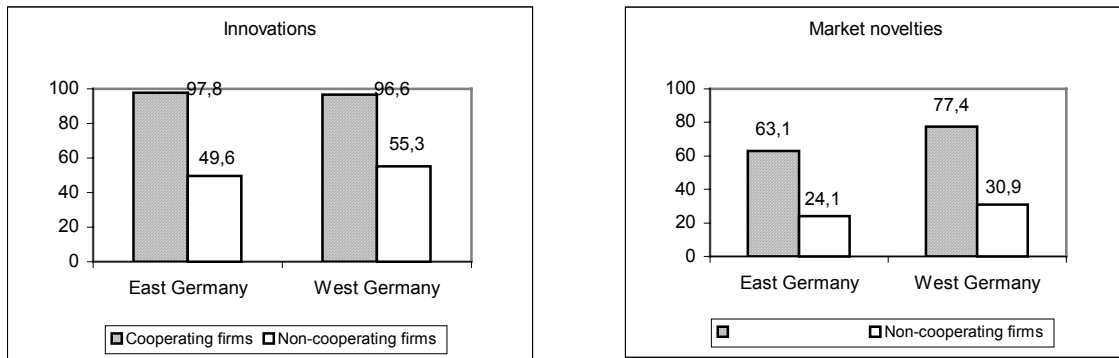
Looking at the innovation frequency of cooperating firms, it becomes visible that in East Germany almost all cooperating firms (97.8%) were firms that carried out at least one **innovation** during 1998-2000. In contrast, only 49.6% of the non-cooperating firms carried out an innovation during the same time period. This is not very different in West Germany where 96.6% of the cooperating firms were innovative compared to 55.3% of the non-cooperating firms.

With respect to innovations in the narrow sense it shows that 63.1% of the cooperating and 24.1% of the non-cooperating firms in East Germany appear with at least one market novelty in 1998-2000. In West Germany, one can observe the same tendency, although on a slightly higher level. That means, 77.4% of the cooperating firms carried out at least one market novelty while 30.9% of the non-cooperating firms were innovative in the narrow sense. The findings presented in chart 2 point to the fact that cooperating firms are indeed more innovative, but from the available data it cannot be claimed that the innovations and market novelties are an immediate result of cooperation. Causality could also be the other way around, that means innovative enterprises are attracted by cooperation.

Chart 2:

Cooperating and non-cooperating firms in East and West Germany with innovations and market novelties respectively 1998-2000

- number of firms in % -



Data source: Mannheim Innovation Panel 2001 (own calculations).

The results above raise the question of how much the introduction of market novelties finally matters for East and West German firms when it comes to sales. The only figure available within the MIP suitable to answer this question is the “proportion of sales with market novelties” (see table 4). Not very surprisingly, cooperating firms make a larger proportion of their sales with market novelties than non-cooperating firms and interestingly, East German cooperating firms make an even larger proportion of sales with market novelties than West German firms (16.2% versus 11.8%).

Table 4:

Average proportion of sales with market novelties 2000

- in % of total sales -

	East Germany (n=143)		West Germany (n=401)	
	Cooperating enterprises	Non-cooperating enterprises	Cooperating enterprises	Non-cooperating enterprises
Proportion of sales with market novelties (%)	16.2	4.1	11.8	6.2

Data source: Mannheim Innovation Panel 2001 (own calculations).

Box 3: Comment on the data about market novelties

As mentioned earlier, market novelties are not necessarily novelties on world level, which would be hard to determine anyway. When asked about market novelties it is up to the enterprises to define the “market”. It is most likely that respondents in West Germany use a broader definition of “market” when they make statements about their market novelties, because West German enterprises operate more often on international markets while East German firms concentrate on local markets. Accordingly, an innovation that counts as a market novelty for an East German enterprise would not necessarily be regarded as such within a West German enterprise. In other words, the broader the definition of market the more unlikely it is that the relevant enterprise regards an innovation as a market novelty and vice versa. Therefore, one has to be careful when comparing survey results about market novelties. For the reasons mentioned above, it is likely that the figures about East Germany’s market novelties are “overestimated” compared to West Germany.

These considerations reveal how difficult it is to generate accurately comparable innovation data. Nevertheless, the problem of comparability can only be mentioned at this point, but not be solved within this paper.

The fact that cooperating firms in East Germany innovate and make a considerable proportion of sales with market novelties points to the right direction. Whether this also leads to a better performance of productivity (sales per employee) can be seen in table 5 below.¹⁴ Cooperating firms in East Germany are clearly less productive than cooperating firms in West Germany (0.269 and 0.409 respectively). In other words, cooperating firms in East Germany reach only 66% of the productivity level of West German cooperating firms. Non-cooperating firms show nearly the same (low) productivity in East and West (0.297 and 0.330 respectively). What is striking, however, is that in East Germany cooperating firms are not more productive than non-cooperating firms, but even slightly less productive (0.269 versus 0.297). Both, the productivity gap between East and West German cooperating firms and the backward productivity of cooperating firms compared to non-cooperating firms within East Germany, calls for explanation. Possible reasons will be discussed below.

Table 5:

Productivity (sales per employee) of cooperating and non-cooperating firms in East and West Germany 2000

	East Germany (n=552)		West Germany (n=1180)	
	Cooperating enterprises	Non-cooperating enterprises	Cooperating enterprises	Non-cooperating enterprises
Labor productivity (sales per employee in million DM)	0.269	0.297	0.409	0.330

Data source: Mannheim Innovation Panel 2001 (own calculations).

¹⁴ Gross value added per employee, the more meaningful expression of labor productivity, could not be calculated from the available data.

5. Summary and preliminary conclusions

The empirical study shows that there are no deficiencies in cooperation frequency or cooperation continuity in East Germany compared to West Germany, and differences in cooperation partner priorities only reflect the given structural differences between the two regions. With respect to the outcomes of innovation cooperation it could be shown that among the cooperating firms there are clearly more firms that carried out innovations and market novelties than among non-cooperating firms. This applies to East and West Germany. Nevertheless, these positive circumstances do not translate into a better productivity of cooperating enterprises in East Germany while cooperating enterprises in West Germany show the expected effect of higher productivity. These rather unexpected findings about the results of innovation cooperation in East Germany correspond to empirical studies on other fields of cooperation, namely production, purchasing, distribution, and services (Brussig/Kinkel/Lay, 2003).

It seems that East German enterprises cooperate successfully with respect to the immediate goals of cooperation, here with respect to the existence of innovations and market novelties – provided that innovations and market novelties are the result of cooperation. But this remains a half-way success as long as it is not possible to improve the overall performance (productivity) of East German enterprises. In the literature, a common explanation for the missing productivity increase of cooperating enterprises in East Germany is the assumption of “cooperation from weakness”. That means that especially “weaker” firms with a lower productivity engage in cooperation in the hope that they will perform better in the future. Nevertheless, with respect to innovation cooperation as investigated in this paper, the thesis of “cooperation from weakness” sounds somehow contradictive since enterprises engaged in innovation cooperation are particularly innovative – clearly more than their non-cooperating counterparts.

Thus, the productivity gap between East and West German enterprises engaged in innovation cooperation rather supports the assumption that cooperations in East Germany are not (yet) fully functioning, especially with respect to the commercialization of new products. In other words, it seems that East German cooperating firms, different from West German cooperating firms, fail to adequately commercialize their innovations and market novelties with the result that the new products do not translate into higher sales.

The finding that East German cooperating firms have a lower productivity than East German non-cooperating firms is most probably owed to the fact that innovation cooperation is an investment into the future – a “burden” that non-cooperating firms do

not have. Similar to R&D investments, it may be that the positive effects of innovation cooperation in terms of productivity increase require more time to become real.¹⁵

¹⁵ It is indeed the case that R&D intensive branches are less productive than non R&D intensive branches within East Germany. In 2000, East Germany's non R&D intensive branches reached nearly 70% of the West German productivity level while R&D intensive branches reached only 60% (BMBF, 2001, 57).

Appendix

Policy programs in support of innovation cooperation in Germany

Name of program	Potential network partners	Objective	East Germany	West Germany	Maximum state aid per network or enterprise (total)	Subsidy (maximum %)	Operating since	Maxim. duration of public support	Budget	Number of supported networks or enterprises
I. Programs at the Federal Ministry of Education and Research :										
InnoRegio	<ul style="list-style-type: none"> - Business enterprises - Research institutions (e.g. universities, research institutes) - Further regional actors 	<ul style="list-style-type: none"> - Joint innovation projects in any field of technology with a high market potential 	X		3-20 Mill. € per network	50% (enterprises), 100% (other partners)	1999	5 years	1999-2005: 256 Mill. €	23 regions (<i>InnoRegios</i>) with 321 projects
Innovative Regionale Wachstumskerne Innovative Regional Growth Centers	<ul style="list-style-type: none"> - Business enterprises - Research institutions (e.g. universities, research institutes) - Further regional actors 	<ul style="list-style-type: none"> - Joint innovation projects in any field of technology with a high market potential or - Joint education projects (human capital formation) 	X		1.3-7.3 Mill. € per network	70% (small and medium sized enterprises), 50% (big enterprises), 100% (research organizations)	2001	3 years	2001-2003: 38 Mill. €	9 Growth Centers with 137 projects
Innovationsforen Innovation forums	<ul style="list-style-type: none"> - Business enterprises - Research institutions (e.g. universities, research institutes) - Further regional actors 	<ul style="list-style-type: none"> - Further qualification of existing networks through consultations and meetings between relevant partners - Often in preparation of further programs (e.g. <i>Wachstumskerne, NEMO</i>). 	X		85 000 € per network	always 100%	2001	6 months	2002: 255 000 € *2003: 510 000 €	2001: 23 forums 2002: 3 forums

Name of program	Potential network partners	Objective	East Germany	West Germany	Maximum state aid per network or enterprise (total)	Subsidy (maximum %)	Operating since	Maxim. duration of public support	Budget	Number of supported networks or enterprises
II. Programs at the Federal Ministry of Economics and Labour:										
<i>Netzwerkmanagement Ost (NEMCO) Network Management East</i>	- Business enterprises - Research institutions (e.g. universities, research institutes)	- Initiation and/or Breakthrough of joint innovation projects through consulting (only financing of external network management)	X		300 000 € per network	90% (1 st year), 70% (2 nd year), 50% (3 rd year), 30% (4 th year)	2002	3-4 years	2002: 2.8 Mill. € *2003: 6 Mill. €	Until Oct. 2002: 24 networks
<i>Innovative Netzwerke (InnoNet) Innovative Networks</i>	- Business enterprises - Research institutions (e.g. universities, research institutes)	Joint innovation projects between - at least 4 business enterprises and - at least 2 research organizations in any field of technology with high market potential	X	X	1.5 Mill. € per network	80% (enterprises), 85% (research institutes, remaining 15% covered by the enterprises)	1999	3 years	2002: 7.8 Mill. € *2003: 13 Mill. €	1999: 17 networks 2000: 12 networks 2001: 25 networks (about 164 enterprises)
Program Innovation (Pro Inno) Program for Innovation	- Business enterprises - Research institutions (e.g. universities, research institutes)	- Joint innovation projects and/or - Exchange of R&D personnel (Cooperation between business enterprises or between business enterprises and research organizations)	X	X	135 000 € per enterprise	45% (enterprises), 70% (research organizations)	1999	15-22 months	2002: 123.5 Mill. € *2003: 137.5 Mill. €	1999: 310 networks 2000: 960 networks 2001: 780 networks (until 2001 enterprises)

*Preliminary figures (according to the budget plan for 2003).

Source: Compiled by Institute for Economic Research Halle (IWH), October 2002.

References

- BMBF (2001):** Zur technologischen Leistungsfähigkeit Deutschlands. Gutachten im Auftrag des Bundesministerium für Bildung und Forschung. Berlin: Bundesministerium für Bildung und Forschung.
- BMBF (2002):** Faktenbericht Forschung 2002. Berlin: Bundesministerium für Bildung und Forschung.
- Braczyk, Hans-Joachim/Cooke, Philip/Heidenreich, Martin (1998):** Regional Innovation Systems. The Role of Governances in a Globalized World. London: UCL Press.
- Brussig, Martin/Dreher, Carsten (2001):** Wie erfolgreich sind Kooperationen? Neue Ergebnisse zur Kooperationspraxis in Ostdeutschland. In: WSI Mitteilungen, No. 9, pp. 566-572.
- Brussig, Martin/Kinkel, Steffen/Lay, Gunter (2003):** Verbreitung und Nutzen regionaler Netzwerke in der deutschen Investitionsgüterindustrie. Forthcoming 2003.
- Corsten, Hans (2001):** Unternehmungsnetzwerke. Formen unternehmensübergreifender Zusammenarbeit. München: Oldenbourg.
- Etzkowitz, Henry/Leydesdorff, Loet (2000):** The dynamics of innovation: from National Systems and “Mode 2” to a Triple Helix of university-industry-government relations. In: Research Policy, Vol. 29, pp. 109-123.
- Fritsch, Michael/Franke, Grit/Schwirten, Christoph (1998):** Innovationsaktivitäten im Verarbeitenden Gewerbe – Ein Ost-West Vergleich. In: Fritsch, Michael et al (ed.): Innovationen in Ostdeutschland. Potentiale und Probleme. Heidelberg: Springer, pp. 119-144.
- Fritsch, Michael (1999):** Strategien zur Verbesserung regionaler Innovationsbedingungen – Ein Überblick über den Stand der Forschung. Freiberg working papers No. 19, Freiberg: Technische Universität Bergakademie Freiberg.
- Fritsch, Michael (2001):** Innovation by Networking: An Economic Perspective. In: Koschatzky, Knut/Kulicke, Marianne/Zenker, Andrea (ed.): Innovation Networks. Concepts and Challenges in the European Perspective. Heidelberg: Physica, pp. 25-34.
- IWH (1999):** Gesamtwirtschaftliche und unternehmerische Anpassungsfortschritte in Ostdeutschland. Neunzehnter Bericht. IWH-Forschungsreihe 5/1999. Halle: Institut für Wirtschaftsforschung Halle.

- IWH (2002):** Fortschrittsbericht wirtschaftswissenschaftlicher Institute über die wirtschaftliche Entwicklung in Ostdeutschland. Gutachten im Auftrag des Bundesministeriums der Finanzen. Halle: Institut für Wirtschaftsforschung Halle.
- Janz, Norbert/Ebling, Günther/Gottschalk, Sandra/Niggemann, Hiltrud (2001):** The Mannheim Innovation Panels (MIP and MIP-S) of the Center for European Economic Research (ZEW). In: Schmollers Jahrbuch, 121, pp. 123-129.
- Kaiser, Stefan/Kaiser, Wolfgang (2000):** Chance Kooperation. Ein Leitfaden für kleine und mittlere Unternehmen. Stuttgart: LOG_X Verlag.
- Krugman, Paul (1991):** Geography and Trade. Cambridge: MIT Press.
- Lundvall, Bengt-Ake (1992):** National Systems of Innovation. Towards a Theory of Innovation and Interactive Learning. London: Pinter Publishers.
- Marshall, Alfred (1952):** Principles of Economics. An introductory volume. 8th edition. New York: The Macmillan Company.
- Müller, Gerald (1998):** Schmalere Produktivitätslücke bei Beachtung von Preiseffekten. In: Wirtschaft im Wandel, No. 4, pp. 14-19.
- Müller, Ralf (2002):** Die Funktionsfähigkeit des Marktes für Forschung und Entwicklung: Welche Technologiepolitik ist notwendig? Baden-Baden: Nomos Verlagsgesellschaft.
- Nelson, Richard R. (1993):** National Innovation Systems: A comparative Analysis. Oxford: Oxford University Press.
- OECD/Eurostat (1997):** Proposed Guidelines for Collecting and Interpreting Technological Innovation Data. Oslo-Manual. Paris: OECD.
- Porter, Michael E. (1990):** The Competitive Advantage of Nations. New York.
- Porter, Michael E. (1999):** Unternehmen können von regionaler Vernetzung profitieren. In: Harvard Business Manager, No. 3, pp. 51-63.
- Priewe, Jan (2002):** Ostdeutschland 2010 – Perspektiven der Investitionstätigkeit. Berlin. Unpublished research report.
- Ragnitz, Joachim/Müller, Gerald/Wölfl, Anita et al (2001):** Produktivitätsunterschiede und Konvergenz von Wirtschaftsräumen – Das Beispiel der neuen Länder – Gutachten im Auftrag des Bundesministeriums für Wirtschaft und Technologie. Halle: Institut für Wirtschaftsforschung Halle.
- Ragnitz, Joachim/Wölfl, Anita (2001):** Netzwerkaktivitäten und die Produktivitätslücke Ostdeutschlands: Die Rolle von Agglomerationsvorteilen. In: Wirtschaft im Wandel, No. 13, pp. 315-319.

Semlinger, Klaus (1997): Innovationsnetzwerke. Kooperation von Kleinbetrieben, Jungunternehmen und kollektiven Akteuren. Eschborn: RKW-Verlag.

Staudt, Erich/Kriegesmann, Bernd/Thielemann, Frank/Behrendt, Sabine (1995): Kooperation als Erfolgsfaktor ostdeutscher Unternehmen. Ergebnisse einer empirischen Untersuchung zur Kooperationslandschaft in Ostdeutschland. In: Zeitschrift für Betriebswirtschaft, Vol. 65, No. 11, pp. 1209-1230.