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INNOVATION-ORIENTED LAND-USE POLICY AT THE SUB-NATIONAL LEVEL: CASE STUDY GERMANY

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Innovation-oriented Land-use Policy at the Sub-national Level: Case Study Germany

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Abstract

This study investigates major features of land-use strategies that German municipalities have adopted to attract innovative firms (IFs). In this context a two-stage competition model is introduced: firstly a municipality should solve economic and interest conflicts related to its preference for high-quality sites for IFs against the land needs of simple manufacturers. The second part of the model describes location competition among municipalities with high-quality sites for the location of IFs. German municipal land-use policy is well combined with industrial policy; this paper reveals the strengths and weaknesses of the urban real estate market in Potsdam, and its future opportunities and risks as the location of different economic activities are determined in the planning process. Science Park Adlershof (Berlin) is an output of the spatial-oriented technology policy, which creates incubators for innovative SMEs. Municipalities also cooperate, since it provides larger sites, generates economies of scale and contributes to a smooth suburbanisation process (see Leipzig).

JEL Classification: H42, H54, L3, O18, O3, R14, R52, R58

Keywords: Land-use Policy, Municipal Regional Competition, Two-stage Competition Model, Zoning, Technology Park

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1. INTRODUCTION

In several European countries, including Germany, land-use policy is carried out at the sub-national level, for which justification is based on what is termed the subsidiarity principle. Local or regional economies are currently directed both inwards (to develop their own innovative capacities) and outwards (to compete in global markets). It is a generally acknowledged fact that the basic innovation carried out by firms creates new industries, drives the business cycle and provides the basis for long-term economic growth (Schumpeter 1934; Grossman and Helpman 1991). More precisely, the growth of a region is stimulated by the presence of innovative industries and/or industries in the rapid-growth phase of the product life cycle, and is hindered by the presence of industries in the slow-growth or declining stage. At the same time, changes in economic structure and technological development (e.g. in the direction of stronger high-order services and knowledge orientation) have forced firms to develop a range of new production and logistic concepts, which in turn have made new investments in different places necessary (Zwicker-Schwarm *et al*. 2010). As a consequence, a modern, growth-oriented land-use policy should primarily aim to provide attractive locations (not only in terms of quantity but also quality) for innovative firms, and also to safeguard the employment level of highly-qualified productive workers in the long run.

However, it should also be borne in mind that network characteristics are nowadays widely considered to be particularly important for innovation and the growth prospects of regions (European Commission 2004; Hoekman *et al*. 2009).[1] Such important network aspects appear to be more seriously and adequately taken into account when developing an optimal local and/or regional land-use plan, which is effectively combined with the local technology policy.[2]

The provision of adequate spaces for commercial and industrial purposes and setting prices for these in the context of local land-use planning has recently become increasingly important for what is termed location competition among regions and municipalities for attracting innovative firms, since the regional (or local) gap in the provision of some traditional 'hard' infrastructure, including transportation, energy supply, waste disposal facilities, communication systems and so on, has continuously been getting narrower within the country over the course of time.[3] On the

[1] In this context, innovation is seen as an evolutionary, systemic process resulting from various, associational interactions among a number of actors in a given region, which can also be characterised as social capital (Puttnam 1993; Cooke and Morgan 1998; Cooke and Memedovic 2003; Lawton-Smith 2003). In particular, the concept of agglomeration economies and the incubator hypothesis have been widely applied to explain why the local and regional-level innovation performance of firms and economic growth are influenced by economies generated by the spatial proximity of the actors (like relations among located firms, research institutions, government agencies, etc.) and associated externalities (Glaeser *et al*. 1992; Mills and McDonald 1992; Sternberg 1995; Fritsch 2001). Such a close geographical concentration allows for a better exploitation of the 'dynamic relative advantages' in developing the skills and know-how of a given territory that arise from the synergetic relationship between actors in the innovation system and economies of scale in the provision of innovation services and support (see also Wolfe 2002).

[2] Thus creating a sort of local 'space-oriented' industrial policy which, in turn, generates greater agglomeration advantages through a closer geographical proximity, enabling better (physical and functional) accessibility of firms, research institutions, etc. within a municipality. In particular the establishment of competent and competitive local industrial clusters and the creation of an innovative branch-mix (also among R&D-oriented, high-tech industries and modern service firms) will furthermore gain importance when designing the municipal land-use plan and implementing relevant policy strategies (see also Zwicker-Schwarm *et al*. 2010).

[3] Innovation safeguards the long-term employment of qualified workers. However, there are also a number of less-developed regions and municipalities in Germany that are suffering from the lack of absorption capacity of innovation activities: in general they are poorly endowed with research infrastructure and innovation firms are simply lacking there (Fagerberg and Srholec 2007). Under such circumstances, an effective land-use strategy *alone* is not enough to attract innovative firms to these poor regions. In addition many 'one-company' municipalities have traditionally been occupied by labour-intensive manufacturing activities employing mainly less-qualified workers

other hand, various types of local policy incentives such as specific tax reductions and direct location subsidies cannot generally be introduced in many advanced countries, since tax competition as such has been limited by fiscal constitution or by EU regulation, for example, as is the case in Germany. Furthermore, many local and regional governments have been suffering from fiscal stress caused by rapidly increasing expenditure over revenue. Although local tax autonomy has long been guaranteed in Germany and other European countries such as Austria and Switzerland, this fact has made local tax reduction less feasible. Local and regional government can also yield extra revenues from the sales of their own (i.e. public) real estate to private firms, for example. In this case, local governments face a number of trade-off problems emerging between the maximisation of local sales revenue and the attraction of innovative firms in a municipality, when those innovative firms are not willing to pay the best price for the local space.

This study aims to investigate the major characteristics of land-use strategies in German municipalities that are designed to attract innovative firms under the particular consideration of local preferences and the aspect of innovation networks and clusters. As a theoretical basis, a two-stage competition model among municipalities appears to be necessary: in the first phase an individual model is required to highlight the local economic and interest conflicts within a municipality which emerge when providing high-quality areas for those innovative firms, while neglecting the needs of other less innovative manufacturers and service firms. Secondly, when this internal problem related to the division of land among the innovative and less innovative activities is resolved, municipalities with adequate high-quality industrial areas can compete against each other for the location of innovative firms within a game theoretical framework.

The German case study followed here tackles some selected practical aspects of local land-use policy and planning within the given legal framework. First of all, the local land-use policy is combined with the typical local industrial policy in this country. Taking Potsdam as an example, the study illustrates how the strengths and weaknesses (and constraints) of the city's urban real estate market as well as its future opportunities and risks as a location for different economic activities are determined. In land-use planning practice, such classifications are usually made based on the different purpose categories of production sites, such as simple manufacturing areas/logistics locations; high-quality industrial areas; scientific, technology and media locations, etc. The second case study, based on Technology and Science Park Adlershof in Berlin, reveals that such industrial parks are nothing but outputs of the integration of local land-use and technology policies aimed at creating incubators for innovative SMEs and accomplishing a superior competitive position (against other municipalities) for those technology-oriented firms. Thirdly, German municipalities not only compete but also, at the same time, look for opportunities to cooperate with each other in order to attract innovative firms, as is the case with Leipzig. In particular, such a strategy appears to be appropriate for small municipalities which suffer from a limited administration and financial capacity when developing and carrying out the local spatial management individually. In addition, inter-municipal cooperation enables them to provide larger sites, encompassing territories beyond their own borders, while contributing to a smooth suburbanisation process of economic activities in large city areas.

This study is structured as follows: following this introduction, the second section delivers the relevant theoretical framework for the model, which explains the two-stage local competition

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who are locally available. Although it is desirable, one doubts whether the implementation of the innovation-oriented land-use policy in such less-developed regions and municipalities would abruptly break their traditional industrial path-dependency and be successful in changing and modernising the local economic structure there within a short period of time.

among German municipalities in the process of land provision for the purpose of business promotion. Based on this theoretical foundation, the third section presents an overview of the land-use and zoning strategies adopted in Potsdam for attracting innovative firms. Section 4 describes the recent development of the Technology and Science Park Berlin Adlershof and examines the extent to which a technology park with an ample site, which is also well endowed with R&D infrastructure, qualified labour and a modern industrial and business structure, can be superior in municipal competition for the (re)location of high-tech firms. Section 5 highlights Leipzig's experience related to inter-municipal cooperation in the field of innovation-oriented land-use policy. The final section summarises the research findings and offers a conclusion.

2. THEORETICAL APPROACHES TO MUNICIPAL COMPETITION IN THE REAL ESTATE PROVISION FOR THE PURPOSE OF BUSINESS PROMOTION

2.1. Municipal competition in zoning

At the municipal level, the provision of sufficient land and favourable locations for high-tech firms willing to locate themselves (and also to expand) in the municipalities is assessed as crucial for their local development. High-tech industries in particular prefer those municipalities as their locations which are endowed with well-qualified labour, excellent accessibility (also to related modern industries and service firms), as well as a scientific and advanced communication infrastructure, high quality of life and so on. In general, one could distinguish two different phases when examining municipal competition in terms of the real estate provision aimed at attracting firms (Friedrich and Lindemann 2000; Lindemann 1999). The first competition phase relates to land-use planning and the assignment of certain areas as industrial and business districts within a municipality. Although municipalities in Germany (and also Austria, Switzerland and the Netherlands) possess a high degree of autonomy with respect to the use of their territories, the process of municipal decision-making is highly formalised via special laws (see also below). During the second phase, the planned industrial area is sold to investors by business promotion institutions and industrial parks under the consideration of the restrictions on land prices, which are often fixed through subsidisation policy rules set by the EU, central or sub-national governments.

In the model, land is seen as one of the primary production factors. Note that the proportion between the planned areas assigned for industrial purposes and the entire territory of a municipality is characterised as the share of local territory dedicated to industrial zones. The municipalities finance the public production of the municipality (including also public utilities and administration) from tax revenues and the sale of land to firms that locate there. The land revenues of a given municipality also depend on those yielded in a competing municipality. Production functions exist for private production and the public production within the municipality. Furthermore, the adoption of cost-minimal production allows for the determination of net private production, land revenues and public production.[4] Each municipality fixes its zoning relation Bp[5] in such a way as to maximise utility,[6] which is

[4] For more details on the model structure and the parameters considered – see Friedrich and Lindemann (2000).
[5] For municipality 1 we depict Bp1, and for municipality 2 Bp2 (see Figure 1).
[6] In Figure 1 the utility of municipality 1 is expressed by indifference curves that show the highest level at the Bp1 axis. The level of the indifference curves further to the right show descending levels. In analogy the highest level of the indifference curve of municipality 2 is achieved at the Bp2 axis. The indifference curves of municipality 2 further up show also descending levels.

obtained from private and public production under the consideration of the 'dependency' resulting from the zoning of the competing municipality. In this way the utility of both municipalities depends on its own and the competitors' percentage share of industrial zoning.

In the next step, the model shows how municipalities maximise their utility in a duopolistic framework, where the zoning percentage is used as a parameter of action. Municipalities normally act autonomously in competition: one municipality attempts to maximise its utility under the assumption that others do not react (Friedrich 1977). A Launhardt solution in zoning will then result as depicted in Figure 1, where the reaction lines[7] Bp1R and Bp2R cross each other.[8]

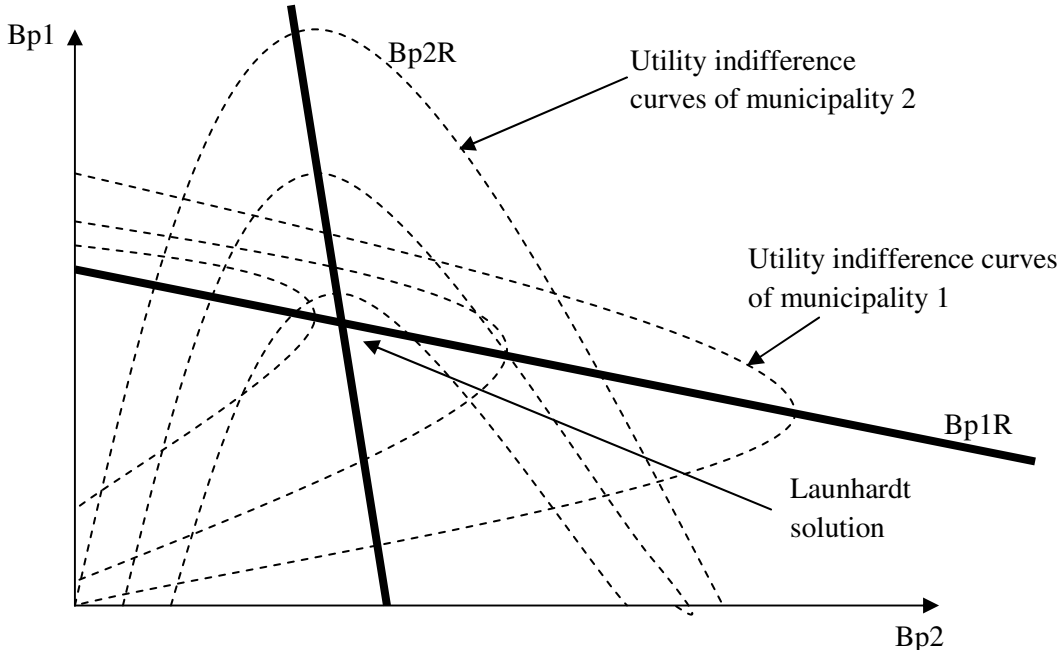

Figure 1. Zoning solution (Similar to Lindemann 1999; Friedrich and Lindemann 2000).

Because of their autonomous behaviour, municipalities tend to plan large zones according to the Launhardt solution. If they were to cooperate together and maximise their common welfare at the collusion point – where the indifference curves are tangential to each other – they would achieve higher utility and plan smaller industrial zones.

When differentiating between the solution formulae for welfare and the zone percentage to the parameters (Lindemann 1999), one can identify the reactions of the municipalities in zoning competition. Here we concentrate on those of municipality 1. If the demand for industrial sites for high-tech industries decreases in municipality 1, the welfare of this municipality also shrinks. In order to compensate for this loss, municipality 1 expands its zone to simulate economic development and to attract low-tech production activities. Consequently, line Bp1R tends to move upwards. If a high preference among high-tech investors for municipality 1 prevails, municipality 1 would provide a large percentage of its territory to high-tech industry: in this case line Bp1R generally shifts upward. If productivity in industry increases due to increased high-tech production, the welfare of municipality 1 (as well as its industrial zone)

[7] The reaction line of municipality 1 Bp1R shows the best Bp1 if municipality 2 has fixed its zoning parameter Bp2. The reaction line Bp2R is that of municipality 2.

[8] A 'collusion solution' of joint utility maximisation is found where the indifference curves are tangential (see also section 5 of this article).

improves, since line Bp1R moves upwards.[9] On the other hand, a growth in the level of wages (e.g. in the high-tech sector) is likely to decrease the welfare of municipality 1, which would react by reducing the proportion of its industrial zone; and as a consequence the Bp1R line would shift downwards. Higher wages in the public sector will also cause lower welfare for municipality 1 and as a compensatory measure an increase in the industrial area will take place there: therefore the Bp1R curve moves up again.

In addition, through the competitive process municipality 2 is then affected. If the relevant parameters for this municipality also vary, similar changes in local behaviour are also anticipated as is shown in municipality 1. Yet it should also be borne in mind that higher-tier governments may well influence the local land-use planning and zoning decisions in terms of special grants aimed at creating an industrial zoning pattern in municipalities that match the preferences of those higher level governments. In this case a type of vertical regional competition prevails when determining the zoning patterns in municipalities (see Friedrich 1973).

2.2. Competition for the location of firms

If municipal industrial zoning has already taken place, then the battle for the acquisition of high-tech firms starts. Within this zone, private landowners can also sell their real estates to firms that are willing to locate there. However, in order to develop and offer adequate infrastructure and other local utilities and services in a more efficient way, industrial parks are often created, either by the municipality itself or by a joint organisation of business promotion firms and interest groups (such as chambers of commerce, banks, etc.) under the terms of public-private partnership.[10] For the purpose of demonstrating the ways in which an industrial park can be effectively established, a theoretical approach aimed at forming a coalition can be adopted.

Firstly, the local decision-makers (the municipality or a private joint organisation) have to decide which resources should be dedicated to the industrial park and who joins the industrial park company. Such resources may be expressed in monetary terms (financial means, real estate, existing infrastructure, etc.) and indicated as x. The term x_i shows the resources brought in by a given decision-maker i, while $\Sigma\, x_{j\,(j=1,..,n)}$ shows the total resources x dedicated to the industrial park. X_R depicts the total resources of all the decision-makers without that of decision-maker i. The number of decision-makers is indicated by n. Decision-maker i expects advantages from its engagement in the park if the share of his or her resources in the park increases, because s/he can expand his or her decision-making power in the park company. These advantages are then expressed by parameter c_i. The dedication of resources by decision-maker i has some negative effects such as opportunity costs, which are captured by parameter b_i.[11] Consequently, we obtain a utility function for decision-maker (possible owner) i as follows:

(1) $u_i = c_i \bullet (x_i / \Sigma\, x_j) - b_i \bullet x_i$

(2) $X_R = X - x_i$

(3) $u_i = c_i \bullet (x_i / (x_i + X_R)) - b_i \bullet x_i = c_i \bullet (1 - X_R/(x_i + X_R)) - b_i \bullet x_i$

We assume that the decision-makers choose an 'autonomous strategy', which in turn, means that one decision-maker maximises its utility under the assumption that others do not react to

[9] Now there is a downward movement of line Bp2R which strengthens the effect for municipality 1.
[10] See section 4 of this article.
[11] Other forms of b_i can be treated as well.

this offer. In other words, the same decision-maker assumes that the offers X_R from the other actors do not change. This solution refers to an approach by Cornes and Hartley (2001). The maximisation of the utility function (3) takes place,[12] when

(7) $X = (c_i / b_i) \bullet (1 - (x_i / X))$

According to equation (7), a decision-maker's (= possible owner's) optimum share of resources in a park turns out to be:

(8) $x_i / X = 1 - (b_i / c_i) \bullet X$

Hence, the optimal number of owners forming the park company and an adequate volume for X is determined where the sums of the values of the optimal shares add up to one. To participate in an industrial park the cost/benefit ratio must be smaller than the average of the sum of other members of the park company. Those decision-makers who are not willing to join have high c parameters on the one hand and low opportunity costs b on the other.

We now adopt a supply restricted monopsony model, which demonstrates that two industrial parks in different municipalities compete against each other for one high-tech industrial firm (Feng and Friedrich 1999; Batey and Friedrich 2000; Friedrich and Nam 2009). Assume that the industrial park is willing to achieve high utility, which in turn, depends on the volume of production of the new firm, its employment, the capital investment of the firm, the revenue from the real estate sale (expressed e.g. in terms of high real estate price) and a 'performance-oriented' subsidy that increases with the firm's production volume. The locating high-tech firm maximises its net profit by facing a demand relation, production function and cost function. A set of possible contracts is determined, which is related to the distribution of utilities in the park and the locating firm. This leads to a utility possibility curve, which is reflected in the descending line on the right hand side of Figure 2. Out of these possible utility distributions and corresponding contracts, a Nash solution for location negotiations is found at point A in the same figure.[13]

Minimum utilities pointing to opportunity benefits, which are realised if no contract is concluded, are also considered (e.g. from a locating non-high-tech firm or some service business instead of high-tech firms).

The competition process is illustrated in Figure 2. Industrial park 1 (in municipality 1) finds an initial solution with the firm at point A. Then the firm negotiates with industrial park 2 in order to improve its utility, taking the utility level resulting from point A as a yardstick for minimum utility. The next superior solution for the firm is then point B, followed by renegotiations with municipality 1, again using the utility level achieved with industrial park 2 as a minimum utility delivered at point C. Furthermore, another negotiation round follows based on the new minimum utility of the firm gained at C, which leads to the final solution. Here the minimum utility of the firm gets so high that industrial park 1 cannot offer another superior option since the industrial park has reached its minimum utility and, due to this reason, stops further negotiations. From one step to another the real estate price shrinks and

[12] (4) $du_i / dx_i = c_i (X_R / (x_i + X_R)^2) - b_i = 0$

(5) $X^2 = (c_i / b_i) \bullet X_R$

(6) $X^2 = (c_i / b_i) \bullet (X - x_i)$

[13] By differentiating the parameters of the solution formulae, one can determine how changes in production functions of high tech firms, factor prices, changes in demand for high tech products, in pre-services and their prices delivered to high tech firms by the industrial park, changes in the utility function of park management or municipalities influence the solution and the size of the land price (Feng and Friedrich 1999; Lindemann 1999; Friedrich and Lindemann 2000).

the utilities of both industrial parks continue to decline, whereas the utilities of the firm increases until one industrial park gives up. Disappointing results of such firm-oriented competition may initiate further changes in the zoning of municipalities that can be explained by an extension of the two approaches mentioned here to an adaptation model (see Lindeman 1999; Friedrich and Lindeman 2000).[14]

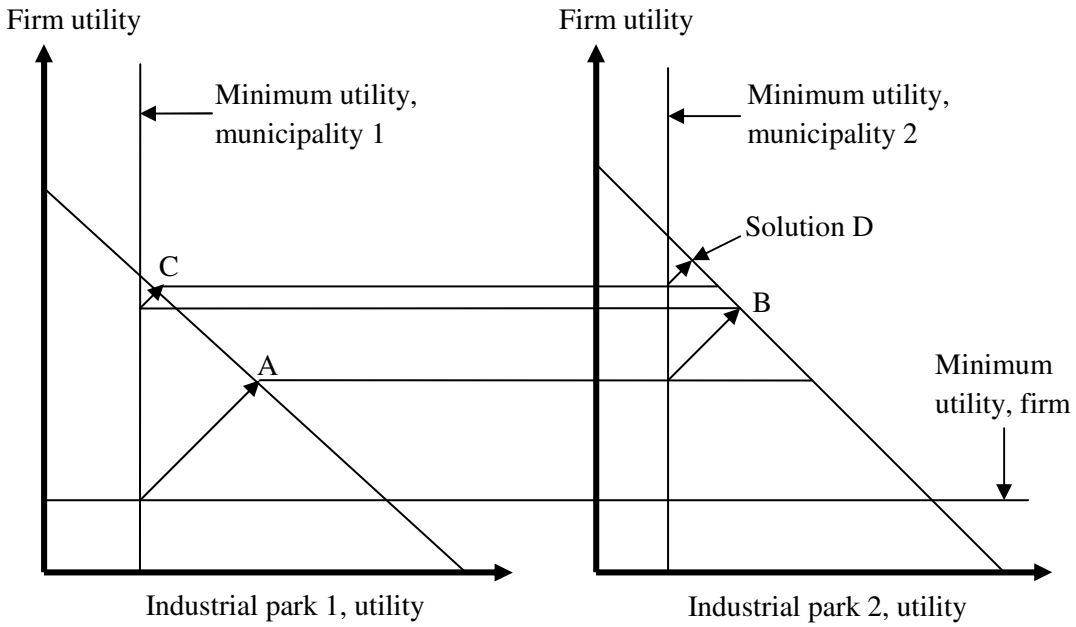

Figure 2. Supply restricted monopsony (Feng and Friedrich 1999; Batey and Friedrich 2000; Friedrich and Nam 2009).

If municipalities compete for a high-tech firm, the successful municipality would be the one which offers an industrial park and local conditions that fit the high-tech firm best and where the high-tech firm allows the winning municipality a large space with a utility frontier that is way over to the right in Figure 2. The size of minimum utility can also be reflected in the fact that a municipality can evaluate other opportunities; for example, the possibility of attracting low-tech manufacturing companies. If there are fewer opportunities to attract such low-tech firms, the minimum utility of the municipality tends to be low and its vertical curve runs further to the left in Figure 2 (see the case of municipality 2). Consequently, this municipality can participate in more rounds of the competition process.[15] On the other hand, if a rather high minimum utility can be achieved in the context of the location of low-tech manufacturing activities, which in turn weakens the position of the high-tech firm, the process will stop earlier. In this case the locating firm is not able to exploit the community to any considerable degree. In Figure 2, the negotiation process stops further to the right, where the firm achieves less utility. The price for the real estate will turn out to be higher in this case.[16]

[14] Empirically observed adaptations of zoning are mentioned in section 4.

[15] In Figure 2, the minimum vertical utility line of municipality 2 is located further to the left than that of municipality 1. The solution space for municipality 2 increases as the triangle between the minimum utility curve and the utility possibility curve increases (e.g. in the right section of the municipality in Figure 2). Moreover, municipality 2 achieves less utility out of the last round and achieves a lower land price. If the move of the minimum line is with the other municipality in Figure 2, its solution space might increase and it can stand more competitive rounds with the effect that the utility of the winning municipality is reduced and the land price lower.

[16] If the right firm presents a minimum utility line further to the right, the solution process stops earlier (here after one round, if the move is big) and the firm cannot achieve a lower land price and higher utility.

3. LAND-USE STRATEGIES FOR ATTRACTING INNOVATIVE FIRMS IN GERMAN MUNICIPALITIES

In general, the demand for commercial and industrial sites for firms (for purchase as well as for rent) stems from the following individual motives:

- The need for established firms to expand their capacity;
- A firm's dissatisfaction caused by the shortcomings and comparative disadvantages of their existing location ('relocation');
- Strategic location decisions made by multinational firms; and
- New start-ups.

It is clear that demand is often determined by a combination of such motives. Furthermore, just like the continuous shortening of a product life cycle, the life cycle of industrial sites and commercial buildings has also been getting increasingly shorter over the course of time. Instead of making intensive efforts towards the conversion and reorganisation of current locations, firms are nowadays much more willing to look for new location sites: in other words, business relocation is presently preferred (Zwicker-Schwarm *et al*. 2010). Yet, according to Grabow *et al*. (1995) and MSWV (2002), the relocation of German firms in a given city usually takes place within a short distance; for example, either within the city borders or to its immediate neighbouring areas. In addition, it should also be noted that the conversion of old industrial sites for modern purposes has recently been a more complicated and costly task for local authorities than the 'new' development of unused land for the same use.

In Germany, for example, municipalities are responsible for local land-use planning related to the provision and allocation of commercial and industrial spaces. Within this framework they can also change the local economic structure. At the first stage of land-use planning, German cities and municipalities set the extent to which the available sites in their own territories can be distributed for different economic purposes like production, housing, transportation, green areas and so on. By doing so, they also attempt to create an optimal spatial mix in the municipality, which not only ideally encompasses all these different land-use purposes in a systematic way, but also generates maximum positive external effects. Secondly, when allocating the spaces to individual firms, which occurs via the local real estate market process, cities and municipalities in Germany can still judge whether the provision of municipal land for a given firm is desirable or not. Through such a mechanism, they can affect the selection process and location of innovative firms in their own territory. Yet due to the general spatial limits, it has traditionally been a difficult task to resolve the conflict in most German cities and municipalities between land-use for housing on the one hand, and commercial and industrial purposes on the other (see also Lindemann 1992; Lehmann-Grube and Pfähler 1998; Friedrich and Lindemann 2000; Blume 2003).

In many large German cities, commercial and industrial sites are categorised according to their different uses as follows:

- Simple manufacturing areas/logistics locations;
- High-quality industrial areas;
- Locations for light manufacturing and craft;
- Scientific, technology and media locations; and
- Integrated urban areas for offices.

All these locations differ from one type to another in terms of site size required for production and other related economic activities, intensity of environmental disruption, urban or rural

quality, road and public transport connections, proximity to research firms and/or large international firms, etc. In practice, some additional aspects like the time constraints related to the availability and usage of industrial and commercial sites as well as their ownership (private vs. public) have also played a role for such classifications (Zwicker-Schwarm *et al*. 2010).

Taking Potsdam, the capital of Brandenburg, as an example, Table 1 and 2 demonstrate the strengths and weaknesses (and constraints) of the city's real estate market as well as its future opportunities and threats as a location for different economic activities. The classification has been made based on the different purpose categories of production sites shown above.

Table 1. Development of industrial and commercial sites in Potsdam: strengths vs. weaknesses

Strengths	Weaknesses
Quality of industrial site as a location in general • Solid economic and structural base for development • Excellent image of the city as a science and modern service centre combined with high-quality of living • Regional policy eligibility (e.g. former Objective 2 region in the EU) • Availability of substantial areas as potential sites for production • Urban and integrated industrial areas for modern commercial uses	*Quality of industrial site as a location in general* • Very high price in the local real estate market • The city government possesses very few unused areas which can be further developed as industrial sites. On the other hand, private ownership of potential sites is dominant • Some modern service functions like logistics parks and suitable sites for such functions are not prevalent in the city • Inner-city traffic connections somewhat problematic (e.g. Nadelöhre Havelbrücken) • Relatively poor nationwide railway connection
Science, technology and R&D-oriented firms • Strong research base in cooperation with competent R&D-oriented firms • Existence of locations with technology competence and agglomeration advantages (including Medienstadt Babelsberg, Wissenschaftspark Golm, Telegrafenberg) • Supply of various types of potential sites for technology and incubator centres	*Science, technology and R&D-oriented firms* • Acute spatial shortage (also anticipated to prevail in the medium term future) in the high-quality R&D-oriented locations, in particular for research institutions and new start-ups in areas like Telegrafenberg, Medienstadt Babelsberg, Wissenschaftspark Golm, etc.
Manufacturing firms and crafts • Crafts sector an important part of the local economy • Existence of a large number of strongly environment-oriented manufacturing firms in the city, which would possibly attract the location of more technology-oriented firms there	*Manufacturing firms and crafts* • Serious impediments presently exist in spatial expansion for simple manufacturing activities • Huge up-grading and improvement needs for established industrial locations like Potsdam-Süd (also in terms of infrastructure) • Supply deficit of suitable production areas and other sites for their related activities (e.g. factories and warehouses at reasonable prices/rents) • Less intensive public care and maintenance for existing industrial sites
	Local land-use policy related to the provision of industrial sites • Too strong a focus on attracting new firms from outside, while somehow neglecting the need for industrial sites for indigenous firms located in the city • Information deficits related to the supply of sites for production purposes • Insufficient support from local authority in project development (unclear communication related to planning possibilities, etc.)

Source: Zwicker-Schwarm *et al*. (2010).

Table 2. Development of industrial and commercial sites in Potsdam: future opportunities and risks

Opportunities	Risks
Quality of industrial site as location in general • Favourable development prospects (in particular positive demographic and labour market forecasts) • Improvement of location quality through the opening of the new Berlin Brandenburg International Airport (BBI) • Increasing significance of 'soft' infrastructure and its endowment in the city	*Quality of industrial site as location in general* • Some difficulties in developing industrial and commercial sites, due in part to the fiscal stress from which Potsdam has been suffering • Spatial competition, not only with the surrounding municipalities which offer lower-cost industrial sites than the city does, but also with Berlin in terms of modern offices
Science, technology and R&D-oriented firms • Growth and concentration of firms in areas of biotechnology, life science and media, for which Potsdam already has comparative advantage • Further improvement of location quality for firms related to green production, environmental protection and climate change, etc. • Attractive business environment for high-tech firms (in terms of economic and sector-specific features and infrastructure)	*Science, technology and R&D-oriented firms* • Possible drifts of spin-offs caused by the lack of suitable (and attractive) production sites (also for expansion) • Insufficient exploitation of spatial potential for the new location of firms • Strong nationwide competition for location, particularly in the media sector
Manufacturing firms and crafts • Growing market for local and regional products and services	*Manufacturing firms and crafts* • Deindustrialisation and continuing decrease in the number of jobs in German industries, including the automotive sector • Transformation and regeneration of old industrial sites within the city for other purposes such as residential areas • Termination and relocation of business caused by insufficient supply of sites
Services • Continuous internationalisation of services and research activities, as well as the intensification of global technology network • Growth of service sector, especially the business-oriented service firms, in Germany	

Source: Zwicker-Schwarm *et al.* (2010).

4. TECHNOLOGY PARK: A STRATEGIC MIX OF LAND-USE POLICY AND LOCAL TECHNOLOGY POLICY

In the context of regional and/or local technology policy, technology and innovation centres in many countries have sought to play an incubator role in the establishment of new innovative SMEs. In other words, the policies of such high-tech centres focus on the mobilisation and enhancement of local technological and industrial resources and are mainly targeted at creating small new technology-based firms. For example, in Germany, in the context of public-private partnership, local authorities (i.e. city or municipal governments), private firms and the local Chamber of Industry and Commerce (IHK) are generally the major sponsors in the development of these centres. All these ambitious projects have been accompanied by local innovation-oriented land-use policy, since such technology parks usually need ample land, the provision of which is often difficult. For a limited period (usually three to five years), German innovation centres provide offices and other commercial facilities at affordable rents to make the

establishment of technology-oriented firms easier (Sternberg 1995). Even for those municipalities and regions faced with a high concentration of older, declining industries, these innovation centres have been assessed as a tool for facilitating economic restructuring through the incubation of new-technology-based SMEs (Rothwell 1986; Gray 1992; Nauwelaers and Wintjes 2000).

A number of previous studies evaluating the effectiveness of German innovation centres as instruments of combining land-use policy with local innovation policy aimed at achieving technology-led economic development have generally been positive, particularly in reference to the support given to start-up firms, the value added to the local economy (especially in old industrial areas) and the multiplier effects derived from the concentration of highly-qualified professional employment in those centres (Fiedler and Wodtke 1991; Steinkühler 1994). On the other hand, the geographic size of German innovation centres is relatively less compared to the more spatially-concentrated centres in the United States and France – a fact which also indicates the shortage of high-quality spaces for industrial and commercial purposes in this country. Nevertheless, many centres in Germany do not fully utilise the capacity of commercial sites for new firms. In addition, assessments have largely shown that the employment effects on the local and/or regional labour market led by incubator activities are less significant than expected, partly because many of the centres dispersed across the country are relatively small (see also Sternberg 1995). Yet the recent development of the Technology and Science Park Berlin Adlershof appears to be somewhat different and promising (see below).

In many cases, technology and industrial parks have not developed as originally planned. As a consequence, the economic and social benefits of such a project often tend to differ largely from what is anticipated. These facts are well indicated by the development of a number of technology centres into industrial monocultures, rather than into the well-balanced and highly diversified industrial parks envisaged by the planners. This phenomenon is due in part to a number of complex sociological and economic reasons. The mistakes made during the planning and design stage have also led to the moderate success of technology parks in many countries, which include, for example, the choice of an underdeveloped region with poor road and air communications; insufficient attention to other basic elements of infrastructure (such as telecommunications or electricity supply) and to the overall interregional and/or international accessibility of the sites; and a mismatch between local skills and those required for new production activities. To a larger extent, the successful development of a technology park also seems to be led by the ability and flexibility of the operating authorities to react to changing (particularly economic and sector-specific) circumstances, to make the necessary mid-course corrections, and, more generally, to develop an effective evaluation and problem-solving mechanism.

Case study: Technology and Science Park Berlin Adlershof

As a district, Adlershof belongs to the eastern part of Berlin. It is connected to Highway 113, which runs from just north of Berlin–Schönefeld Airport to Dresden. The transport situation in the district will be further improved by the expansion of the railway underpass in Adlergestell/Rudower Chaussee, while the expansion of the tram connection between the subway station and Campus Adlershof is under construction. The road connection between Groß-Berliner Damm and Schöneweide is also favourable. Embedded in an overall urban development concept for the city of Berlin, this integrated science**,** business and media centre was established in an area of 4.2 km^2 in 1991. In close proximity one can also find shops, hotels, restaurants and a park of 66 hectares.

Adlershof has traditionally been a scientific centre pursuing intensive cooperation with industry. In particular, the *East German Academy of Science* (founded here in 1946 with nine scientific institutes in the fields of physics and chemistry) made decisive contributions to inventions such as ultra-short pulse lasers, time-resolved optical spectroscopy and space diagnosis devices. Other things like trifocals and contraceptive pills were also created here for the first time. After unification the former Academy was reorganised and territorial conversion took place in Adlershof for modern use. Since the establishment of the Adlershof Technology and Science Park in 1991, a total of 1.3 billion euros of public funds (provided by Berlin as well as the German federal government) has been invested in the development area's infrastructure and its industrial and commercial facilities (see DIW 2010).

Based on its historical strength, the major goal of the project was to generate synergies from science and industry, bridging innovation and the market via appropriate applications. In order to encourage innovative businesses to locate there, several modern specialised centres were established, utilising comparative advantages: the first was the Innovation and Business Incubation Centre (IGZ) in 1991, followed by the Centre for Photonics and Optical Technologies, the Centre for Environmental, Bio and Energy Technology, the Centre for Information and Media Technology, and the Centre for Materials and Microsystems Technology. [17]

At the end of 2010, 883 companies, scientific institutes and other types of institutions were based in Adlershof – an increase of 47 on the previous year. Amounting to 2.1 billion euros, business revenues (including financial coverage for scientific institutions and subsidies made by governments) rose by 21% compared to the previous year. The number of people employed at Adlershof rose by 4.1% to more than 14,000. Table 3 shows the classification of the total business performance of Adlershof according to individual core activities.

Table 3. Business performance of Adlershof classified by its core activities in 2010

Science and Technology Park Number of companies: 425, of which 46 new additions in 2010 Number of employees: 4,908 Total annual turnover: 580.2 million euros (including the share of government subsidies of 6.4%)
Non-university scientific institutions (11 institutions) Number of employees: 1,701 Total annual basic funding: 119.5 million euros (including third-party funding of 53.4 million euros)
Institutes of the Humboldt University of Berlin (Institute for Computer Science, Mathematics, Chemistry, Physics, Geography and Psychology) Number of employees: 925 Number of students: 7,874 Total annual basic financing: 39 million euros (including third-party funding of 20.5 million euros)
Media City Number of companies: 139 Number of employees: 1,734 (including freelancers) Total annual revenue: 176.7 million euros
Related Trade and services Number of companies: 302 Number of employees: 5,000 Total annual revenue: 1.2 billion euros

Source: http://www.adlershof.de/datenfakten/?L=2.

[17] See more detailed information and facts at http://www.adlershof.de/.

The regional economic analysis carried out by DIW (2010) demonstrates that:

- Over 1 billion euros of gross value added (GVA) was generated directly in Adlershof in 2010. In addition to that, a further 740 million euros in GVA in other parts of Berlin was indirectly triggered by Adlershof.
- In 2010, over 14,000 people were directly employed in Adlershof as already mentioned above. For every employed person in Adlershof there was another employed person in other parts of Berlin who depended on the former, so that the overall effect was just below 28,000 employed people.
- In 2010, Adlershof triggered 340 million euros of tax revenue, around 180 million of which remained in the state of Berlin.
- Since 2005 Adlershof has been growing rapidly. This applies to both sales (+10.9% per year) and GVA (+7.2% per year) and for tax revenue (+7.1% per year) and the number of employed people (+3.8% per year). These values are well above the comparable figures for Berlin or Germany.

Moreover, calculations based on the potentially available space in Adlershof indicate that a further growth in employment of up to 18,800 jobs is possible in the future. If innovative and high-growth companies from future-oriented industries consistently continue to locate there, it is likely that the existing, above-average growth trajectory will be maintained and the area capacity of the technology park will be fully utilised between 2025 and 2033 (see DIW 2010).

5. INTER-MUNICIPAL COOPERATION AND INNOVATION-ORIENTED LAND-USE POLICY

As an alternative for overcoming the general shortage of high-quality spaces prevalent in many municipalities in Germany, closer inter-municipal cooperation in space management has often been suggested as an ideal way of attracting investments from innovative high-tech firms and modern services (Blume 2003). This type of cooperation is likely to generate positive synergy effects as well as to easily realise the economies of scale: the implementation of this strategy appears to be particularly effective for small municipalities which have a limited administration and financial capacity when developing and carrying out the local spatial management individually. Additionally, cooperation with other neighbouring municipalities not only reduces the location competition among them but also enables them to provide larger sites encompassing territories beyond their local borders. Such collaboration also improves the exchange of relevant know-how among local authorities, making municipal land-use design more efficient. Moreover, such cooperation will strengthen the position of the local entities involved not only when representing and marketing the quality and availability of the common industrial sites provided, but also in the fierce spatial competition against other regions in the struggle to be more successful in attracting innovative firms.

Secondly, inter-municipal cooperation in the provision of industrial and commercial sites around the borders of a core city and its surroundings can contribute significantly to a smooth suburbanisation process of economic activities in large city areas. In this context, the core cities which generally suffer from a lack of space can better provide the opportunities for spatial expansion for those well-performing local firms in the cities, while the surrounding municipalities can also benefit from attracting modern industrial and service activities in terms of spin-offs and related positive external effects. This would be one of the ideal ways of creating the region-specific (inter-municipal) clusters of innovative firms and industrial mix in relatively

large enclaves, which are well-endowed with existing hard and soft infrastructure already provided by the core cities.

Case study: The CITYREGIO project of the Leipzig region

The City of Leipzig and its surroundings (Landkreis Delitsch, Leipziger Land and Muldentalkreis) developed a cluster-oriented location management system within the scope of the common initiatives INTERREG III B (EU Cooperation Area CADSES). In the context of the CITYREGIO project, which ran from 2003 to 2005, this inter-municipal cooperation aimed to seek and implement a series of measures required for the development of local economic clusters and location information system for the following high-tech industries and modern services:

- Car and ancillary industry;
- Environmental technology and energy; and
- Health and recreation services (Dressen 2004).

This project was originally initiated by local authorities, based on their acknowledgement that the traditional location competition for new industries and service activities between the centre and its neighbouring municipalities has caused difficulties and frictions, which have not only caused difficult relationships but also seriously hindered the promotion of balanced economic development between the two areas. In particular, badly-coordinated land-use planning for industrial and commercial sites has led to an excessive overall supply of sites in the Leipzig region but has failed to satisfy the specific demands of local and other innovative firms. The CITYREGIO Leipzig project strongly emphasised the negative effects of such shortcomings on local and regional development and attempted to develop a cooperative pan-regional land-use policy to attract (innovative) firms to locate and to strengthen the economic competitiveness of the entire region.

The following activities belong to the principal tasks of the project:

- Coordination of land-use design and spatial development for industrial sites;
- Harmonisation of the development strategy options between the core city and its surroundings (for example, in location marketing);
- Enhancement of the knowledge base of endogenous economic potentials of the municipalities involved and the entire region; and
- Improved cooperation between firms and local administrations (at the regional level) in the creation of a regional cluster (Dressen 2004).

The city/surroundings cooperation carried out an analytic task and some realisation-related activities. To the former task belong, for example, the analyses of economic and population structure, and the location system of the individual entities as well as their city/surroundings relations and the endowment of potential human resources. Based on the location and branch analyses, which are strongly oriented to the creation and/or expansion of clusters, necessary information and know-how was collected in order to systematically improve the regional economic environment for the selected industrial branches and to better coordinate the spatial development strategy of local authorities at the regional level.

Some activities were also defined as ‘regional’ tasks, which include, for example:

- The development of regional location and branch information systems for the economic location cluster;
- Regional location management (one-stop agency);

- Planning support and investment-preparation measures for industrial and commercial sites (with high priorities for sustainable economic cluster development) and for cluster support measures (training, traffic and infrastructure plan, etc.);
- The establishment of regional networks among actors such as enterprises, chambers of commerce, local administrations, etc. and scientific consultation and training for the regional actors in the network;
- Regional location marketing; and
- Dissemination of project results and experiences as well as further recommendations for future use by other conurbations of the CADSES space (Dressen 2004).

With all these measures, the project partners attempted to (1) achieve better mobilisation and interlinking of endogenous regional economic potential, which has been insufficiently exploited up to now, (2) make the entire region more attractive for investors, (3) improve the regional labour market situation, and (4) strengthen the competitiveness of the firms located in the region.

6. CONCLUSION

This study highlights the role of land-use policy in location competition between German municipalities and attempts to investigate the major characteristics of their strategies, which are aimed at attracting innovative firms under the particular consideration of their own local preferences and the aspect of innovation networks and clusters. Strongly based on the subsidiarity principle, local land-use policy is usually combined with the typical local industrial and innovation policy in this country. In this context, German municipalities can have an impact on the local economic structure, since they set the extent to which the available sites in their own territories can be distributed for different purposes such as production, housing, transportation, green areas, etc. By doing so, they can also create an optimal spatial mixture in the municipality, which not only ideally encompasses all these different land-use purposes in a systematic manner but also generates the maximum positive external effects (see the Potsdam case).

Those large-scale industrial parks, such as the Technology and Science Park Adlershof in Berlin, are seen as a strategic mix of local land-use and technology policies designed to create incubators for innovative SMEs with *ample space* and to accomplish a superior position in the competition (with other municipalities) for those high-tech firms. Such industrial parks generate the synergies from science and industry, bridging innovation and the market via appropriate applications.

Furthermore, German municipalities like Leipzig and its surroundings not only compete against each other but also, at the same time, look for opportunities to cooperate in order to attract innovative firms. Major cooperation issues include, for example: (a) coordination of land-use design and spatial development for industrial sites; (b) harmonisation of the development strategy options between the core city and its surroundings (for example, location marketing); (c) enhancement of the knowledge base of the endogenous economic potentials of the municipalities involved as well as the entire region; and (d) improved cooperation between firms and local administrations (at the regional level) in the creation of regional clusters and so on.

Such German-style sub-national innovation-oriented land-use strategies and the competition behaviours of municipalities can be well demonstrated by a ‘theoretical’ two-level municipal competition model, as shown in this study. The municipalities compete in the first phase of land-use planning and zoning within their territories (see the case of Potsdam). After having

decided on the size and character of their industrial zone, they enter the second stage of municipal competition for the location of firms by establishing industrial parks. In this competition, the planning of the size and quality of the land in the industrial zone, as well as its sales strategy, plays a crucial role. This competitive aspect among municipalities is also revealed in the legal and institutional frameworks in Germany.

The empirical research finding coincides with a zoning model that illustrates the oligopolistic competition between municipalities that aims to attract high-tech firms. The model makes it possible to suggest the direction of changes in zoning if there is a shift in relevant factors such as preferences for high-tech firms, factor endowments and prices as well as demand for industrial plots among high-tech firms. The solution also demonstrates that there is a tendency for large industrial zones related to the size of the municipalities, whereas it also points to municipal welfare improvements led by inter-municipal cooperation like the CITYREGIO project in Leipzig. This fact suggests that the described competition model can also be modified and further developed through the consideration of some additional determinants that are relevant for cross-border municipal cooperation.

In order to be well prepared for location competition among high-tech firms, municipalities tend to establish industrial parks. A theoretical model which explains the formation of such a park by municipal and private decision-makers is also demonstrated. The municipal benefits c_i are closely linked to the municipality's share in the resources of the park x_i/X. The parameter b_i reflects the opportunity costs caused by its engagement. Furthermore, the model demonstrates important factors in the outcome of the negotiation in the form of a location contract; for example, in terms of land price, firm outputs, subsidies and so on, and the change in land price if the evaluations of the municipality, the market conditions of the locating firm and the infrastructure endowment change. These factors are well highlighted in the case studies concerning Potsdam and Berlin Adlershof.

The process of location competition is shown in the study in terms of a simple supply restricted monopsony model. Its outcome illustrates that the competition between industrial parks for a high-tech firm tend to lead to relatively low land prices. An exploitation of the municipalities is involved as they receive less utility than without competition. Moreover, it points to the tendency that industrial parks such as Berlin Adlershof with its infrastructure endowments attract particularly profitable high-tech firms. Such circumstances allow for a large solution space for the negotiators. Those municipalities, which are not sufficiently equipped with infrastructure and favourable location factors, have a small solution space. They are likely to lose in the competition and should be satisfied with the location of traditional industries and services.

The model approach made in this study primarily focuses on the parameters shaping zoning and land-use at the municipal level. The demonstrated competition model could be extended by considering other parameters of clustering more explicitly, such as supply relations between firms, connecting infrastructure including product lines, shareholding networks, support programmes for other public actors and so on. In future research, some extra attention should also be paid to the adaptation of the outcome of the competition model for real land-use policy making and the revision of such policy under the adequate consideration of local economic and demographic development.

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Innovationsorientierte Flächennutzungspolitik der Kommunen: Das Beispiel Deutschland

Im Rahmen dieser Studie untersuchen die Autoren wichtige Eigenheiten, kommunaler Flächennutzungspolitik zur Ansiedlung innovativer Unternehmen. Grundlage der theoretischen Analyse bildet ein kommunales zwei Stufenkonkurrenzmodell. In einer ersten Konkurrenzphase bestimmen Gemeinden im Rahmen ihrer Flächennutzungsplanung, welche Flächen als Industrieflächen in Erwartung möglicher Ansiedlungen innovativer Firmen ausgewiesen werden sollen. Dabei berücksichtigen sie das kompetitive Flächenplanungsverhalten anderer Gemeinden sowie ihre eigenen Präferenzen bezüglich innovativer Firmen. Nachdem Industrieflächen geplant worden sind, konkurrieren die Gemeinden in einzelnen Ansiedlungsfällen um innovative Firmen. Ansiedlungsspiele resultieren.

Zur Erklärung der ersten Konkurrenzphase wird ein Duopolmodell (Lindemann 1999, Friedrich und Lindemann 2000) herangezogen. Eine Gemeinde plant den Anteil ihrer Fläche für industrielle Aktivitäten in Prozent Ihrer Gesamtfläche Bp. Die Gemeinden ziehen Nutzen aus öffentlicher Produktion und aus privater Produktion. Der Finanzierung der öffentlichen Produktion dienen Steuerzahlungen und Flächenverkaufserlöse. Die Einnahmen aus dem Landverkauf hängen auch von den Landverkäufen der Konkurrenzgemeinde ab. Produktionsfunktionen existieren für die private und öffentliche Produktion in einer Gemeinde. Unter der Annahme kostenminimaler Produktion werden im Modell die private Produktion nach Besteuerung, die öffentliche Produktion sowie die geplanten Einkünfte aus dem Flächenverkauf bestimmt. Jede Gemeinde fixiert ihren Flächennutzungsparameter Bp, um ihren Nutzen zu maximieren. Da Gemeinden im Konkurrenzprozess sich häufig autonom verhalten, maximiert eine Gemeinde ihren Nutzen unter der Annahme, dass die andere Gemeinde mit ihren Planungen auf eigene Planungen nicht reagiert. Eine Launhardtlösung resultiert (siehe Figure 1). Das autonome Verhalten der Gemeinden bewirkt eine Tendenz zum Ausweis umfangreicher Gewerbeflächen. Das Modell berücksichtigt Gegebenheiten, die für innovative Firmen wichtig sind. In dem die Lösungsformeln nach den bestimmenden Parametern differenziert werden, lassen sich die Reaktionen der Gemeinden hinsichtlich ihrer Industrieflächenausweise auf folgende Änderungen ermitteln. Dazu zählen :Produktivitätserhöhungen, Lohnveränderungen im Privatsektor sowie im öffentlichen Sektor und Eingriffe übergeordneter Gebietskörperschaften über Steuersätze, Zweckzuweisungen, Subventionen.

Um ihre Chancen im kommunalen Wettbewerb zu erhöhen, weisen die Gemeinden nicht nur Industrieflächen aus, sondern sie gründen unter Einschluss von Industrie- und Handelskammern, privaten Grundstückseigentümern, Projektentwicklern, öffentlichen und privaten Banken usw. Industrieparks, die öfters Public Private Partnerships darstellen. Diese Aktivitäten werden mit Hilfe eines Kooperationsmodells analysiert. Die möglichen Beteiligten an einer solchen Partnerschaft erwarten aus der Gründung des Industrieparks einen Nutzenzuwachs. Einerseits steigt der Nutzen eines Partners an, wenn seine Engagement, ausgedrückt in der Höhe seines Anteils an den Gesamtressourcen des Industrieparks, steigt, z.B. aufgrund erhöhter Abstimmungsmacht. Andererseits entstehen Nutzenverluste, da die Ressourcen für alternative Verwendungen fehlen. Unter der Annahme autonomen Verhaltens der Gründer wird gemäß Cornes and Hartley (2001) eine Optimalstrategie für jeden Beteiligten und eine Lösung ermittelt bei der die notwendigen Ressourcen bereitgestellt und jene Beteiligten ermittelt werden, die den Industriepark

gründen. Es sind jene Kandidaten, die hohe Nutzenzuwächse erwarten und geringe alternative Nutzenverluste aufweisen.

In der zweiten Konkurrenzphase konkurrieren die Industrieparks um ansiedlungswillige Unternehmen. Diesen Wettbewerb verdeutlicht ein angebotsbeschränktes Monopson Modell (Feng und Friedrich 1999; Batey und Friedrich 2000; Friedrich und Nam 2009). Zwei Industrieparks bemühen sich, um die Ansiedlung eines innovativen Unternehmens, dem sie Standorte verkaufen. Die Industrieparks maximieren Nutzen, der jeweils von der Höhe der Produktion des neuen Unternehmens, seiner Beschäftigung, den Investitionen des Unternehmens, dem Verkaufserlös, und vom Umfang seiner am Produktionsvolumen orientierten Subvention abhängt. Die innovative Unternehmung maximiert ihren Gewinn, der sich gemäß den herrschenden Nachfrage-, Produktions- und Kostenbedingungen einstellt. Es wird eine Anzahl möglicher Verträge bestimmt, denen Nutzenverteilungen zwischen einem Industriepark und dem innovativen Unternehmen entsprechen. Beide Vertragspartner erzielen einen Mindestnutzen, der sich für sie jeweils ergibt, wenn sie keinen Ansiedlungsvertrag schliessen. Aus den möglichen Verträgen resultiert mittels einer Nashlösung ein Lösungsvertrag (siehe Figure 2. Diese Lösung akzepiert das Unternehmen, wenn nur ein Industriepark als potentieller Käufer existiert. Da ein zweiter Industriepark konkurriert, verhandelt das Unternehmen mit diesem ebenfalls, um eine Nashlösung auszuloten. Dabei verlangt es als Mindestnutzen in diesen Verhandlungen mindestens den Nutzen, den es mit dem ersten Industriepark realisieren würde. In einer nächsten Rückverhandlungsrunde mit dem ersten Industriepark besteht es auf einer Mindestnutzenhöhe, die mindestens jenem aus einem Vertragsabschluss mit dem Industriepark 2 entspricht, um zu einem Vertragsangebot gemäß Nash zu erlangen. Dieser Wettbewerbsprozess setzt sich fort, bis einer der Industrieparks dem Ansiedlungsunternehmen keine Nutzenerhöhung mehr bieten kann. Von einer Runde zur nächsten sinkt der Grundstückspreis. Jener Industriepark gewinnt, der Standortkonditionen bietet, die dem innovativen Unternehmen große Gewinnaussichten eröffnen. Die Höhe der Mindestnutzen eines Industrieparks vermag auch Nutzenhöhen zu reflektieren, die sich beim Verkauf an geringer innovative Unternehmen ergeben. Sind derartige Möglichkeiten hoch, so wird das innovative Unternehmen sich mit weniger attraktiven Grundstückspreisen begnügen müssen, der gewinnende Industriepark erzielt einen höheren Grundstückspreis.

Die Modelle reflektieren teilweise die kommunale Flächenpolitik deutscher Gemeinden. Die Grundstücke werden von Ansiedlungsunternehmen nachgefragt, um Kapazitätsengpässe, die Firmenerweiterungen gefährden, zu überwinden, um Umsiedlungen zu bewältigen, um strategische Entscheidungen multinationaler Firmen zu realiseren und um Unternehmensneugründungen zu lokalisieren. In größeren deutschen Städten werden die betreffenden Grundstücke, die gewerblichen und industriellen Zwecken dienen, als industrielle und logistische Standorte, als Hightechindustriegebiete, als industrie- und handwerkliche Standorte, als Flächen für wissenschaftliche, technische sowie Medienaktivitäten und als integrierte städtische Büroflächen gekennzeichnet. Sie unterscheiden sich hinsichtlich ihrer Größe, Eigentumsverhältnisse, Verkehrslage, ihrer Umweltgegebenheiten und ihrer Erreichbarkeit. Am Beispiel Potsdams werden die Stärken und Schwächen der vorhandenen Flächenangebote, der Flächeneigenheiten und deren Entwicklungsmöglichkeiten aufgezeigt sowie Entwicklungschancen und -risiken diskutiert. Potsdam besitzt günstige demographische, kulturelle und infrastrukturelle Entwicklungsvoraussetzungen. Es gelingt wissenschaftliche Einrichtungen, und wissenschaftsorientierte und innovative Unternehmen anzusiedeln, wozu auch die Existenz eines leistungsfähigen Handwerks und der gestärkte Dienstleistungssektor beitragen.

Entwicklungshemmend wirken sich die Finanznöte der Stadt, der scharfe regionale Wettbewerb und eine zu geringe Qualität der Flächen sowie die Transformationsfolgen aus.

In Deutschland wurden viele Industrieparks oder Innovationszentren entwickelt. Sie haben durchaus positive technologieorientierte wirtschaftliche Entwicklungen hervorgerufen und zu Unternehmensneugründungen sowie Einkommens- und Beschäftigungseffekten geführt. Allerdings sind sie öfters klein, und es herrscht ein Überangebot an Industrieparks, so dass etliche von ihnen nicht voll genutzt werden. Manchmal wurden sie falsch konzipiert, z.B. hinsichtlich der Infrastruktur, der Eignung der Standortregion und deren Ausstattung mit qualifizierten Arbeitskräften, oder sie wurden nicht flexibel genug gemanagt.

Zu den positiven Beispielen zählt in Deutschland der Technologie- und Wissenschaftspark Adlershof in Berlin. Er ist verkehrsmäßig gut an das städtische Verkehrsnetz, den Flugverkehr, den Schienenverkehr und an Autobahnen angeschlossen. Er umfasst ein großes Areal und ist in die Stadt Berlin integriert. Er hatte Vorgänger als Wissenschaftszentrum zur Zeiten der Deutschen Demokratischen Republik, wo dort neun physikalische und chemische Institute existierten. Auch sie wurden während der Transformation mit Grundstücken und Finanzmitteln (1,3 Milliarden Euros) großzügig ausgestattet. Etliche Spezialzentren für Optik, für Umwelttechnologie, für Bio- und Energietechnik sowie Informationstechnik, für Materialwissenschaft und für Mikrosysteme sowie für Medienentwicklung wurden errichtet. Ferner existiert ein Gründungszentrum. Gestützt auf Synergieeffekte innerhalb des Wissenschaftsparks, aber auch aufgrund der Nähe zu anderen Entwicklungszentren in und um Berlin, haben sich bis zum Jahre 2010 883 Firmen, wissenschaftliche Institute und andere Organisationen mit über 14 000 Beschäftigten in Adlershof angesiedelt. Die ökonomischen und fiskalischen Effekte sind bedeutend. Ein Anwachsen der Beschäftigtenzahl auf 18800 erscheint infolge des schnellen Wachstums der dort lokalisierten Firmen und der bis 2025 ausreichenden Parkkapazitäten möglich.

Da in Deutschland geeignete Flächen und Standorte für innovative Unternehmen nicht in genügender Eignung und Menge zur Verfügung stehen und da der intensive regionale Wettbewerb die Vorteile der Ansiedlungen für die Träger der Flächenpolitik vermindert, wird nach Wegen kommunaler Zusammenarbeit gesucht. Gemeindeübergreifende abgestimmte Flächenpolitik soll finanzielle Engpässe der Gemeinden vermindern, kooperative Lösungen erleichtern und den kommunalen Konkurrenzkampf mindern sowie Stadt-Umlandkonflikte reduzieren. Am Beispiel der Region Leipzig zeigen die Autorent, wie die beteiligten Akteure eine gemeinsame Cluster orientierte Standortentwicklung anstreben, die insbesondere die Kraftfahrzeugindustrie, die Energie- und Umwelttechnik und den Gesundheits- und Erholungssektor betrifft. Flächennutzungspläne und Industrieflächenentwicklung werden koordiniert sowie gemeinsame Strategien zur Gestaltung der Stadt Umlandbeziehungen entwickelt, Die Informationsbasis der Entscheidenden soll gestärkt und die Zusammenarbeit zwischen den Kommunalverwaltungen vertieft und die regionalen Netzwerke gefestigt werden. Die Kooperationspartner forcieren die Nutzung gemeinsamer Ressourcen, sie erhöhen die Attraktivität der Region für Investoren und verbessern die Arbeitsmarktsituation und fördern die Wettbewerbsfähigkeit der dort lokalisierten Unternehmen.

Die vorgestellten Modelle sollten erweitert werden, um Cluster-Parameter wie gegenseitige Lieferbeziehungen, infrastrukturelle Verflechtungen, Eigentums- sowie Finanzierungs-verflechtungen und Förderungsprogramme zu berücksichtigen. Ferner sind Anpassungs- und Revisionspolitiken der Kommunen als Reaktion auf Flächennutzungserfolge oder –enttäuschungen in die Modelle einzubeziehen.