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**Global circulation and territorial development: the case South-East Brabant in the Netherlands**

**Arnoud Lagendijk**

**Frans Boekema**

**Abstract**

Since the early 1990s, the south-eastern part of North-Brabant (also known as the Greater Eindhoven region) in The Netherlands has enjoyed a major turn in its economic position and outlook. From a more or less traditional industrial region in decline, it has become a “cradle of innovation” with a key position in the wider “knowledge-based” economy. This paper sheds light on this transformation by referring to the recent literature on territoriality and relationality, and how it has informed post-Marshallian accounts of clustering. In particular, we discuss the context and scope for regional strategy-making in light of selectivities stemming from state and firm activities. The success of the Eindhoven region cannot be understood without seeing how it was structurally privileged by agents and processes largely external to the region. Part of its success, however, can be attributed to strategic action undertaken within the region itself.

**Introduction**

The south-eastern part of the province of North Brabant, also known as the (Greater) Eindhoven region, is one of the most interesting regions in the Netherlands from a technological and innovative perspective. The last two decades have witnessed a remarkable transition in the region’s economy. In the early nineties, the socio-economic

climate was far from favourable: with severe competition from Eastern Europe and South-East Asia, manufacturing was in steep decline. But today, the Eindhoven/South-East Brabant region is considered a “hot spot” of innovation and knowledge-based production; almost 50 per cent of all private expenditure on R&D in the Netherlands takes place here. As a result, it outdoes all other areas in The Netherlands in R&D and innovation, and belongs in the top league of innovative regions internationally. What is more, it is largely due to this single case of outstanding regional performance that The Netherlands features strongly on the European Innovation Scoreboard and similar benchmarks, whether concerning competitiveness, employment, R&D expenditure, level of education, numbers of patents, productivity or innovation potential.

This paper adopts a relational perspective on regional development and innovation to explore the transformation of more or less traditional industrial regions into “knowledge” economies. In particular, we want to differentiate the more structural from the strategic dimensions of how new forms of localised knowledge dynamics are established under conditions of advancing globalisation. We thus draw upon recent debates in economic geography on relationality versus territoriality to conceptualise and examine the nexus between regional economic dynamics and the global circulation of knowledge. This relational perspective on regional development will be applied to the case of South-East Brabant in the final part of the paper.

### **Regions between territoriality and relationality**

Geographers generally have a double-edged perspective on the region. On the one hand, regions are understood as territorial entities whose main features can be understood primarily on the basis of local characteristics. On the other hand, regions are parts of a global world of interconnections, the nature and intensity of which define a region’s positionality and identity within wider contexts. Following Massey’s (1984) seminal work which placed the region within the debate on growing spatial divisions of labour, it was Castells’ (2000) contribution on the Network Society that furthered it by conceptualising regions as bounded places in a global world of flows

Geographers have advanced and refined the debate primarily under the rubric of “relationality”. Essential to a relational understanding of regions is that they are conceived not as closed systems or single entities, but as “relational construct[s] through which heterogeneous flows of actors, assets and structures coalesce and take place” (Yeung, 2005, p. 47). But as Yeung argues, relationality primarily entails a method of understanding. It provides an analytical lens for the interpretation of regional phenomena in broader perspective. Rejecting the essentialist stance in which intrinsic aspects (properties) of phenomena provide keys to explanation, a relational approach seeks to understand the meaning and performance of phenomena through their position in (or through) these flows. What counts is not so much the notion that we live in a world increasingly dominated by flows (an ontological argument), but the idea that we should assess the world in terms of flows (an epistemological argument).

This tension between flows as “pervasive fact” and “critical lens” has troubled the discussion on relationality from the outset and continues to do so. In the 1970s and 1980s, interest in the more factual aspects of the region’s position within spatial divisions of labour was closely linked to the long-standing debate, inspired by Marxist thinking, on the notion of *social relations* in critical geographical work. Later, on the more factual side, the rapidly growing literature on globalisation, scaling and networking encouraged further elaborations of regions as nodes in “upcoming” global networks; on the analytical side, the relational lens was given new impetus from analytical network perspectives and theoretical strands such as Actor Network Theory. In practice, the ontological and epistemological sides of research are closely interwoven (cf. Hay, 2002), though the geographical debate has paid insufficient attention to actual practice in its own field of research. The result is continued conceptual confusion and lack of analytical orientation.

For instance, there has been a tendency to conflate notions of circulation in terms of expanding flows (factual) and circulation as a way to understand the rise of stable actor-networks (analytical) (Lagendijk, 2006). While both forms of circulation (and their impact) involve spatial aspects, and are thus of interest to geographers, conceptually and analytically they need to be distinguished. It obviously makes sense to examine flow phenomena through a relational analytical lens, as suggested by the Global Production Network (GPN) perspective (Henderson et al., 2002). But phenomena lacking a close and

direct association with networks, flows or globalisations can also be understood in relational terms. A stand-alone typewriter can be seen as a relational construct, assembled out of the circulation of technologies, typing conventions and commercial interests, as much as a computer permanently hooked onto the Internet. A challenge for geographers is to show that phenomena that evidently seem local can only be properly understood by assessing their global associations, a point made most vividly in Massey's (1991) work on Kilburn Road. Manifestly global activities, in turn, may actually be rather local in nature. For example, the massive growth of package holidays to tropical tourist resorts – often portrayed as an icon of globalisation – may be seen primarily as a product of household developments and travel company investment strategies back home. A seemingly global phenomenon may thus be primarily local in nature.

The real challenge, however, does not lie in the labelling of phenomena as “local” or “global”. Relationality urges us not to categorise in terms of given spatial fixities or scales, but to unravel how the relational construction of phenomena itself bears upon selective processes of categorisation and fixation. Describing something as local or global is in itself an act of construction, based on certain – often hidden – perceptions, assumptions and motives. In many ways, it is also a political construction, driven by particular viewpoints and agendas. Key lessons can be drawn from Jones' recent work on territoriality and, more broadly, from Jessop's work on the strategic-relational approach with its emphasis on *structurally inscribed strategic selectivity* (discussed further below). In his recent work on “phase space”, Jones (2005) voices concern over the way recent relational thinking has placed too much faith in the more factual notion of a world of flows and ignored the pervasive (albeit changing) role of territorial anchorage and boundedness. Such fixity is not given, however, but results from processes of *territorialisation* that are time and place-specific (see also Brenner, 2004). In line with this notion of selectivity, territorialisation is produced through “mutually transformative evolution of inherited spatial structures and emergent spatial strategies within an actively differentiated, continually evolving grid of institutions, territories and regulatory activities” (Jones, 2005, p. 22) A useful distinction is that between the three concepts of *territories* as bounded, enacted spaces under the governance of a particular collectivity; *territoriality*, as the characterisation of how the collectivity is spatially related (local and

non-local); and *territorialisation* as the process of creating bounded and non-bounded forms of territorial relations. Relationality, then, amounts to a “conceptual middle road between space as territorial anchorage and fixity and conceptions of space as topological, fluid and relationally mobile” (Jones, 2005, p. 19). Yet, as stressed above, local “fixity” can also be understood through a relational lens. Critical questions are hence: What kind of territorialisation has produced this fixity? What has shaped it as a seemingly logical or even natural property or ambition? What were the characteristics of the selective environment, and which strategic drives led to the privileging of this type of spatial anchorage? To what extent and how did it become self-reinforcing and “locked in”?

Within a relational perspective, the specific influence and performance of a region can be explained in terms of *emergent* effects or properties supporting regional development. In Yeung’s (2005, p. 46) words, “the efficacy of such an emergent effect is contingent on the practice of a variety of actors such as firms, unions and agencies entering into all sorts of heterogeneous relations – a relational practice that activates this emergent effect. In other words, the emergent nature of power is experienced through action and practice.” This underwrites the critical role of economic agents active in a region, or, more specifically, those regions engaged in particular processes of territorialisation. A recurrent theme in relational approaches is the alleged dialectical relationship between firms and territories. To continue Yeung’s argument, “firms produce places through their place-based activities and places produce firms via prevailing sets of institutions, rules and conventions”. Dicken (2000) situates this dialectic in the way transnational corporations, while territorially embedded, also act as nodal points in global networks. Yet this should not be understood as a two-way interaction between autonomous entities. Territories are not only the *objects* of firms’ practices; they are the products of a long accumulation of business activities and strategies, of “rounds of investments” (Massey, 1984). Similarly, territories do not just yield resources to firms; they produce seedbeds and environments for business development from which firms can never fully detach. Although firms may over time radically change their spatial structures, and move from place-based to more network-based forms of embedding and dependence, their activities remain spatially rooted and hence dependent on specific

spatial environments. This is an issue we will further explore in the case of South-East Brabant.

So how to proceed? Rather than trying to continue and refine the discussion of relationality and territoriality, we propose a different path. While relationality can shed light on the position of regions within wider economic settings, the issues raised are not alien to the “mainstream” debate on regional development, caught in what can be described as Marshallian and post-Marshallian terms. In the next section, we briefly review this literature in light of notions of relationality presented thus far. This will help us to more precisely follow the conceptual middle road between fixity and flows as advocated by Jones. To organise the discussion, three (admittedly crude) lines of thinking will be distinguished: Advanced Marshallian perspectives that continue to base themselves on the notion of localisation; Neo-Marshallian perspectives that consider territories in nodal terms; and Post-Marshallian approaches that provide alternative perspectives to localisation.

### **Advanced Marshallian perspectives: cognitive economies and relationality**

Besides the availability of resources (such as labour and intermediate products), Marshall’s explanation of localization within industrial districts points to the intense and continuous flow of communication in socially dense economic environments (Lagendijk and Oinas, 2005). Recent accounts on industrial districts, notably of the “Italianate” version, have focused on the nature and impact of communication. These have been explored in terms of processes (cognition, conventions), content (significance of tacit knowledge) and governance (rise of special institutions and strategies that facilitate and direct the circulation of information and knowledge) (Rullani, 2003). In this way, communication is considered the key intervening variable between the social-cultural fabric of a territory and its capacity to underpin an “organised market” that fosters innovation and rising productivity. Such an organised market can be understood in terms of the proliferation of advanced *filières* and the development of social institutions and codebooks that help to address uncertainty and to develop and maintain an effective balance between collaboration and competition (Maskell, 2003).

So one form of relationality, primarily of a “factual” kind, resides in the specifics of the circulation of information and knowledge within the territory creating a kind of cognitive economy (Turvani, 2003). The circulation is constantly fed by a (partly collectively governed) inflow of “intelligence” from the outside. Yet, in separating such a local “buzz” from the feeder “pipelines” (Bathelt et al., 2004), a critical distinction is made between the internal and external dimensions of knowledge flows. In recent years, research on districts has pointed to various other forms of circulation accompanying that of information and knowledge, such as the role of labour moving between firms and the role of fixed and financial capital. It has also revealed how, especially in more mature districts, flows of knowledge become increasingly subject to the managerial control of leading firms, amounting to more hierarchical forms of governance and formal modes of interaction (Albino and Schiuma, 2003).

A second, more analytically oriented relational theme concerns the particular role of social relations. Industrial districts are, in this view, characterised by exceptional kinds of relationships between labour, firms and capital, and between localised agents in general. Such relationships are imbued with notions of solidarity, common purpose and identity, producing a “thick”, proactive, responsive and resilient production environment (Becattini, 2003). Shared practices of risk management facilitate the rapid circulation of capital. A flexible labour market allows individuals to smoothly move between positions as entrepreneurs, employees and merchants. A common orientation on a competitive, final product encourages effective, low-cost forms of inter-firm coordination. The outcome is, in Becattini’s (2003, p. 13) words, “Systematic osmosis between the reproductive processes of workers, entrepreneurs and capital” and “a fruitful ambivalence between subordinate and autonomous labour, and ‘dead’ capital and ‘living’ work” (p. 14). Yet these relations – and the kind of knowledge and capital circulation they support – are in no way generic. They are deeply contextual and situated, and cannot easily be extended across district boundaries. The district-specific evolution of social relations are thus a significant factor in the *localisation* of production activities and the local proliferation of “organised markets” distinguishable from the outside world.

A third way to apply a relational perspective is by assessing the phenomenon of industrial districts in terms of broader conditions and relations. Relationality is here

applied primarily in an analytical sense. Without disputing the notion that districts can be explored starting from the perspective of bounded space, they are considered phenomena that cannot be analytically isolated from the world outside. Specificities of industrial organisation, technological developments, wider territorial conditions (amongst other factors) provide structural conditions as well as scope for processes of localisation. A critical factor is (potential for) a high degree of vertical disintegration, combined with a stronger need for economies of scope than of scale. Districts thus tend to specialise in products where a few centres worldwide can cater for (major parts of) the world market. Moreover, they tend to flourish in sectors where the need for innovation is incremental, not radical, since the latter tend to rely on close linkages between “big science” and “big enterprise”. Territorial conditions further include those aspects of multi-level governance that define the scope for collective regulatory and strategic action at the local level (Lewis et al., 2002). The significance of these factors should be assessed in the light of possible alternative forms of industrial organisation. In the words of Rullani (2003, p. 69), “IDs [industrial districts] cannot be analysed per se, but their role stems from the global competitive arena, in which IDs face alternative forms of cognitive/regulatory circuits of organisation”, such as virtual networks.

This third approach is the most challenging as it requires an in-depth exploration of a wide variety of relations and relational constructs. It poses major dilemmas in terms of the selection of analytical objects and their interpretation as “relational constructs”. So far, opening the “black box” of well-performing industrial districts has seemed a manageable, fertile path of research. Besides the expected set of Marshallian economies, the box has thrown out appealing concepts such as localised cognitive economies and proactive forms of governance. However, this achievement is based on a rather narrow perspective that pitches a “thick”, localised socio-economic world against a rather thin economic world outside, one that mainly serves to absorb the district’s products and provide resources (Lagendijk, 2004). Adopting a more open, relational approach that analytically transcends the “invisible walls” of the district may thus shed light on how local performance is part of a highly complex, dynamic system of economic circulation. Yet putting such an approach into practice – that is, trying to map and explore the relational setting of industrial districts – poses a daunting task. Indeed, the black box of

relationality may well turn out to be a Pandora's Box once we attempt to open it. Without spatial and hence analytical boundaries, it is hard to determine how far, in terms of positions and relations, an analysis should go. While we may already have a strong indication of what kinds of external factors and relations will be most relevant, there is no obvious end to relational analysis. A partial solution may be provided by starting from a different angle, as suggested by neo-Marshallian approaches.

### **Neo-Marshallian approaches: regions as nodes**

In line with Massey's work, Thrift and Amin (1992) coined the term "neo-Marshallian nodes" to argue that dynamic regions should be seen not as self-contained socio-economic and political entities, but as central places in global networks, or *filières*. Regions as nodes play a major part in – and exert considerable control over – the creation and circulation of knowledge and products/services. While Amin and Thrift pointed to the need to consider the way regions are plugged into global webs of relations, it was the later work on Global Production Networks (GPN) that provided a full-fledged elaboration of this idea (Henderson et al., 2002). Rather than starting with the region, the GPN approach features circuits and networks of interaction, mediated through differential power relationships in global production networks and through transnational social networks (Dicken, 2004). Applying Rullani's (2003, p. 69), conceptualisation, GPNs can be considered "cognitive/regulatory circuits of organisation" comparable to – and hence alternative to – industrial districts and other spatial configurations. As relational "architectures", GPNs are embedded in macro-structures representing different types of capitalism while they in turn provide the conditions for the development of regions-as-nodes. Corporations, dominant states, state alliances (e.g. EU), trade associations and NGOs play a critical role in shaping organisational networks, institutional forms and "power geometries" (Massey, 1999; Yeung, 2005). All exert influence on the formation of conventions, institutions and discourses underpinning structural conditions and prevailing courses of action.

In the GPN perspective, relationality has both factual and analytical connotations. Factually, economic production is seen as dominated by global networks and circuits.

Analytically, the understanding of economic geographies and regional performance is based on a relational heuristic that ingeniously links macro, meso and micro levels. The starting point for research is the level of the GPN, and hence of its networks and circuits. To what extent this also leads to a global perspective depends on the GPN's specific territorial organisation; the involvement of particular spaces and scales is not a-priori, but can only be deduced through empirical observation. GPNs are often, as characterised by Henderson (2002, p. 446), "discontinuously territorial". Certain activities may be firmly anchored and concentrated in specific places but many others – including knowledge production and circulation – tend to be spatially distributed. Their architecture may draw in particular regions, and is economically and institutionally embedded in particular spaces.

Localisation thus remains a pervasive phenomenon, but one which needs to be assessed in strategic-relational terms. The relational dimension resides in the way regional positions are, in the words of Coe et al. (2004, p. 469), the "dynamic outcome of the complex interaction between territorialized relational networks and global production networks within the context of changing regional governance structures". To a large extent, regional positions are outcomes of the particular trajectories along which regional assets, global production networks and associated governance structures have developed and intertwined, and hence have "locked in" particular *regional* development trajectories. While such a "lock in" entails structural constraints, it also defines the scope for action. For instance, whereas their core space for action is presented by GPNs, global corporations often seek to tap and modify regional assets. Clusters of SMEs, on the other hand, may seek to tie in with GPNs. Such strategic endeavours result in what Coe et al. (2004, p. 469) call a "dynamic 'strategic coupling' of global production networks and regional assets, an interface mediated by a range of institutional activities across different scales". At the level of regional authorities and associations, concerted action is generally undertaken to "hold down" the global, not only by exerting a pull on parts of GPNs, but also by securing the local extracting of *value* from these activities. Strategic coupling can thus be understood as a combination of emergent properties and strategic interventions.

Neo-Marshallian approaches are characterised by their emphasis on *social-institutional* factors in explaining the coupling between regions and global networks.

Amin and Thrift (1992) have described the capacity to “hold down” the global in terms of “institutional thickness”. The GPN approach further includes institutions at different scales and by detailing a range of institutional activities expected to contribute to “strategic coupling”. To what extent and how this happens, however, remains largely an open question, both theoretically and empirically. There is no consensus on how institutions should be defined and analysed, on how spatial-economic performance can be explained in terms of specific institutions, and how the latter have emerged in particular places. Moreover, the daunting task of considering social institutional factors *relationally* – that is, by assessing their own relational construction as well as their impact on a region’s connectivity – remains. Thus despite providing a detailed understanding of relationality at different levels and scales, in terms of concrete analysis the Pandora’s Box remains open. While clearly a step forward, the GPN perspective is no panacea.

A solution is still not in sight. A strategic-relational approach to localisation not only requires an understanding of how social-institutional factors may *support* and *direct* economic action and performance. There is also the economic dimension itself. In line with Marshallian thinking, the benefits from networking and spatial concentration stem from pecuniary and non-pecuniary forms of externalities. Due to organisational and technological innovations, such externalities can be gained at different spatial scales (from regional to global), and in different organisational forms. The latter include internal (firm-based), external (market-based) and intermediate forms (clusters, districts, networks). According to Phelps (2004), paying attention to the specific geographies of such externalities yields a more precise image of processes of localisation. Drawing in and anchoring distant resources and outlets through establishing what Amin (2002) calls “near-far networks”, regions can benefit from being plugged in to “remote” places. Rather than the classical industrial districts, Phelps identifies spatially extended, often polycentric agglomerative fields as the dominant spaces of localisation and domains in which externalities arise. This certainly applies to spatial-economic development in the south (as well as the west) of The Netherlands.

In agglomerative fields, non-pecuniary externalities – notably those related to labour market dynamics, knowledge circulation and insights into the “rules of the game” – effect both specialisation (scale) and diversity (scope). Such a relational understanding

of externalities and localisation meets Jones' call for a middle road between fixity and flows. In Phelps' (2004, p. 983) words: "the relational nature of external economies and the sorts of patterns of agglomeration that can emerge rest on the common-place co-existence of different types of external (and internal) economies that are available over different geographical scales and are potentially open to firms operating in one location."

### **Post-Marshallian perspectives: beyond the supply side**

The discussion so far has shown that Neo-Marshallian approaches have stretched the concept of agglomeration economies far beyond its original connotation. As a result, the notion of space has been extended to larger regions and spatial networks, conceptualisations of innovation and knowledge have grown in sophistication, and there is now more attention to the institutional embedding of economic activities (notably innovation). Yet the approach remains centred on economic processes of localisation and its supporting mechanisms. While the spatial-economic fabric may be seen as more complex – with more emphasis on aspects of "flow" – argumentation remains based on explaining competitive strength in terms of a set of spatially rooted supply side characteristics. And while attention has been directed towards differentiation and development on the supply side of economic production, other dimensions have been ignored, such as geographical differentiation in demand and macro-economic factors, and the state's impact on investment processes and market structuring. Two influential approaches that have addressed these shortcomings, although in very different ways, are Porter's cluster approach and political economy perspectives on competitiveness.

The appeal of Porter's (2000) diamond and, more specifically, that of the cluster approach, can be understood in how Porter embeds Marshallian thinking in a broader framework that takes on board demand and other "factor" and "market" conditions. The approach is extremely flexible in its industrial and geographical scope, contributing to its image, in Simmie's (2004, p. 1101) words, of a "beguiling siren call" of cluster-based increased competitiveness, higher productivity, new firm formation, growth, profitability, job growth and innovation. The flexibility and receptiveness, however, do not come with a sophisticated understanding of territoriality and relationality; the role of the state is

largely confined to that of a backstage provider of certain forms of support and regulation.

Political economy perspectives on the other hand assign a more fundamental role to the state and dominant actors (elites, leading firms, universities). These actors are not just nurturing localisation and “pinning down the global”, facilitating what are seen as, in the end, intrinsically (and independently) economic processes. Rather, their role is essentially *strategic* in that they shape the discursive and material settings for localised forms of economic development (Peck, 2005). Although assessed here from a more critical stance, the emphasis on collective (although elite-based) strategy-making matches the Triple Helix model boosting the benefits of “University-Industry-Government Relations” (Etzkowitz and Leydesdorff, 1996). Discursively, collective action produces a narrative of the challenges facing an area and of the opportunities to be seized. Strategic action is driven, in particular, by economic imaginaries that “develop as economic, political, and intellectual forces seek to (re)define specific subsets of economic activities as subjects, sites, and stakes of competition and/or as objects of regulation and to articulate strategies, projects and visions oriented to these imagined economies” (Jessop, 2004, p. 5) (see Varró in this issue). Conceiving of a region as a potential equivalent of Silicon Valley, however ambitious it may sound, can create an imaginary yielding a strong sense of direction to mobilise actors and engender collective action. Materially, this translates into the privileging of particular courses of action with selected agents, networks and resources, both local and non-local. We should add here that the effects of such endeavours will never be in line with the original images and (perceived) goals. In the end, the *emergent* effects may still make significant contributions towards the region’s socio-economic position.

Jessop’s strategic-relational approach provides a useful perspective to explore the unfolding and impact of such strategies. Scope for selectivity is limited by material and discursive constraints: material constraints stem, for instance, from the needs of labour markets and collective innovation for proximity and embedding, while discursive constraints arise from conceptions of possible and desirable courses of action. There is nothing natural about these constraints; they reflect the accumulated intended and unintended outcomes of previous decisions and actions. However, they present a high

level of fixity and permanence – what is often labelled as “lock in”. Within these limitations, there remains scope for privileging particular courses of action, involving specific places, scales or networks. It is this succession of strategic orientations under conditions of structural selectivity that shape territories as relational constructs, including the emergence of particular manifestations of localisation. In the remainder of the paper we discuss the relevance of these perspectives for understanding the recent transformation of the South-East Brabant (Greater Eindhoven) region in The Netherlands.

### **The demise of industrial Brabant and the rise of the “Brainport”**

The Dutch province of North Brabant accounts for almost 15 per cent of the national population and is strategically located in the southern Netherlands between Amsterdam, Brussels, Rotterdam and the Rhine-Ruhr area in Germany. The core economic regions of The Netherlands, Germany and Belgium (Randstad, Ruhrgebiet and Flemish Diamond) are nearby, as are the European business centres of Frankfurt, Brussels and Strasbourg. Today the area (especially the region of South-East Brabant) is characterised as the high-technology centre of the Netherlands and one of Europe’s technology and innovation hot spots.

Even by Dutch standards, South-East Brabant is a small region. It consists of 21 municipalities, with around 725,000 residents and 355,000 workplaces. About 70,000 jobs (approximately 20 per cent of the total) and 40 per cent of its added value come from manufacturing. South-East Brabant’s industrial base is internationally oriented, characterised by a concentration of manufacturing, high-tech businesses, institutes for research and applied science, and related services. Overall, The Netherlands’ southeastern provinces of Brabant and Limburg are responsible for 20 per cent of the nation’s GDP, 30 per cent of its industrial employment and almost 40 per cent of Dutch manufacturing’s added value. High-tech industry comprises 22.2 per cent of economic activity in the region, compared to 11.9 per cent for The Netherlands as a whole. The region is specialising in automotive industries, mechatronics, Life Tech (medical equipment, biotechnology, life sciences) and ICT (micro and Nano electronics, embedded systems). It is also strong in energy, environment and transport, and different forms of

polymer electronics and materials technology (including textiles and coatings). As a result, the region is considered the “economic heart” of the southeast Netherlands, matched nationally only by the Amsterdam-Schiphol region.

Less than twenty years ago, however, some of the large manufacturing companies in the region, including Philips and the truck manufacturer DAF, were forced to lay off thousands of workers. This caused bankruptcies and lay-offs down the supply chain for hundreds of small and medium sized enterprises. The economic outlook for the region was so bleak that the European Commission granted South-East Brabant the status of “Objective Two region”. Its fate seemed sealed when, in 1997, the headquarters of Philips moved from Eindhoven to Amsterdam. But while the apex of Philip’s strategic decision-making sought the proximity of the country’s principal bankers, headquarters of other leading companies and Schiphol Airport, the company decided to concentrate the expansion of most of its core R&D activities around Eindhoven. Since the late 1990s, investments by Philips and other companies have changed the region’s fortunes.

Investment was channelled into what was initially called the Philips High Tech Campus, soon changed to High Tech Campus Eindhoven to reflect the more inclusive strategy. Partly due to its relationships with other R&D and technology hot spots in the region and elsewhere in Europe (such as Leuven and Aachen), the campus can be seen as an outstanding regional initiative for open innovation (Chesbrough, 2003; Rutten and Boekema, 2007). The strength of private R&D has since turned the region into a “knowledge powerhouse” of international significance. Measured in terms of patents per million inhabitants, South-East Brabant (the Eindhoven region) now ranks among the top in the European Union (European Commission, 2003) while leading R&D companies and divisions continue to expand their activities. The region now brands itself as “South-East Brabant; a true cradle of innovation”. In national policy discourse and spatial planning documents it has acquired the status of “Brainport”, mirroring two other major agglomerations, Amsterdam-Schiphol and the port of Rotterdam (both labelled “Mainport”).

In recent years Brabant’s Brainport has fared better than the Mainports. In 2006, the region’s turnover was more than double the national average (3.1 per cent versus 1.2

per cent), while growth of the gross regional product continues to outpace the national average. In effect, “Brainport Eindhoven” is the only region in the Netherlands and one of the few in the European Union that meets the Lisbon goal of spending at least 3 per cent of the gross regional/national product on R&D. These include Stockholm in Sweden, Uusimaa in Finland, Oberbayern and Stuttgart in Germany and North Brabant in the Netherlands (Bureau Louter, 2005).

### **Science, technology and innovation policies**

Strategic local investments take place within national and EU-wide initiatives to stimulate innovation. The Dutch government’s ambition is for The Netherlands’ knowledge economy to be a leader in Europe; its goals are formulated within the context of developments in the EU in general and the European Research and Innovation Area (agreed at the Lisbon European Council in March 2000) in particular. Towards this end, two key national policy documents appeared in 2003: the “Innovation Letter” *Action for Innovation*, and the Science Budget for 2004, *Focus on Excellence and Greater Value* (Commissie Siermans, 2005). The Innovation Letter stressed improving the climate for innovation, incentives for companies, and building critical mass in strategic sectors. The 2004 Science Budget likewise emphasised greater focus and building mass in key areas, and recommended concentrating funds in genomics, ICT and nanotechnology, and on areas of special interest for Dutch society. The budget further contained provisions for rewarding excellence among research groups, promoting the utilisation of research results, attention for human resources in science and technology, and raising public awareness for (applied) science.

The “Innovation Platform” – an alliance of state and business actors and knowledge institutes chaired by the Prime Minister – was established in 2004 to leverage science and technology policy. Three policy documents appeared in quick succession: *Industry Memorandum* (Ministry of Economic Affairs, 2004a) announced state support for focal points in innovation; *A Strong Basis for Delivering Top Performance* (Commissie Siermans, 2004) emphasised renewed support for entrepreneurs. The third, *Peaks in the Delta* (Ministry of Economic Affairs, 2004b), is an important document

from a regional point of view. It presented the government's agenda for six regions, one of them being "BrabantStad" – the urban network between Eindhoven, Tilburg, Den Bosch, Breda and Helmond, the five main cities in the central and eastern part of the province of Brabant.

*Peaks in the Delta* bears witness to a radical change in perspective within Dutch regional economic policy. The document stresses The Netherlands needs to make clear strategic choices in the face of stiffening international competition. It advocates building on existing strengths, investing in those sectors that hold most promise for the future, and further strengthening what are described as the "peaks" in the innovation landscape. This is a sea change from the previous catch-up policy that aimed to alleviate differences between Dutch regions (which are no longer seen as so great, particularly in a European context). To systematically seize and develop regional economic opportunities, *Peaks in the Delta* advocates the "Triple-Helix" approach of (local) authorities, the business community and knowledge institutions working closely together. Echoing a general trend in thinking on multi-level governance, it recommends to do locally what can be done locally and to restrict centralised activity to the bare essentials – to projects regions are unable to effectively pursue on their own. *Peaks in the Delta*, by connecting region-specific knowledge and networks to national policy, thus presents a kind of linchpin between the regions and the central government. Examples of sectors supported by national policy include the Life Sciences in the region around Wageningen, biotechnology in the area surrounding Leiden, and the automotive and micro-electronics sectors in the Eindhoven area.

South-East Brabant's potential has been recognised in at least two key national policy documents: "The region is vital to the innovation and knowledge development of the industrially oriented economy and its spread to other (knowledge) regions" (VROM et al., 2004). "The Cabinet will investigate as a priority how the existing potential of the Brainport Eindhoven/South-East Brabant, part of the Eindhoven-Leuven-Aachen cross-border top technology region, may be further utilised" (Ministry of Economic Affairs, 2004b). While political interests and planning settings affect the scale and shape of the spatial economic imaginaries – from a regionalised "Brainport" through a provincial "BrabantStad" (a strategic cooperation of five of the largest cities in Brabant) to a cross-

border technology region – the overall approach, in emphasising connections with other regional, national and international centres of innovation, accords with a relational perspective on the region.

### **Brainport's prospects**

“Brainport” Eindhoven’s ambition to be a leading European technology region does not come without risks. The export orientation of companies and the susceptibility of sectors (for instance metal and electro) to commodity prices mean the regional economy is exposed to considerable fluctuations within world markets and to dynamics within specific GPNs. While the economy is now booming, in the period 1998-2003 the region suffered from unemployment considerably higher than the national average (Etin-Adviseurs, various years). Various GPNs are now cutting costs and limiting capital-intensive investments, while shorter (and more complex) product development paths force companies to strive for economies of scale and greater efficiency.

As soon as industrial processes and products no longer depend on the initial sparks of innovation, manufacturing costs largely determine whether competitive power can be maintained. One possible consequence – resulting in the break-up of production processes, either fully or in part – is industrial out-migration to lower cost locations. Mass production in particular is vulnerable to such relocations. Moving production elsewhere will lead to the hollowing out of local *filières*, and once manufacturing disappears, more knowledge-intensive activities and R&D may follow. So there is a strong interest in preventing such creeping processes of business migration by strengthening the region’s ability to attract and retain knowledge intensive businesses and institutions.

Companies worldwide are searching for regions with hospitable climates for innovation and R&D. While competition is fierce, a limited number of regional centres of excellence (with critical mass in their own areas of expertise, and supported by regional and European networks) are emerging as formidable competitors on both the European and global levels. While the geographical concentration of networks remains important to anchor and showcase knowledge, know-how and experience, increasingly rapid product development (notably in more mature sectors) necessitates greater cooperation. In cases

of open innovation, pre-competitive cooperation is becoming more common, with local players working together to secure and improve their position within GPNs. This means that besides the presence of knowledge institutions, the network approach places greater emphasis on mechanisms of knowledge transfer, firms' absorption capacities and entrepreneurial spirit. Encouraging these developments is now one of the roles of the authorities (Ministry of Economic Affairs, 2006).

## **Conclusion**

How can we understand a region's ability to derive territorially anchored benefits from its position in global production networks? In her seminal paper on "sticky places", Markusen (1996) already pointed to possible configurations and strategies that differ from classical Marshallian approaches focusing on industrial districts. Her contribution discussed the significance of the relational make-up and positioning of regional economies, something which has been taken up and further explored in what is now known as the relational approach to economic geography. In this paper we have followed this line of thinking by reviewing Marshallian perspectives from a relational point of view, and by discussing the contribution of other (post-Marshallian) approaches. As argued in the first part of the paper, the debate on relationality is far from settled. Geographers continue to struggle with the status of networks and relations, and with fundamental concepts such as space, power and evolution. Nevertheless, the search for a middle road between flow and fixity – both ontologically and epistemologically – appears to be a fruitful trajectory. We need to know more about how regional actors produce specific strategies bearing on business practices, networking and processes of knowledge creation and use, which produce effects that can best be described as *emergent* rather than the outcomes of intentional behaviour.

Against this background, our brief exploration of the recent "magical" transition of South-East Brabant from a declining industrial area into a "Brainport" was merely illustrative. Our work did not allow for an in-depth relational assessment of the area – which still needs to be done. What we could indicate, on the basis of our cursory observations, is where the region's story fits our perspective on relational approaches.

Assessing South-East Brabant in terms of its nodal position within global production networks sheds an important light on the region's development. Its nodality is not based on decision-making or regulatory power, but on innovative capacity in particular sectors. This capacity, in turn, is a product of how the region forms part of a much larger agglomerative field stretching to other core regions in The Netherlands and beyond. Follow-up work should focus on relational patterns and the way these produces externalities and incentives for knowledge development across space.

Nodality and embedding within larger relational structures, however, is only part of the story. The turn in the region's economic fortune also includes a strategic dimension with key roles played by dominant firms and the state at various levels. From a national policy and business point of view, the region has been *privileged* as a knowledge powerhouse. Within the region, important connections have been made between knowledge institutions, firms and state organisations. In structural terms, the industrial legacy of the region has not presented major bottlenecks. On the contrary, the mindset and resource base of the region has provided scope for productive forms of collective action and mobilisation.

What will happen in the long-term, however, remains to be seen. Structural conditions in the global production networks – notably those that link innovation and production – are already challenging the region's position. A relational approach that can address both strategic and structural dimensions – within a spatial perspective focusing on the nexus between fixity and flow – may help us to assess this and other regions' current positions and scope for change.

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