PEGIS

Papers in Economic Geography and Innovation Studies

2019/08

The dark side of regional industrial path development: towards a typology of trajectories of decline

Jiří Blažek, Viktor Květoň, Simon Baumgartinger-Seiringer, Michaela Trippl

University of Vienna | Vienna University of Economics and Business | Austrian Academy of Sciences | University of Agder | Kiel University

The dark side of regional industrial path development: towards a typology of trajectories of decline

Jiří Blažek[1], Viktor Květoň[2], Simon Baumgartinger-Seiringer[3] and Michaela Trippl[4]

[1] Department of Social Geography and Regional Development, Charles University; jiri.blazek@natur.cuni.cz

[2] Department of Social Geography and Regional Development, Charles University; viktor.kveton@natur.cuni.cz

[3] Department of Geography and Regional Research, University of Vienna, Austria; email: simon.baumgartinger-seiringer@univie.ac.at

[4] Department of Geography and Regional Research, University of Vienna, Austria; email: michaela.trippl@univie.ac.at

Abstract

Over the past few years, scholarly debates on new path development have attracted increasing attention within the economic geography literature. This work distinguishes various trajectories of regional and industrial evolution. So far, these evolutionary trajectories have been mainly conceptualised as 'positive' forms of path development. However, in reality, many regions are undergoing phases that can be characterised as 'negative' trajectories. Despite their potentially detrimental social and political effects, 'negative' pathways have to date largely been ignored in the extant literature. Drawing on the adaptive cycle model of socioeconomic systems, we aim to shed light on the 'dark side' of path development by developing a typology of what we call 'pathways of decline'. The paper identifies conceptually three forms of negative pathways, that is, path contraction, path downgrading and path delocalisation and provides empirical illustrations for each of them.

Key words: evolutionary economic geography, new path development models, adaptive cycle model, trajectories of decline, downgrading, delocalisation, contraction.

INTRODUCTION

Evolutionary economic geography (EEG) provides a powerful theoretical framework for understanding the socioeconomic evolution of regions and industries (Storper, 2011). Within this stream of literature, much attention has been devoted to elucidating the sources of what has been termed 'new path development', that is, the rise and growth of new economic activities and the successful rejuvenation of mature regional industries. Protagonists of this approach have provided a differentiated view on how such processes unfold, distinguishing between path renewal, diversification, importation and creation (Tödtling and Trippl, 2013; Isaksen, 2015; Grillitsch et al., 2018; Trippl et al., 2018). So far, evolutionary trajectories have been predominantly conceptualised as 'positive' forms of path development, that is, growth paths.

This obscures that in reality many regions undergo phases that display negative trajectories, causing not only economic but also social and political challenges (Rodríguez-Pose, 2018). Yet, the 'dark side' (Phelps et al., 2018) of regional industrial path development has not been systematically investigated, even though negative trajectories in one region or industry are often closely intertwined with positive trajectories in other regions and industries. Such inter-regional and inter-industrial path interdependencies may have several sources, ranging from the level of capital accumulation in existing industries to more favourable business outlooks in other branches, market linkages, value chain relations and other forms of connections, overall policy support, brain drain etc. (Frangenheim et al., 2018; Isaksen, 2018; MacKinnon et al., 2018a; Oinas et al., 2018; Steen and Hansen, 2018; Hassink et al., 2019). What is more, periods of growth are often followed by periods of disarray (Chisholm, 1990; Beynon, 1989).

Arguably, it has to be acknowledged that many studies have examined declining industries and negative regional lock-in, especially those investigating the fate of old industrial regions (e.g. Hassink, 2005, 2010; Schamp, 2005). Moreover, there are other streams of literature dealing explicitly with regions undergoing socioeconomic decline.

First, recent studies on the economic and social transformation of industrial districts in Italy and beyond have zoomed in on negative trajectories (Schamp, 2005; Alberti, 2006; Hadjimichalis, 2006; Sammarra and Belussi, 2006; Rabellotti et al, 2009; Giuliani and Rabellotti, 2018). These studies point to a variety of economic challenges in once flourishing industrial districts and they identify a broad spectrum of adjustment strategies (such as out-

sourcing and delocalisation, functional downgrading, engagement of 'ethnic' firms, downsizing, moves into market niches, etc.). For some districts (such as the traditional footwear industry in the Pirmasens area in Germany), even more radical strategic responses of companies were identified: 'firms either stayed in the industry, but left the region; or stayed in the region, but left the industry' (Schamp, 2005, p. 617).

Second, the disarticulation approach has casted light on regions that undergo severe decline (Bair and Werner, 2011a, 2011b; Hough, 2011). This approach has been developed to conceptualize the processes of disconnection or expulsion of companies and regions from global value chains (GVCs), contesting the 'inclusionary bias' in existing GVC research (Bair and Werner, 2011a).

Finally, as shown below, in conceptual terms, key notions of the EEG literature (lock-in, path dependency and resilience; see, for instance, Hassink, 2010; Boschma, 2015), integrative frameworks for path development (MacKinnon et al., 2018b; Trippl et al., 2018) as well as the adaptive cycle model of socioeconomic systems (Martin and Sunley, 2011) help to gain a better understanding of sources, mechanisms and processes of negative path development.

Therefore, all these streams of literature and conceptual frameworks provide useful insights, enabling one to complement the existing new path development debate to explicitly comprehend also periods of socioeconomic decline and thus to gain a more comprehensive understanding of potential evolutionary trajectories of regional industries. Moreover, to the best of our knowledge, even those studies that examine regional lock-ins pay primary attention to periods of renewal, while the strategies of particular actors and actual mechanisms of change during periods of decline are hardly analysed in detail (Cooke et al., 1989; Bair and Werner, 2011b; Beer, 2018).

This paper seeks to develop a typology of negative pathways. The point of departure of our conceptual discussion are the key dimensions proposed by the adaptive cycle model, that is, capital accumulation, connectedness and resilience (Martin and Sunley, 2011) as well as other dimensions. We use examples from the extant literature and from our own research to illustrate the characteristics of different types of negative path development.

The paper is organized as follows. First, we outline and discuss the theoretical framework. In a next step, we identify three forms of negative pathways and link them to existing case studies of socioeconomic decline in regions. Finally, the concluding section summarizes the main arguments of the paper and proposes avenues for future research.

THEORETICAL DISCUSSION

Recent debates on 'new regional industrial path development' (see Hassink et al., 2019 for a critical review) have enhanced understanding of the conditions and mechanisms of longer-term regional structural change. Drawing on insights advocated by the main representatives of EEG (Martin and Sunley, 2006, 2010; Boschma and Frenken, 2011; Boschma, 2017), Isaksen and Trippl (2016, p. 66) synthesize the key claim made in this literature as follows: the 'pre-existing industrial and institutional structures form the regional environment and context in which current economic and innovation activities take place and new ones emerge'. Protagonists of the 'new path development model' have identified various forms and mechanisms by which new industries come into being and old ones renew themselves and argued that different types of regions (and their innovation systems) vary in their capacity to nurture these 'positive' forms of path development. Isaksen and Trippl (2016) distinguish between organizationally thick and diversified systems, organizationally thick and specialized systems and organizationally thin systems. According to these authors, organizationally thick and diversified RIS exhibit the highest capacity to promote path creation, while the typical development pattern in thick and specialized innovation systems are path renewal or path extension. The most vulnerable regions, that is, organizationally thin RIS, are found to lack of critical mass of capable and innovative regional actors and to be poorly endowed with knowledge organisations and other assets. It is argued that they show a limited capacity to develop new economic activities (Isaksen and Trippl, 2016; Trippl et al., 2018). While these typologies are useful as they spell out the most likely evolutionary trajectories in different types of regions, they cover primarily phases of socioeconomic growth. Arguably, Isaksen and Trippl (2016) and Trippl et al. (2016) consider 'path exhaustion' (defined as the erosion of competitiveness due to negative lock-in) as one potential form of path development. However, they hardly go beyond a brief mentioning that a lack of renewal and experimentation might lead to stagnation and decline. Negative forms of path development are thus not sufficiently addressed in this body of research.

Negative path development is defined here as the decline of a given industry (that is, functionally related firms and supportive actors and institutions) in terms of employment and capital accumulation, resulting in a drop of economic output and adverse modification of the region's asset base.

We argue that several conceptual approaches can be mobilized to outline the spectrum of possible trajectories of decline. A useful point of departure are three interrelated concepts that are widely employed within contemporary EEG research: lock-in, path dependency and resilience (for detailed reviews of these notions, see Hassink, 2010; Boschma, 2015). Most scholarly work invoking the notion of negative lock-ins builds on a typology originally outlined in Grabher's (1993) study of the decline of the Ruhr area. Grabher (1993) distinguishes between functional, cognitive and political lock-in. Hassink (2010) argues that regional lock-in represents a set of these closely interrelated types of lock-ins and claims that regions with strong specializations in capital-intensive industries with high entry and exit barriers are particularly prone to severe lock-ins.

It should be stressed that while the concept of lock-in is often considered as a form of constraint to future development (even though some scholars explicitly distinguish between negative and positive lock-ins; see, for instance, Essletzbichler and Winter, 1999; Martin and Sunley, 2006), path dependence entails both negative and positive connotations (i.e., resources and capabilities may either restrain or enable current and future development). Finally, regional resilience is generally considered a positive feature, not only as a sort of a recovery to a state preceding a shock, but more appropriately as a process enabling regions to 'bounce forward' and develop new growth paths (Hassink, 2010; Simmie and Martin, 2010; Treado, 2010; Boschma, 2015).

The major source for our conceptualisation of negative forms of path development is the adaptive cycle model (Martin and Sunley, 2011), which builds on the above-mentioned EEG concepts (lock-in, path dependency, resilience). This model helps to advance our understanding of the socioeconomic evolution of regions both in terms of growth and decline. The adaptive-cycle model challenges the idea of a predetermined pathway of development. It points to a significant variation and unpredictability of evolutionary trajectories. The adaptive-cycle model underlines the importance of the recombination and reuse of resources and emphasises the role of both path dependence and place dependence. What is more, it assigns an important role to contingent agency (Martin and Sunley, 2011).

One of the key arguments of the adaptive-cycle model is that in most cases one can hardly identify one single dominant factor that drives the evolution of a region (or industry) (Martin and Sunley, 2011). Rather, the model sheds light on multiplicity, close interlinkages and overlaps of various evolutionary trajectories. Martin and Sunley (2011) argue that 'system change is an outcome of the balance between experimentation and novelty, and conservation and selection, as well as the interactions between entities at different scales' (Martin and Sunley, 2011, p. 1309). The authors outline four phases of the adaptive cycle model: i) reorganisation and restructuring, ii) exploitation and growth, iii) conservation, and iv) decline and release.

Each of these phases is characterized by three dimensions: connectedness (defined as traded and untraded interdependencies among companies), capital/resource accumulation (accumulation of productive, knowledge and institutional capital) and resilience (capacity of firms to respond flexibly to internal and external disturbances). We believe that these three dimensions can be employed to capture the key features of negative pathways, which are in focus in this paper.

Since negative forms of path development are often closely interlinked with evolutionary trajectories in other regions, we see considerable value in developing a more nuanced view on the dimension 'connectedness' by distinguishing between internal (regional) and external (inter-regional) connectedness. We argue that varying forms and degrees of connectedness among companies may be observed within the region and on an inter-regional level. For example, the notion of 'truncated development' points to a disruption of existing intra-regional networks, often induced by the inflow of FDIs (Hayter, 2012), which is said to often go hand-in-hand with a growing connectedness to companies in other regions based on the integration of foreign-owned branch plants as well as of local SMEs into global production networks (Pavlínek, 2018).

Martin and Sunley (2011) admit that the adaptive cycle model falls short of grasping the processes driving the evolution of the system. In addition, in line with Boschma's (2015) work on resilience, it has to be acknowledged that regions are made up of individuals, organizations, industries, networks and institutions, each of which could have their own evolutionary trajectories. Therefore, any path development model deals primarily with prevailing or dominant pathways only.

However, in order to comprehensively conceptualize negative forms of path development, it seems to be crucial to consider and disentangle the underlying multi-dimensionality between the single-firm (firm level), the industry level and the regional level is crucial. In times of economic downturn or sharp competition it might be rational (and in a sense positive) for firms to, for instance, downsize their portfolio of activities or reorient to other places. From a regional and industry perspective however, such firm-level activities are most probably seen as negative, not only because of potential devaluation of assets and unemployment (regional level) or possible adverse effects on other firms (industry-level). From an EEG point of view, negative forms of regional industrial path development in a given region will also influence its future trajectory by affecting the 'regional environment' and thereby weakening the region's future potential for successful path development processes (Martin, 2010).

Recent work on regional asset modification (MacKinnon et al., 2018b; Trippl et al., 2019) might help to unravel in more detail the underlying processes leading to what has been termed a 'constraining environment' for new path development. A broad set of assets, ranging from (i) natural assets to (ii) infrastructural and material assets, (iii) industrial assets, (iv) human assets, and (v) institutional endowments (Maskell and Malmberg, 1999; MacKinnon et al., 2019) is seen to be important for nurturing regional industrial path development. This 'regional asset base' is considered to be the outcome of past regional economic activities and serves as a 'platform' for future rounds of development (MacKinnon et al., 2019; Trippl et al., 2019). In case of a negative pathway on the firm or industry level, the regional asset base is modified in a specific way, thereby most probably rendering the region less favourable for future economic activities.

Obviously, the decline of an industrial path will likely imply some sort of de-locking of existing assets, for instance human assets in the form of laid off labour skills or infrastructural and material assets, like facilities. This underlines the relevance of exploring trajectories of decline in more detail from a system-level perspective, as it is not only firm-level actors' but also system-level actors' role to identify, harness and valorise the value rooted in (de-locked) regional assets (MacKinnon et al., 2019). This could entail to modify assets to fit the needs of transnational firms (MacKinnon, 2012), leading to path transplantation (Isaksen and Trippl, 2017). Other potential strategies could strive to alter de-locked (redundant) assets in ways that boost the potential of path creation or diversification (Trippl et al., 2019).

In this paper, we seek to answer the following research questions: (i) What types of negative forms of path development can be identified? (ii) What are the differences among these pathways in terms of the main dimensions suggested by the adaptive cycle model (capital accumulation, connectedness and resilience)? (iii) In what ways is the regional asset base modified by these different pathways and how does asset modification affect future rounds of regional industrial path development?

TOWARDS A TYPOLOGY OF TRAJECTORIES OF DECLINE

A large number of factors and processes can lead to negative forms of path development and socioeconomic decline of regions. Within the EEG literature, these factors and processes have often been subsumed under the broad notion of lock-in (see above). As argued in the previous section, lock-in comes in many shapes, ranging from functional to institutional, cognitive (Grabher, 1993) and other types of lock-in (Martin and Sunley, 2006). More often than not, various forms of lock-in are interrelated and tend to reinforce one another (Hassink, 2010). We argue that due attention needs to be paid to the severity and longevity of lock-in processes[1] and the type of response to development challenges by key stakeholders in order to understand how they are linked to negative pathways.

There are strong reasons to claim that various intertwined lock-in processes can lead to several major types of trajectories of decline. These trajectories differ in terms of the three key dimensions conceptualized in adaptive cycle model, that is, connectedness, capital accumulation and resilience. Following MacKinnon et al. (2019) and Trippl et al. (2019), we recognize the need to also pay due attention to the role played (or not played) by different types of actors, including firms and non-firm actors (such as universities, regional development agencies, labour unions, policy actors, and so on). Due to space restrictions, our focus in this paper is on economic actors (that is, companies) but we see considerable value in including other actor groups in future analyses (see also the concluding section). Firm actors can be foreign or home-grown ones and they may differ strongly in terms of the strategies they use to respond to the decline of their industry.

[1] Arguably, other factors such as depletion of natural resources (Campling, 2012), environmental catastrophes like earthquakes, tsunamis, floods, hurricanes, man-made pollution (Martin, 2012), or sudden disruption of economies and international trade e.g. by civic unrest (Hough, 2011) can play a key role as shown by studies employing a disarticulation perspective (Bair and Werner, 2011a,b).

Building on the concepts and the theoretical discussion outlined above, we develop a typology of negative forms of path development that draws a distinction among three main types, namely path contraction, path downgrading and path delocalisation even though we acknowledge that in reality industries in regions can follow multiple pathways. Finally, we argue that each of these pathways can in the worst case result in the most radical form of decline, i.e. in a complete destruction of a given industry in a particular region.

In what follows, we will outline the main features of each path and show that various pathways are likely to have different impacts on the transformation of the regional economies.

Path downgrading

This pathway is underpinned by two major strategies of key companies in a given regional industry. First, path downgrading may be the result of what we call 'adjustment strategy ', that is the removal of higher value-added functions such as R&D (i.e. downgrading in terms of functions performed). Second, path downgrading can be the outcome of what is termed 'respecialisation strategy', more precisely respecialisation in low-cost production (see, for instance, the case of South African wine producers, Ponte and Ewert, 2009) and – related to this – reorientation towards serving less demanding markets (i.e. downgrading in terms of market segments).

Functional downgrading can occur through the inflow of FDI driven by low-cost motives while strategic functions are being performed abroad. This is often taking the form of turning the acquired local companies into branch-plants without higher-level functions and often results in a destruction of previous local linkages and networks (Hayter, 1982). What is more, several case studies identify only limited spillovers from foreign to domestic companies (Pavlínek et al., 2017; Pavlínek, 2018). This pathway is fragile as regional growth is orchestrated by powerful external actors operating on a transnational or even global level, seeking higher returns of their investments (Pavlínek and Smith, 1998).

An alternative source of a downgrading trajectory can be an intensive competitive pressure, which local companies of a given industry are unable to withheld, leading them to reorient their strategy towards low-cost production of standard goods or components. This strategy was often

adopted in Central Eastern European countries when the former state-own companies that were for several decades locked-in primarily in the Eastern European strongly regulated markets found themselves uncompetitive after the sudden liberalisation of foreign trade (Blažek and Csank, 2016). Therefore, numerous Central and Eastern European (CEE) regions embarked on a downgrading trajectory combining both mechanisms outlined above (i.e. inflow of low-cost seeking FDIs and withdrawal of home-grown companies from the final market). This was often accompanied by a disruption or dissolution of pre-existing regional networks, while the external connectedness increased (Květoň and Blažek, 2018; Blažek and Csank, 2016; cfr. also Pavlínek, 2018).

Many other examples of regional industries suffering from downgrading have been identified in the literature (e.g. regions in countries at different stages of development such as China, Austria or Bulgaria (Zhu and Pickles, 2014; Tödtling and Trippl, 2004; Pickles et al., 2006). Overall, the level of autonomy of regional companies declines significantly and, if the conditions change, the way back can be very challenging or even impossible. Thus, the level of resilience tends to decrease significantly. However, in rare cases, downgrading can enable a significant employment growth as well as an improvement of economic performance at least in the short-term (Ponte and Ewert, 2009).

Generally, it can be claimed that path downgrading is most likely to occur in those regional industries, which fail to accumulate sufficient know-how and capital. However, if companies in these less successful regional industries are not able to safeguard a favourable cost-capability ratio (Yeung and Coe, 2015) or, more broadly, if they fail to develop and sustain firm-specific routines that are equally efficient as those of competing firms (Schamp, 2005), then an intense market pressure might push them further downwards to serve yet lower market segments or towards mere low value-adding production activities. Obviously, also the former leaders can be forced to follow such adverse trajectory if they fail to keep pace with their competitors.

As a result of withdrawing from upper market segments or from the final market, the regional asset base is also likely to diminish in quality. While, in some cases, single firms might profit from following a downgrading strategy, the regional ecosystem will most likely be weakened. Especially industrial assets in form of technology or firm competencies or human assets (labour skills) might be lost, as observed in many CEE regions, where R&D functions and other activities with higher added-value disappeared during the 1990s, because they were dispensable

for routine manufacturing operations. Losing such 'creative assets' might be particularly detrimental to a region's future potential as they are seen as especially important for economic prosperity (Florida, 2014). Additionally, local and extra-regional innovation networks and linkages might be destroyed due to changing trade structures. This could lead to an overreliance on localized routines, i.e. 'spatial myopia', and thereby future lock-ins (Maskell and Malmberg, 2007; Zhu et al., 2017). Path downgrading processes might thus set in motion a downward spiral, rendering the regional asset base less favourable for future higher value economic activities and thereby severely damaging the long-term regional competitiveness.

Path contraction

The second trajectory is referred to as path contraction. Path contraction implies a shrinkage of the seize of the regional industry brought about by the withdrawal from some market segments or market territories and a gradual re-specialization of existing companies in a limited number of products, niches or activities. Thus, the portfolio of economic activities performed in a regional industry becomes increasingly specialised. Firms reduce the product diversity, even in supplementary industrial branches. However, in contrast to path downgrading, where the companies usually loose a significant part of their autonomy, path contraction implies that the key companies retain their know-how and high value-added functions including organization of production in other regions or countries, but limit their own production activities to specialised and demanding and hence often low-volume niches (see Treado's (2010) study of the steel industry in Pittsburgh). Path contraction has been also observed in some CEE countries after their re-integration into the global economy. Blažek and Fendrychová's (2012) analysis of the Czech outdoor equipment industry, where offshoring of the labour-intensive phases of production to China was observed, is telling in this respect.

Therefore, in terms of the three key dimensions of the adaptive cycle model (Martin and Sunley, 2011), the level of regional connectedness tends to decrease, while the external connectedness can remain high or may even increase. In contrast, overall capital accumulation is likely to decrease due to a profound reduction of production capacities. Nevertheless, the key companies tend to make new investments in order to enhance their position in selected and demanding niches. Likewise, resilience of the remaining companies, which succeed in re-specialisation in particular phases of production and/or in particular market niches, might increase.

This evolution concerns primarily large endogenous firms or even lead firms in global production networks, which struggle to reposition themselves within the global economy. However, given the prominent role of large companies in some regional economies, also their suppliers might be forced to narrow the portfolio of performed activities to reflect the changing demand of their large customers. If the contraction of an industry into a narrower spectrum of activities is not leading to a recovery in economic performance and if further negative changes occur, an overall destruction of the regional industry may occur. On the other hand, this type of path development can also be closely linked with a significant functional upgrading of those companies of a regional industry, which successfully re-specialize in selected market niches and high value-added functions, despite the overall shrinkage in the volume of production. There are several examples of path contraction, like Pittsburgh's steel industry in the period 1980-2005 (Treado, 2010), South Birmingham's automotive industry during the 1970s and 1980s (Smith, 1989) or Teeside steel and chemical industry in the same period (Beynon et al., 1989, see Table 1). Generally, mature sectors in old industrial regions are often prone to embark on a contraction pathway when technological or market conditions change.

Path contraction activities are also likely to downsize the regional asset base. As outlined above, the external connectedness might shift, but can stay rather high, making the risk for 'spatial myopia' less severe. Similarly, re-specialization of key companies might in some cases lead to a stronger alignment of complementary assets and thereby to shrinking communication costs, stronger synergetic effects and possibly increasing returns. However, even though there might be some cases in which path contraction activities lead to (short-term) regional benefits, we generally assume that path contraction activities will harm a region's long-term competitiveness, especially in cases when assets become 'over-specialized'.

A declining range of competencies on the firm level will diminish possibilities of knowledge re-combination and is therefore likely to harm the regional development opportunities, as the regional variety of (related) industries shrinks (Boschma and Frenken, 2011). In cases of less successful re-specialization or over-specialization on the firm-level, there might additionally be quite severe subsequent effects (e.g. closure of connected firms), which might ultimately dissolve the whole regional industry, setting free or destroying an even broader range of (human, infrastructural or/and industrial) assets.

Path delocalisation

The third type of evolutionary trajectory considered in this paper can be characterised as path delocalisation. Such a pathway encompasses relocation of key economic activities in a given regional industry, often followed by further disinvestment and brain drain processes. Delocalisation is frequently epitomised as a move performed by footloose multinational companies in their quest for yet cheaper locations in emerging economies (Labrianidis et al., 2011). Generally, delocalisation occurs when companies in a given regional industry due to various lock-ins fail to keep a favourable cost-capability ratio (Yeung and Coe, 2015) and hence gradually lose their competitiveness resulting in the relocation of foreign-owned and sometimes even of home-grown companies (Forthegill and Guy, 1990; Isaksen, 2016; Bertoncin et al, 2018).

Arguably large-scale relocation of labour-intensive phases of production or whole industries to lower-cost locations has been documented already in the literature on deindustrialization of developed countries/regions (cfr. Fröbel et al., 1978). The decision to offshore parts or even the whole production can be also taken by local companies (even SMEs) in case they see an opportunity or face severe challenges. In the latter case, offshoring is often seen as a measure to keep at least some parts of the industry and employment in the region. However, delocalisation may well lead to an overall dissolution of the regional industrial fabric and can result in a complete destruction of the regional industry (Bair and Werner, 2011b). Delocalisation of leading firms may force their suppliers to follow them (see, for instance, the case of the Montebelluna district, Bertoncin et al. (2018)), leading – in the worst case – to a disruption of the economic fabric of the region under consideration. Delocalisation of economic activities may also result in an increase of competition. Alberti's (2006) study of the apparel industry in the industrial district of Como provides interesting insights in this regard. Delocalisation of low value-added production activities to China accelerated the district's decline through 'self-created' competitors, which benefited from the transfer of tacit knowledge, skills and technology from Italy to China.

The case study by Alberti (2006) also shows that delocalisation may not only be observed for plants under foreign control but also for local SMEs (see also Isaksen's (2018) recent study of small Norwegian boat-building companies and their relocalisation to Germany and Poland).

Generally, delocalisation has been enhanced by a growing 'footlessness', especially of some manufacturing industries in the contemporary globalised economy as well as by the increase of vertical fragmentation of the production process, which has led to a widespread formation of global production networks in manufacturing as well as in services (e.g. Coe, 2014; Dörry, 2014). This has also sparked interest in the question of how 'strategic coupling' between regional assets on the one hand and the needs of multinational companies orchestrating global production networks (GPNs) on the other hand is taking place in different spatial contexts (see MacKinnon, 2012; Yeung, 2016).

In addition to the above-mentioned gradual exit of FDIs due to emergence of new competitors with better cost-capability ratios or due to technological change (Smith 2003, Yeung and Coe, 2015) another set of factors deserves attention. Delocalisation may also be triggered by a broad spectrum of changes in the external environment as well as inside the region. For example, there is evidence for a profound influence of national economic regulation and policies, e.g. implementation of "Go Up Policy, Go West Policy, Go Out Policy" in China (Zhu and Pickles, 2014), changes in regulatory frameworks for international trade, environmental protection, etc. However, delocalisation can be sparked also by other factors, such as by a vast scale of environmental degradation or resource depletion (Campling, 2012).

Particular forms of this type of evolutionary trajectory induced by shifting trade regulations have been documented for example in the case of delocalization of the textile industry from the La Laguna region in Mexico (Bair and Werner, 2011b), the automotive industry in South Australia and Victoria (Beer, 2018) or the boat-building industry in the Arendal region in Norway (Isaksen, 2018). The relocalization of the footwear industry from EU-15 regions to CEE regions and later further east has been emphasized by Totev and Sariiski (2010). Recent scholarly work has also documented the relocation of some automotive suppliers from Central European to Balkan countries sparked by the global economic crisis at the end of the 2000s (Pavlínek et al., 2017; Pavlínek, 2015; Sass and Hunya, 2014). Thus, global integration and delocalisation are intertwined trends (Labrianidis et al., 2011).

Path delocalisation can be characterised in terms of the three key dimensions of the adaptive cycle model (Martin and Sunley, 2011) in the following way. The level of connectedness within the region tends to decrease, while the external connectedness can even increase in the early phase of delocalisation before its drop in subsequent phases if the process of delocalisation

gains momentum. In contrast, capital accumulation as well as resilience of the regional industry in question is likely to decrease due to the reduction of the production capacities and capabilities.

Consequently, it can be argued that given the high intensity of evolutionary dynamics when new industrial spaces frequently challenge the established industries in advanced regions as well as given the sharp international competition in the current, highly globalized economy, delocalisation is bound to be a widespread phenomenon across a large variety of industrialized regions. According to Labrianidis et al. (2011), regions specialised in industries with a high labour intensity, easy entry and relatively low value-added are particularly endangered by delocalisation. On the other hand, as has been shown by Alberti (2006), delocalisation can, at least under certain conditions, represent a mechanism allowing for catching-up processes of those regions, which were previously lacking any tradition in a particular industry. Subsequently, these emerging economic spaces can thus become strong competitors for regions with established traditions in a given industry. In this context, one needs to recall that the capacity to enable the rise and growth of new industries and to upgrade the existing industrial base to compensate the loss induced by delocalisation varies significantly across regions (Isaksen and Trippl, 2016).

This negative pathway might likely be the most severe form for the region's future development potential in terms of its asset base, given the high probability of an overall dissolution of the regional industrial path. Especially in regions which show a strong specialization in industries facing delocalization, the danger of triggering a subsequent chain reaction is high. This might include a brain drain process (human assets), leaving supplier-firms (industrial assets) and further investments towards other regions that offer more promising prospects (MacKinnon, 2012). Additionally, strong alignments between the asset base and the leaving path might delay restructuring efforts (Grabher, 1993; MacKinnon, 2012). Another problem stems from the fact that regional asset bases oriented towards labour intensive tasks and low value-added are already equipped with relatively weak potential for new path creation (Isaksen and Trippl, 2016), making respective regions even more prone to long-term development struggles. Furthermore, natural assets are of special significance, as their depletion can be an important cause for path delocalisation. Affected regions might face particular challenges to restructure ("resource curse"), as is shown by many regions in developing countries (Auty, 1993).

As mentioned above, the modification of institutional assets (regulatory frameworks) might even be the reason for path delocalization. However, this relationship is ambiguous. In GPN and FDI literature the power asymmetries between transnational corporations (TNCs) and regional actors have gained some attention (Coe and Hess, 2011; Dawley, 2011). Essentially, TNCs, due to their 'footlessness' can bargain with different regions (MacKinnon, 2012). This might lead to asset modifications complementary to the needs of powerful TNCs, especially in regions with a rather weak asset base and therefore low bargaining power. However, such endeavours to adapt the asset base to the needs of powerful firms in order to prevent delocalization might come at the expense of other actors (Phelps, 2000, 2008), essentially leading to dependencies and a constraining environment for new path development.

To summarize, negative regional industrial path development may come in different forms, ranging from path downgrading to path contraction and delocalisation. Arguably, this is an analytical distinction. In reality, one might observe a coalescence of the 'ideal types' discussed above (see, for instance, Alberti's (2006) analysis of the adverse trajectory of apparel industry in Como in the 1990s and early 2000s, which points to a combination of path contraction and path delocalisation). Table 1 provides an overview on the key dimensions and features for each trajectory and it points to empirical findings from case studies. Each of the three trajectories is illustrated by several cases, indicating that none of the pathways is confined to a specific sector but can rather be observed in various industrial and regional contexts.

Table 1: The key dimensions of particular evolutionary pathways of a decline

Path	Firm-level		Key dimensions of the adaptive cycle model			Region-level: Modification of the regional asset base		Empirical illustrations	
	Strategies	Main drivers	Connectedness	Capital accumulation	Resilience	Main alterations	Future potential	Example	Reference
Down-grading	Removal of higher value-added functions	FDIs driven by low-cost strategies / intensive competitive pressure	Internal: decrease; external: increase	declining	declining	Loss of key assets	Risk of being trapped in lower-quality segments	• South East of Bulgaria (apparel, 1990s) • Styria (metal, 1970-1985) • Daegu (textile, 1980-2005)	• Pickles et al. (2006) • Tödtling & Trippl (2004) • Hassink (2010)
Contraction	Reduction of product diversity / re-specialization	Weak competitiveness in the global economy	Internal: decrease; external: increase	declining	varying	Risk of over-specialized assets	Diminishing opportunities for diversification	• Pittsburg (steel, 1980-2005) • South Birmingham (automotive, 1970-80s) • Teeside (steel & chemicals, 1960-80s) • Lancaster (linoleum industry, 1960-80s)	• Treado (2010) • Smith (1989) • Beynon et al. (1989) • Bagguley (1989)
De-localisation	Relocation to more favourable locations	Better cost-capability ratio, more suitable frameworks or availability of resources at other locations	Ultimately declining (internally & externally)	Dis-investment	sharply declining	Broad destruction and de-locking of assets	Severe effects on long-term development potentials	• La Laguna (textile, 2000-2010) • Arendal (boat-building, 1990-2010) • S. Australia & Victoria (automotive, 2000-2017)	• Bair & Werner (2011b) • Isaksen (2018) • Beer (2018)

Source: Own compilation

CONCLUSIONS

In this paper, we seek to contribute to a better understanding of the 'dark side' (Phelps et al., 2018) of regional industrial path development. Scholarly work in this field has thus far mainly focused on explicating how (different types of) 'positive' path development (that is, the rise and growth of new industries and the successful renewal of traditional ones) unfolds across space and over time. Systematic research on the negative pathways is missing.

The paper complements existing typologies of 'positive' evolutionary pathways by identifying and conceptualising three distinctive trajectories of decline, namely path downgrading, path contraction and path delocalisation. In so doing, we employ key concepts of evolutionary economic geography (lock-in, path dependence and resilience) as well as the core dimensions of the adaptive cycle model suggested by Martin and Sunley (2011), that is, connectedness, capital accumulation and resilience, and the role of economic actors in 'producing' these outcomes. We also draw on recent work on asset modification processes (MacKinnon et al., 2019; Trippl et al., 2019) to better understand how negative forms of path development affect the wider regional asset base and thus the region's future potential for path development.

Overall, the above-outlined typology of evolutionary trajectories of decline reflects different firm strategies in a given regional industry. It should be underlined that in practice the evolutionary trajectory of a particular industry in a particular region might consists of multiple and swinging shifts.

Moreover, it is important to stress that – in the most severe cases – all three types of negative pathways might lead to an overall destruction of a given regional industry and the related institutional set-up, resulting in job losses and a profound alteration of the regional economic structure.

However, one needs to emphasize that the pathways discussed above may also entail positive features. For example, path downgrading can lead to an increase in sales and to recovery of the regional industry and path contraction can in some cases be associated with functional upgrading despite the shrinkage of the overall production.

Overall, there are strong reasons to argue that regions differ markedly in their capacity to not only cushion the adverse effects of declining paths but also to redeploy regional assets in novel ways to open up new growth trajectories. Regions with thick and diversified innovation systems can be assumed to be best placed in this regard, while places with highly specialised or thin system structures may face more challenges.

Arguably, more conceptual and empirical research is required to gain a deeper understanding of the sources, mechanisms and processes of negative path development in different types of regions. Future work in this field might seek to identify other distinctive trajectories of decline to complement those discussed in the present paper. We also see considerable value in developing a more dynamic approach to grasp various sequences of pathways of growth and decline in particular types of regional contexts.

Another issue for future research is to move beyond the focus on firms and adopt a multi-actor approach to study also the (changing) role of other stakeholders. In addition, more conceptual and empirical work is needed to better understand the mechanisms that underpin various forms of negative path development, especially under what conditions negative dynamics can be broken. Moreover, detailed studies might reveal variations across different types of regions and industries and comprehend influences of multi-scalar institutional environments.

Finally, a key challenge for future research is to elaborate on how policy at various spatial scales could target the dark side of path development in different spatial contexts. Declining industrial paths can easily turn the fate of entire regions, transforming them into disadvantaged and left-behind places, suffering from economic, social and political problems (Rodríguez-Pose, 2018). Developing adequate strategies and responses to negative forms of path development is thus a core task for policy.

FUNDING

Financial support of Grant Agency of The Czech Republic (no: 17-06621S) is greatly acknowledged. This work has been also supported by Charles University Research Centre Program UNCE/HUM/018.

ACKNOWLEDGEMENT

The authors would like to thank Danny MacKinnon and other participants of the International Workshop on Innovation-based Restructuring and New Path Development held in Vienna in February 2019 for their valuable comments on an earlier version of this paper.

REFERENCES

Alberti, F.G. (2006) The decline of the industrial district of Como: recession, relocation or reconversion? *Entrepreneurship & Regional Development*, 18(6), 473-501, DOI: 10.1080/08985620600884792.

Auty, R. (1993) Sustaining Development in Mineral Economies: The Resource Curse Thesis, London: Routledge.

Bair, J. and Werner, M. (2011a) 'Commodity chains and the uneven geographies of global capitalism: a disarticulations perspective', *Environment and Planning A* 43: 988–97.

Bair, J. and Werner, M. (2011b) 'The place of disarticulation: global commodity production in La Laguna, Mexico', *Environment and Planning A* 43: 998–1015.

Bagguley, P., Mark-Lawson, J., Shapiro, D., Urry, J., Walby, S., Warde, A. (1989) Restructuring Lancaster, In: Cooke, P. (ed) The Changing Face of Urban Britain Localities, Unwin Hyman, London, 129-165.

Beer, A. (2018) The closure of the Australian car manufacturing industry: redundancy, policy and community impacts, *Australian Geographer*, 49(3) 419-438.

Bertoncin, M., Pase, A., Quatrida, D., & Scroccaro, A. (2018) How the replica of the Italy's Northeast Industrial District model failed in Timisoara (Romania), *Investigaciones Geográficas*, 69: 73-89. doi:10.14198/INGEO2018.69.05.

Beynon, H., Hudson, R., Lewis, J., Sadler, D., Townsend, A. (1989): It´s all falling apart here: Coming to terms with the future in Teeside, In: Cooke, P. (ed) The Changing Face of Urban Britain Localities, Unwin Hyman, London, 267- 295.

Blažek, J., Csank, P. (2016) Can emerging regional innovation strategies in less developed European regions bridge the main gaps in the innovation process? *Environment and Planning C: Government and Policy* 34(4):1095–1114.

Blažek, J. Fendrychová, L, (2012) The geography of knowledge sources in the Czech outdoor equipment industry: Key role of global temporary clusters and of national informal networks, *AUC Geographica*, 47(1) 255-275.

Boschma, R., Frenken, K. (2011): Technological relatedness and regional branching. In: Bathelt, H., Feldman, M. P., Kogler, D. F. (Hg.) Beyond Territory. Dynamic geographies of knowledge creation, diffusion, and innovation, Routledge, 64–81.

Boschma, R., Martin, R. (2007): Editorial: Constructing an evolutionary economic geography, *Journal of Economic Geography*, 7, 537-548.

Boschma, R., Martin, R. (2010): The aims and scope of evolutionary economic geography, *Papers in Evolutionary Economic Geography (PEEG) 1001*, Utrecht University, Department of Human Geography and Spatial Planning, revised Jan 2010.

Campling, L. (2012) The tuna 'commodity frontier'. *Journal of Agrarian Change* 12(2–3): 252–278.

Chisholm, M. (1990) Regions in recession and resurgence, London: Unwin.

Coe, N. (2014) Missing links: Logistics, governance and upgrading in a shifting global economy. *Review of International Political Economy*, 21.1: 224-256.

Coe, N., Hess, M. (2011) Local and regional development: a global production network approach. In: Pike, A., Rodriguez-Pose, A., Tomaney, J. (eds) Handbook of Local and Regional Development, Routledge, 128–138.

Cooke, P. (1989) (ed.): Localities: The Changing Face of Urban Britain. Unwin Hyman: London.

Dawley, S. (2011) Transnational corporations and local and regional development. In: Pike, A., Rodriguez-Pose, A., Tomaney, J. (eds) Handbook of Local and Regional Development, Routledge, 394-412.

Dörry, S. (2014) Global production networks in finance. *L'Espace géographique* 43.3: 227-239.

Essletzbichler, J., Winther, L. (1999) Regional technological change and path dependency in the Danish food processing industry, *Geografiska Annaler: Series B, Human Geography* 81 (3), 179-196.

Florida, R. (2014) The Creative Class and Economic Development. *Economic Development Quarterly*, 28 (3) 196–205.

Forthegill, S, Guy, N. (1990) Retreat from the regions: corporate change and the closure of factories. London: Jessica Kingsley.

Fröbel, F., Heinrichs, J., Kreye, O. (1978) The new international division of labour, *Social Science Information,* 17(1) 123-142.

Giuliani, E., Rabellotti, R. (2018) Italian industrial districts today: between decline and openness to global value chains. In: De Marchi, V., Di Maria, E., Gereffi, G. (eds): Local Clusters in Global Value Chains: Linking Actors and Territories Through Manufacturing and Innovation, Routledge, 21-32.

Grabher, G. (1993) The weakness of strong ties: the lock-in of regional development in Ruhr area, In. Grabher G. (ed) The Embeded Firm, pp. 255-277, Routledge, London.

Grillitsch, M., Asheim, B., Trippl, M. (2018) Unrelated knowledge combinations: the unexplored potential for regional industrial path development, *Cambridge Journal of Regions, Economy and Society* 11 (2), 257-274.

Hadjimichalis, C. (2006): The End of Third Italy As We Knew It? *Antipode*, 38 (2) 82-106.

Hassink, R. (2010). Locked in decline? On the role of regional lock-ins in old industrial areas. In R. Boschma & R. Martin (Eds.) *The handbook of evolutionary economic geography* (pp. 450–468). Cheltenham: Edward Elgar.

Hassink, R., Isaksen, A., Trippl, M. (2019) Towards a comprehensive understanding of new regional industrial path development, *Regional Studies*, https://doi.org/10.1080/00343404.2019.1566704.

Hayter, R. (1982) Truncation, the International Firm and Regional Policy, *Area,* 14 (4), 277-282.

Hough, P. A. (2011) 'Disarticulations and commodity chains: cattle, coca, and capital accumulation along Colombia´s agricultural frontier', *Environment and Planning A* 43: 1016–34.

Isaksen, A. (2015): Industrial development in thin regions: trapped in path extension? *Journal of Economic Geography*, 15 (3) 585–600.

Isaksen, A. (2018): From success to failure, the disapperance of clusters: a study of a Norwegian boat-building cluster, *Journal of Economic Geography*, 18 (11) 241-255.

Isaksen, A., Trippl, M. (2016) Path Development in Different Regional Innovation Systems: A Conceptual Analysis. In. Parrilli, M.D., Fitjar, R.D., Rodríguez-Pose A. (eds) *Innovation Drivers and Regional Innovation Strategies.* London, Routledge, pp. 66-84.

Isaksen, A, Trippl, M. (2017) Exogenously led and policy-supported new path development in peripheral regions: Analytical and synthetic routes, *Economic Geography*, 93 (5): 436-457.

Květoň, V., Blažek, J (2018) Path-development trajectories and barriers perceived by stakeholders in two Central European less developed regions: narrow or broad choice? *European Planning Studies,* 26 (10), 2058-2077.

Labrianidis, L., Kalantaridis, C., Dunford, M. (2011) Delocalization of Economic Activity: Agents, Places and Industries*, Regional Studies*, 45:2, 147-151, DOI: 10.1080/00343404.2011.548967

MacKinnon, D. (2012) Beyond strategic coupling: reassessing the firm-region nexus in global production networks, *Journal of Economic Geography*12: 227–45.

MacKinnon, D., Dawley, S. Steen, M., Menzel, M-P. Karlsen, A., Sommer, P. Hansen, Normann, H.E. (2018) Path creation, global production networks and regional development: A

comparative international analysis of the offshore wind sector, *Progress in Planning*, https://doi.org/10.1016/j.progress.2018.01.001.

MacKinnon, D., Dawley, S., Pike, A., Cumbers A. (2019) Rethinking Path creation: A geographical political economy approach. *Economic Geography* (in press). DOI: 10.1080/00130095.2018.1498294

Martin, R. (2010) Roepke lecture in economic geography—rethinking regional path dependence: beyond lock-in to evolution. *Economic Geography*, *86*(1), 1-27.

Martin, R. (2012) Regional economic resilience, hysteresis and recessionary shocks, *Journal of Economic Geography*, 12 (1) 1–32, https://doi.org/10.1093/jeg/lbr019.

Martin, R., Sunley, P. (2011) Conceptualizing Cluster Evolution: Beyond the Life Cycle Model? *Regional Studies*, 45(10) 1299-1318.

Maskell, P., Malmberg, A. (2007) Myopia, knowledge development and cluster evolution. *Journal of Economic Geography*, 7 (5) 603–618.

Maskell, P., Malmberg, A. (1999) The Competitiveness of Firms and Regions. *European Urban and Regional Studies* 6 (1) 9–25.

Menzel, M. P. Fornahl, D. (2010) Cluster life cycles—dimensions and rationales of cluster evolution, *Industrial and Corporate Change*, 19 (1) 205–238.

Pavlínek, P. (2018) Global production networks, foreign direct investment, and supplier linkages in the integrated peripheries of the automotive industry, *Economic Geography,* 94 (2), 141-165.

Phelps, N.A., Atienza, M. Arias, M. (2018) An invitation to the dark side of economic geography, *Environment and Planning A: Economy and Space*, 50(1) 236–244.

Pickles, J., Smith, A., Buček, M., Rouková, P., & Begg, R. (2006) Upgrading, Changing Competitive Pressures, and Diverse Practices in the East and Central European Apparel Industry. *Environment and Planning A: Economy and Space*, 38(12), 2305–2324.

Ponte, S. and Ewert, J. (2009) 'Which way is "up" in upgrading? Trajectories of change in the value chain for South African wine', *World Development* 37: 1637–50.

Rabellotti, R., Carabelli, A, Hirsch, G. (2009) Italian Industrial Districts on the Move: Where Are They Going? *European Planning Studies*, 17 (1) 19-41.

Rodríguez-Pose, A. (2018) Commentary: The revenge of places that don't matter (and what to do about it). *Cambridge Journal of Regions, Economy and Society*, 11(1), 189–209. doi:10.1093/cjres/rsx024.

Sammarra, A., Belussi, F. (2006) Evolution and relocation in fashion-led Italian districts: evidence from two case-studies, *Entrepreneurship and Regional Development*, 18, 543-562.

Schamp, E. W. (2005) Decline of the district, renewal of firms: an evolutionary approach to footwear production in the Pirmasens area, Germany, *Environment and Planning A*, 37(4): 617-634.

Simmie, J., Martin, R. (2010): The economic resilience of regions: towards an evolutionary approach, *Cambridge Journal of Regions, Economy and Society*, 3 (1), 27–43, https://doi.org/10.1093/cjres/rsp02í

Smith, A. (2003) Power Relations, Industrial Clusters, and Regional Transformations: Pan-European Integration and Outward Processing in the Slovak Clothing Industry, *Economic Geography*, 79, 1:17-40.

Smith, D. (1989) Not getting on, just getting by: changing prospects in South Birmingham, In: In: Cooke, P. (ed) The Changing Face of Urban Britain Localities, Unwin Hyman, London, 235-266.

Steen, M., Hansen, G. H. (2018) Barriers to Path Creation: The Case of Offshore Wind Power in Norway, *Economic Geography*, 94:2, 188-210, DOI: 10.1080/00130095.2017.1416953

Storper, M. (2011): Why do regions develop and change? The challenge for geography and economics, *Journal of Economic Geography*, 11, 333-346.

Totev, S., Sariiski, G. (2010) Industrial Delocalization in an Integrating Europe: A Survey of Enterprises in the Footwear Industry. *Eastern European Economics*, 48.1: 43-63.

Trippl, M., Baumgartinger-Seiringer, S., Frangenheim, A., Isaksen, A., Rypestøl, J. O. (2019) Green path development, asset modification and agency: towards a systemic integrative approach, *PEGIS - Papers in Economic Geography and Innovation Studies*, No. 2019/01.

Trippl, M., Grillitsch, M., Isaksen, A. (2018) Exogenous sources of regional industrial change: Attraction and absorption of non-local knowledge for new path development, *Progress in Human Geography,* 42(5) 687-705. https://doi.org/10.1177/0309132517700982.

Trippl, M., Asheim, B. and Miörner, J. (2016) Identification of regions with less developed research and innovation systems. In D. Parrilli, R. Fitjar, A. Rodríguez-Pose (eds.) Innovation drivers and regional innovation strategy, Routledge, London, pp. 23-44.

Yeung, H. W. (2016) *Strategic Coupling: East Asian Industrial Transformation in the New Global Economy*, Cornell University Press: Ithaca/London.

Yeung, H. W. C. and Coe, N. (2015). Toward a dynamic theory of global production networks. *Economic Geography*, *91*(1), 29-58.

Zhu, S., He, C., Zhou, Y. (2017) How to jump further and catch up? Path-breaking in an uneven industry space, *Journal of Economic Geography* 17(3) 521-545.

Zhu, S., Pickles, J. (2014) Bring In, Go Up, Go West, Go Out: Upgrading, Regionalisation and Delocalisation in China's Apparel Production Networks, *Journal of Contemporary Asia*, 44 (1), 36–63, http://dx.doi.org/10.1080/00472336.2013.801166.

Department of Geography and Regional Research
University of Vienna

Contact person: Michaela Trippl
Universitätsstraße 7/5/A0528, 1010 Vienna, Austria
Tel.: +43-1-4277-48720
E-Mail: Michaela.trippl@univie.ac.at
https://humangeo.univie.ac.at/

Department of Socioeconomics
Vienna University of Economics and Business

Contact person: Jürgen Essletzbichler
Welthandelsplatz 1, 1020 Vienna, Austria
Tel.: +43-1-31336/4206
E-Mail: juergen.essletzbichler@wu.ac.at
http://www.wu.ac.at/en/department-socioeconomics

Institute for Urban and Regional Research
Austrian Academy of Sciences

Contact person: Robert Musil
Postgasse 7/4/2, 1010 Vienna, Austria
Tel.: +43-1-51581-3520
E-Mail: robert.musil@oeaw.ac.at
https://www.oeaw.ac.at/en/isr/home/

Department of Working Life and Innovation
University of Agder

Contact person: Arne Isaksen
Jon Lilletunsvei 3/A161, Grimstad, Norway
Tel.: +47-37-23-33-53
E-Mail: arne.isaksen@uia.no
https://www.uia.no/en/about-uia/faculties/school-of-business-and-law/department-of-working-life-and-innovation

Department of Geography
Kiel University

Contact person: Robert Hassink
Hermann-Rodewald-Str. 9, 24098 Kiel, Germany
Tel.: +49-431-880-2951
E-Mail: hassink@geographie.uni-kiel.de
https://www.wigeo.uni-kiel.de/en/