PEGIS

Papers in Economic Geography and Innovation Studies

2021/07

The role of powerful incumbent firms: shaping regional industrial path development through change and maintenance agency

Simon Baumgartinger-Seiringer

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

The role of powerful incumbent firms: shaping regional industrial path development through change and maintenance agency

Author

Simon Baumgartinger-Seiringer; email: simon.baumgartinger-seiringer@univie.ac.at;
Department of Geography and Regional Research, University of Vienna, Austria;
https://orcid.org/0000-0002-3576-7725 *

* *corresponding author*

Abstract

This article seeks to advance perspectives on powerful incumbent firms in (new) regional industrial path development. Drawing on recent insights from Transition Studies, it is argued that this – hitherto often neglected – actor group plays a crucial role in shaping the pace and direction of regional path development through agency oriented towards both change and maintenance. Building on systemic perspectives at the intersection of evolutionary economic geography and innovation studies, particular emphasis is placed on incumbent firms' interventions to reconfigure or stabilize their surrounding regional innovation system to support their intentions. To this end, this article examines how incumbents exert their influence through various forms of power as means by which they promote or hinder regional industrial change. Empirically, the role of incumbent firms in a traditional automotive industry in Austria is investigated. It is shown how they leverage their power to propel the industry's digitalization and suppress its decarbonization.

Keywords

regional restructuring, path development, incumbents, agency, automotive industry, power

Introduction

A substantial body of literature in evolutionary economic geography (EEG) has contributed to our understanding of the unfolding of (new) regional industrial path development[1] (Hassink, Isaksen, and Trippl 2019). While much of this work has traditionally relied on structural explanations, the most recent years have witnessed an increasing attention devoted to the role of agency in creating, recreating and altering paths (Grillitsch and Sotarauta 2020; Hassink, Isaksen, and Trippl 2019). Yet, hitherto, the debate is centred around types of change agency (Bækkelund 2021), that is, agency oriented towards '*identifying change strategies and demolishing, renewing, and building new structures*' (Jolly, Grillitsch, and Hansen 2020, 177). Novel contributions have questioned this one-sided view and called for an incorporation of agency oriented towards maintenance, stability and suppressing change (Henderson 2020; Bækkelund 2021; Jolly, Grillitsch, and Hansen 2020).

Arguably, the strong focus on change agency not only obscures the wider range of agentic practices in processes of (new) regional path development (Henderson 2020), but also limits our understanding of the role of different actors, as it puts emphasis on those bringing novelty to the region. Oftentimes, this is attributed to new firms and innovative Schumpeterian (e.g. start-ups or spin-offs) or institutional entrepreneurs. Actors who actively mitigate or suppress change and seek to maintain the status quo have received limited attention (Jolly, Grillitsch, and Hansen 2020).

A common view is that among these actors are large incumbent firms. Indeed, other strands of literature (such as Transition or Management Studies) emphasize the inertia inherent to incumbents, as they often benefit from the status quo, protect their strong vested interests and thus are unlikely to promote change or champion radical innovations (Heyen, Hermwille, and Wehnert 2017; Patala et al. 2019). The scarce accounts of incumbent firms in the regional path development literature associates them with incremental changes promoting existing paths (Neffke et al. 2018).

Yet, while these perspectives are well grounded in empirical observations (Turnheim and Sovacool 2020), recent insights from transition studies and the management literature also show that incumbent firms are more than actors of resistance. They not only suppress but sometimes embrace disruptive innovations and exploit new opportunities (Kumaraswamy, Garud, and Ansari 2018; Patala et al. 2019). Thus, incumbents might show ambidextrous behaviour and exert both maintenance and change agency in different stages of regional industrial change or even simultaneously (Jolly, Grillitsch, and Hansen 2020).

This article draws on recently developed systemic approaches to path development that combine insights from EEG with the Regional Innovation Systems (RIS) approach (Isaksen and Trippl 2016; Trippl et al. 2020) to examine mature regional industries in phases of transformation. It highlights the role of large incumbent firms centrally embedded in elaborated

[1] An umbrella term referring to various forms of the rise and growth of new economic activities in regions, including the formation of new industries and the substantial transformation of existing ones (Isaksen and Trippl 2016).

RISs[2] and understands them as an important actor type due to their historically grown power, particular interests and influence on other regional and national innovation system elements and on international actors. Here, attention is devoted particularly to incumbents' interventions to shape the wider regional system structures in their favour. It is argued that more explicit attention to their maintenance as well as change agency will help to unravel processes of new regional path development and system reconfiguration or the lack thereof more comprehensively.

The ambition to advance perspectives on incumbencies in regional industrial path development opens up a variety of research questions, ranging from who (are the ones that opt for change/maintenance and why?) to when (under what conditions do incumbent firms strive for change/maintenance?) and beyond. This article – without neglecting the importance of other inquiries – focuses mainly on *how* incumbent firms exert their influence to drive or hinder regional industrial change. To this end, it draws on insights from Transition Studies to better understand their motives and disentangle different channels through which they make use of their power (Geels 2014).

Empirically, this article focuses on incumbent firms in a traditional automotive region, namely the Austrian automotive triangle (AAT), which currently finds itself in fundamental transitions (Trippl et al. 2021), facing two major upheavals simultaneously. First, the increasing digitalization and the advent of automated and connected vehicles is both an opportunity to redefine the regional industry's competitive advantage but, in many ways, also a decisive break with its successful past (Baumgartinger-Seiringer et al. 2021). Second, the climate crisis increase pressure for change towards a sustainable future and away from the combustion engine. As will be shown in this article, incumbent firms react differently in response to different upheavals and thereby substantially contribute to steering the development of the AAT.

The remainder of this paper is structured as follows. The next section reviews the regional path development literature and complementary strands on incumbents and agency as well as on maintenance and change. In section 3, the conceptual framework will be outlined. Section 4 analyses the empirical case of the AAT. Finally, section 5 concludes.

Different perspectives on the role of incumbent firms

Insights from the regional path development literature

Older evolutionary approaches in Economic Geography have a long tradition in explaining mechanisms of maintenance, focusing on causes of regional industrial continuity, path dependency and lock-ins (Martin and Sunley 2006). In contrast, more recent contributions

[2] Importantly, not all mature industries are embedded in highly elaborated RISs. Surrounding regional structural configurations can differ substantially and provide quite different implications for change processes (Baumgartinger-Seiringer et al. 2021). This paper investigates mature industries in well-developed RISs.

consider the past not as a constraint for dynamic regional development but as a resource to be exploited and harnessed for change processes in the present (Martin 2010; MacKinnon et al. 2019). Thereby, path development is seen as enabling rather than constraining and as a mechanism of dynamic regional economic evolution (Martin 2010). This understanding is one pillar of recent systemic approaches that cast light on a broad base of relevant regional assets (including natural, infrastructural, industrial, human and institutional assets) considered both as the outcome of previous rounds of economic development and the platform for future ones (Trippl et al. 2020).

Recently, the regional path development literature has devoted increasing attention to the role of agency[3] and its interplay with structures to explain regional industrial change or continuity (Grillitsch and Sotarauta 2020; Miörner 2020). This new body of scholarly work has brought forward different distinctions in order to disentangle the structure-agency nexus in a more fine-grained way. Researchers have differentiated between firm and system level agency (Isaksen et al. 2019), between innovative Schumpeterian entrepreneurship, place leadership and institutional entrepreneurship (Grillitsch and Sotarauta 2020) and between change and maintenance agency (Jolly, Grillitsch, and Hansen 2020).

The latter can be seen as a response to previous studies that portray agents as heroic and homogeneous pioneers of change (Henderson 2020). In contrast, Jolly et al. (2020, p. 179) cast light on actions that contribute to reproducing the status quo, such as '*introducing new practices to create deterrence for change, supporting the persistence of existing institutional routines, and using narratives to support the routinization of existing practices and adherence to rules*', that is, to maintenance agency. This article combines the differentiations between change and maintenance agency on the one side and firm and system level agency on the other. While the former generally distinguishes agentic practices based on their fundamental goal (change/maintenance), the latter is mainly concerned with their field of influence (restricted to a firm/organization or geared towards adaptations of the wider RIS).

In this context, it is important to note that one shouldn't confuse types of agency with types of actors: the same actors can pursue different types of agency throughout the span of a path development process or even at the same time (Jolly, Grillitsch, and Hansen 2020; Baumgartinger-Seiringer, Miörner, and Trippl 2021). As regards actors, much work in EEG (particularly the so-called 'Utrecht-school') traditionally emphasizes the role of entrepreneurial firms that are seen as the main driver of regional industrial evolution (Hassink, Isaksen, and Trippl 2019). In contrast, systemic approaches consider multiple relevant actors, including firms (both entrepreneurial newcomers like start-ups and established ones), supportive organizations and policy actors (Isaksen and Trippl 2016). Each of these can become a source of both maintenance and change (Jolly, Grillitsch, and Hansen 2020).

There is little explicit work on incumbent firms in the recent regional path development literature. Implicitly, they are often portrayed as rather rigid. As most firms pursue path dependent learning, radical innovations are often attributed to start-ups or spin-offs (Martin

[3] In a broad manner, agency can be understood as '*actions or interventions by actors in order to produce a particular effect*' (Sotarauta and Suvinen 2018, 90).

and Sunley 2010). Incumbents tend to strengthen existing regional specializations but can be stimulated to diversify into new activities by new firms (Neffke et al. 2018).

However, arguably, overemphasizing the role of new entrants in bringing novelty (to the region) limits our understanding of how well-established actors drive and suppress regional industrial change. Other strands of literature offer different perspectives on incumbent firms that – as is argued here – can contribute to advancing our understanding of their role in regional industrial path development.

Insights from Innovation Studies

While a more thorough review of this literature is beyond the scope of this article, Schumpeter's evolving perception of the role of different actors in innovation processes offers important insights for a more comprehensive picture.

While in earlier contributions, he identified individual entrepreneurs as the pioneers of industrial change (referred to as 'Schumpeter Mark I'), Schumpeter increasingly recognized the role of big incumbent firms in innovation processes in later works ('Schumpeter Mark II') (Fagerberg 2009), in which he elaborated on several reasons why established large firms have particular advantages. Schumpeter attributes their favourable position to the dominant market or even monopolistic position. Accordingly, large incumbent firms can allocate larger budgets to R&D, cope with higher risks due to their diversification and prevent imitation by competitors. Moreover, because of their larger range of activities, more opportunities for unplanned innovations/discoveries arise. Furthermore, they often are well-known and more appealing to talented employees (Stephan 2013).

Albeit of high relevance, Schumpeter's perception of incumbents arguably only represents one side of the coin and obscures a more nuanced view on their role as actors of both change and maintenance. A view that is needed as we face a period of growing concerns about the grand societal challenges in which incumbents' heterogeneity of responses and strategies might only increase (Steen and Weaver 2017). Recent discussions in Transition Studies are highly relevant in this regard.

Insights from Transition Studies

Over the last two decades, a body of literature on sustainability transitions has emerged to unravel change in socio-technical systems, such as mobility or power supply (Kivimaa and Kern 2016). A key theoretical concept brought forward is the multilevel perspective (MLP) which distinguishes between three analytical levels to disentangle drivers for and barriers to transitions, namely the landscape (deep structural trends and external factors like demographic, economic or environmental change), regime (the mutually reinforcing structures making up the socio-technical system, like technologies, institutions, markets, infrastructure etc.) and niche

level (spaces in which innovations are developed and tested). According to the MLP, socio-technical transitions are the outcome of top-down pressures from the landscape level and bottom-up developments in niches that together destabilize the regime (Geels 2002).

In response to critique highlighting the lack of attention for power, the bias towards bottom-up dynamics and the insufficient emphasis on incumbent actors, Geels (2014) casts light on the role of regime actors resisting change. In doing so, he draws attention not only to incumbent firms, but also to policymakers, as these two groups often form core alliances on the regime level due to mutual dependencies. On the one hand, incumbent firms depend on policymakers due to regulations (property rights, tariff protection, etc.), tax systems and public procurement. On the other hand, policymakers depend on incumbent firms because of their 'structural power', as they provide jobs, taxes and economic growth (Geels, 2014). The influence of this coalition in hindering change processes has also been observed in the context of current transformations in the automotive industry (Späth, Rohracher, and Radecki 2016).

According to these contributions, incumbents are powerful yet lethargic, part of the regime and interested in keeping the status quo due to strong vested interests based on their historically developed positions and relationships within socio-technical systems (Heyen, Hermwille, and Wehnert 2017). In other words: incumbents are seen as actors engaging in maintenance agency.

This perspective rests on good reasons: not only is it based on empirical observations (Turnheim and Sovacool 2020), there is also a large body of literature in management studies explaining this behaviour. Kumaraswamy et al. (2018) offer different explanations why incumbents have limited interest and ability to embrace emerging technologies. First, incumbents face an economic dilemma: radical innovations are usually not aligned with their business model and competencies. Thus, driving them forward comes with the risk of cannibalizing their own existing offerings, highly efficient production systems and profit streams. Second, radical change might threaten incumbents' identities, templates and mental models. Third, as incumbents are usually large firms, inertia and organizational myopia are often hindering fast responses. Fourth, scholars have also proposed affective explanations (e.g. fear to lose out when compared to competitors or let down shareholders) on the management level that lead to the inability to respond in real time.

However, despite the conceptual and empirical evidence, the view that they only resist change is increasingly questioned and calls to pluralize perspectives on incumbencies have become louder (Turnheim and Sovacool 2020; Steen and Weaver 2017). Indeed, there is some evidence that regime actors are considerably more dynamic than often assumed as they change their strategies over time and not all incumbents remain stuck in old ways if they are able to overcome internal barriers outlined above (Hansen and Coenen 2017). As Turnheim and Sovacool (2020) point out, incumbent firms can leverage their power, finance and influence and become important sources of change agency when seeing value in tactically engaging with transitions (for instance to outmanoeuvre rivals).

With all that in mind, it is also important to note that incumbents often engage in pluralistic responses. They can perpetuate a traditional business model and core functions of a regime, for instance by lobbying for political support, while simultaneously investing in niche activities

(e.g. R&D) (Späth, Rohracher, and Radecki 2016), that is, they can exert change and maintenance agency simultaneously. Thus, it is important to acknowledge both the transformative potential and the influence to maintain the status quo of powerful incumbents at the same time (Späth, Rohracher, and Radecki 2016).

It is argued that incorporating this emerging, more holistic picture of incumbent firms' responses to transformation pressures will contribute to a more comprehensive understanding of regional industrial path development in mature industries.

Towards a more comprehensive understanding of incumbents in regional industrial path development

This section proposes a conceptual framework that helps to unravel the role of powerful incumbents in shaping regional path development processes in mature industries through change and maintenance agency. To this end, this framework (a) departs from the particular position of incumbent firms in their surrounding RIS, (b) highlights the important interplay of structures and agency to understand strategies of actors in regional path development and (c) elucidates the different channels through which incumbents exert their power.

Incumbents and Regional Innovation Systems

Departing from a systemic approach to new path development, this article understands incumbent firms as agents situated in historically inherited regional economic, social and institutional structures (Martin 2010).

Oftentimes, incumbent firms have been strong historical forces in shaping the very structures they are embedded in through their engagement in previous rounds of regional path development. Incumbents in many cases have forged strong ties and mutual or one-sided dependencies to other actors within and outside the region (such as other firms or policymakers), support organizations (like educational bodies or intermediaries) are often tailor-made for their needs and formal (like regulations) as well as informal (traditions and norms) institutions have often developed in tandem with them (Geels 2014; Isaksen and Trippl 2016). Thus, incumbent firms are often strongly aligned with their surrounding regional and national innovation systems and embedded in global innovation and production networks, making them particularly powerful as their position and influence is often reinforced and privileged by prevailing regional as well as extra-regional structural conditions (Baumgartinger-Seiringer et al. 2021).

This article emphasizes regional factors. Thus, it is argued that the power of incumbents stems especially from their influence on the wider regional innovation system and other elements within. However, extra-regional influences affecting their strategies – such as higher governance levels, inter-regional linkages or headquarters elsewhere – are not neglected.

The implications of incumbents' embeddedness in their surrounding RIS are twofold. First, there are indeed strong conceptual arguments from a systemic perspective to assume that incumbents tend to reproduce and maintain existing regional structures from which they often benefit. However, they not always do so, but can become forces of change under certain circumstances outlined above (Turnheim and Sovacool 2020). Second, due to their structural power and resources, incumbents can be seen as particularly effective in modifying the regional asset base if they opt for change.

Structures and agency

To understand the strategies of agents in general, one must acknowledge the complex interdependence between structures and agency. Actors find specific opportunities and constraints for industrial change residing within regional structural preconditions (Baumgartinger-Seiringer et al. 2021). That is, structures will limit the scope of action of embedded actors (Emirbayer and Mische 1998). However, they never fully determine the course of action, as agency is not only shaped by historically developed structures but also by perceived futures and expectations. While structural preconditions enable and constrain actions in the present (Grillitsch and Sotarauta 2020), it is the perceived opportunities in these conditions which agents aim for and allocate resources to (Steen 2016). Accordingly, agency is best understood as an inter-temporal process and as the '*capacity to contextualize past habits and future projects within the contingencies of the moment*' (Emirbayer and Mische 1998, 963).

Consequently, in order to create, recreate or alter paths, actors (incumbents or newcomers) – situated in historically inherited structures and driven by their visions and expectations – *'work on structural elements, that is, they will purposefully try to challenge or maintain elements, depending on whether they hamper or support their intentions*' (Baumgartinger-Seiringer et al., 2021a, p. 9).

It is well established that new path development depends on RIS reconfiguration (e.g. changes in training programs or institutional frameworks), as established innovation systems are usually unfit to provide the necessary assets to meet new demands (Isaksen and Trippl 2016). That is, regional structural elements in many cases do hamper innovators' intentions. Hence, powerful incumbent firms striving for change or maintenance not only engage in firm level (concerned with adaptations within their own organization) but also in system level agency (Isaksen et al. 2019). They have the capacity to work on and reconfigure the wider RIS.

However, this mechanism might very well go in the opposite direction. Powerful actors opting for reproduction of the status quo might exert influence to maintain certain impeding innovation system structures to mitigate or prevent change that would be detrimental to their intentions ('system stabilization').

Thus, incumbents steer path development processes directly (through firm level agency) but also indirectly, as they reconfigure or stabilize the RIS to support their interests.

Incumbents and their channels of power

Now, in what ways do incumbent firms leverage their particular structural position to change or maintain the course of path development and system reconfiguration? There is little conceptual research in the context of regional path development on concrete channels through which power and influence is exerted[4].

Geels' (2014) work on the role of regime actors specificizes different forms of power used to mitigate and resist fundamental change by drawing on insights from political economy. First, incumbents can draw on instrumental power, that is, using their many resources (e.g. authority, money, personnel, …) to achieve their goals (in interactions with other actors). Second, they can resist change through discursive power by shaping discourses and setting agendas using their positions and media access. In doing so, they influence not only what is being discussed but also in what way. Third, incumbents possess material power. They can defend themselves and their position by drawing on their technological capabilities and financial resources to improve the technical dimension of the current regime. This strategy is often coupled with discursive approaches and promises that the solution is 'around the corner'. Fourth, incumbents exert influence through institutional power which are connected to the broader governance structures and political cultures (e.g. seemingly neutral 'hands-off' policies that privilege powerful and resourceful incumbents) and their political leeway (Geels 2014).

While Geels conceptualizes regime stability as the outcome of active resistance by incumbent actors and thus maintenance agency, this article argues that these very channels can be used to leverage their power to promote change. Instrumental, discursive, material and institutional forms of power are not only means by which incumbents can maintain and reproduce regional structures, but also by which they can be altered (Table 1).

Table 1: Channels of power oriented towards change/maintenance (Source: own elaboration based on Geels, 2014).

	Change	**Maintenance**
Instrumental	using resources to **alter** structures/structural elements	using resources to **maintain** structures/structural elements
Discursive	Shaping the discourse to **push** for change	Shaping the discourse to **prevent** change
Material	Improve technical dimension of **new** technology (+promises)	Improve technical dimension of **old** technology (+promises)
Institutional	Using the institutional power to **pave the way** for change	Using the institutional power to **resist** change

[4] A notable exception is Sotarauta's (2009) work on power and influence tactics in the promotion of regional development in Finland by development officers. However, this work focuses on intermediaries and, thus, on an actor type with a very different power base than incumbent firms.

In summary, the conceptual framework proposed here unravels *how* incumbent firms exert their influence to promote regional industrial change or maintenance. Based on their particular position in regional as well as extra-regional structural conditions and driven by their perceived future, they engage in agency that reaches beyond their own organization. They reconfigure or stabilize their surrounding RIS to support their intentions. To this end, incumbent firms draw on various forms of power to shape the direction of regional industrial path development.

The role of incumbents in the Austrian automotive triangle's development

The empirical section studies the role of incumbent firms in the 'Austrian automotive triangle', a traditional automotive region concentrated in the three provinces Styria, Upper Austria and Vienna (Trippl et al. 2021). The AAT has been selected as it hosts several well-connected and long-established companies (Schneider et al. 2018; for an overview see Appendix), making it an interesting case study to examine how powerful firms shape the pace and direction of regional path development and system reconfiguration.

This section first outlines the methodology used for data collection and analysis. Then, it provides insights into the structural conditions of the Austrian/global automotive industry to unravel the interplay of structures and agency in this specific case. Finally, it analyses strategies of incumbent firms in response to two different upheavals the industry and the AAT are currently facing.

Methodology

The analysis is based on 25 in-depth semi-structured interviews with incumbents (six with incumbent firms and three with representatives in industry associations), but also experts in universities and research institutes (five), intermediaries (four) and government agencies (seven) in the AAT. On average, they were around an hour long with some exceptions lasting up to three hours. All interviewees have gained profound knowledge of the regional industry and the broader RIS through their – usually longstanding – occupation.

The interviews were complimented with an intensive document analysis of policy-documents, interviews in newspaper articles and press statements of incumbent firms and their interest organizations like the Federation of Austrian Industries (IV) and the Austrian Economic Chambers (WKO). Furthermore, the author has participated in relevant conferences in the AAT contributing to further robustness. The transcribed interviews and complementary material were coded and analysed using a qualitative content analysis based on themes corresponding to the analytical framework. As previous research has argued, such a qualitative case study approach is suited to unravel the interlinkages between agency and structure (Jolly, Grillitsch, and Hansen 2020).

Importantly, the empirical investigation focuses on the period between 2012 and 2019. This timeframe was selected for two reasons. First, our interview partners highlighted the year 2012 as the point of initiation of transformations. Second, the interviews were conducted in 2019 and, hence, allow for an in-depth and robust *retrospective* analysis of this particular episode of regional industrial path development.

The (Austrian) automotive industry

There are several specific characteristics of the (Austrian) automotive industry considered crucial here to understand processes of change and maintenance.

First, the automotive industry is a key sector of the Austrian economy. Almost 10 percent of the Austrian workforce (almost 400.000 persons) were employed by companies connected directly or indirectly to the industry in 2018 (Kleebinder et al. 2019). Moreover, the industry is dominated by large long-established incumbents, around 82% of revenue is generated in companies with 250 or more employees (Schneider et al. 2018). The automotive path is embedded in and aligned with a strong RIS that consists of many research institutes, (technical) universities, cluster organizations and so on (Trippl et al. 2021). Given the size and elaboration of the automotive path and its surrounding support system, it is hardly surprising that policymakers are eager to support the industry, while – at the same time – hesitant to limit its scope of action (e.g. through regulations). This mirrors Geels' (2014) notion of the alliance on the regime level that often prevents change.

Second, the car industry is traditionally relatively stable. It was long developing rather incrementally and has shown a remarkable capacity to withstand transition pressures (Späth, Rohracher, and Radecki 2016). However, technological progress and ecological concerns are expected to boost fundamental transformations now.

Third, from a management studies perspective the industry is a systemic one, meaning that different components or modules by different firms need to be compatible. In such industries, innovations might alter the 'system's architecture', that is, the form and function of its components and their interfaces. Consequently, innovations have the potential to significantly change roles, relations, rules and transactions (Kumaraswamy, Garud, and Ansari 2018). This can be considered both a threat and an opportunity for the AAT due to its semi-peripheral position in automotive global production networks (GPNs) (Mordue and Sweeney 2020). Pavlínek (2018) characterizes such semi-peripheral regions by their lack of domestic OEMs (Original Equipment Manufacturer), relatively high production costs and their need to redefine their competitive edge in light of recent moves of production to low-cost locations. The AAT indeed hosts only supplier firms, which exhibit a strong export-orientation and forged strong ties to German OEMs. 87% of products manufactured in the AAT are exported, a majority of them to Germany (WKO 2019). The implications for Austria's automotive industry are mixed. On the one hand, the empirical analysis has clearly shown a fear that radical changes in strategies of partner OEMs in Germany might alter established central European production networks and render certain competitive advantages and components manufactured in the AAT

obsolete. This especially holds true for the many firms in value chains connected to the combustion engine. In 2018, a quarter of the production value of 17 billion Euros was generated in the sector 'engines and transmissions' (Högelsberger and Maneka 2020). On the other hand, in consideration of the high R&D-intensity of the industry, the strong support structures of the RIS and trends of de-verticalization in the global automotive industry (Trippl et al. 2021), our interviewees also pointed to the opportunity of supplier firms to reposition within value chains.

Fourth, the automotive industry's systemic architecture, elaboration and capital-intensity give incumbents a decisive advantage in times of disruptive change. Disruptors in such industries are often highly dependent on the very incumbents they seek to challenge, i.e. 'the disruptor's dilemma' (Kumaraswamy, Garud, and Ansari 2018). Thus, incumbents in the automotive sector are particularly influential.

Analysing incumbents' strategies: change and maintenance

Drawing on these more principal considerations, this section will now analyse the concrete strategies of incumbent firms in the AAT and examine how they leverage their four channels of power in response to '*the two megatrends that will have a lasting impact on the automotive industry: 1) decarbonization and 2) digitalization*' (as one representative of a research organization put it).

As will be shown, they react with agency oriented towards maintenance in case of the former, while responding with change strategies in face of the latter. This is explainable by opportunities and constrains found in the structural preconditions and perceived futures.

Decarbonization: Incumbents as actors of maintenance

Mobility is a key field in which decarbonization must happen to fight the climate crisis and increasing resource depletion (Späth, Rohracher, and Radecki 2016; Pichler et al. 2021). While this insight is hardly controversial anymore, the ways to achieve this goal are. They range from more radical ideas questioning the prevailing car-ownership-model altogether to mere efficiency improvements of conventional powertrains. As in many other countries, sustainable mobility over time has been increasingly equated with the electrification of cars in Austria (even though different approaches are still being discussed).

In contrast to more profound changes to the mobility system, the shift to e-cars is an approach to green mobility relatively compatible with the interests of the car industry (Späth, Rohracher, and Radecki 2016). However, the structural orientation on the combustion engine in the AAT leads to strong path dependencies and makes this transformation one with high disruptive potential (Högelsberger and Maneka 2020).

Accordingly, the interests of industrial players and politicians in respect to added value and employment stand in stark contrast to ecological goals. Thus, incumbent firms have used their

channels of power mainly to engage in maintenance agency over the period of investigation that strongly steered the direction of regional path development and system stabilization towards reproducing established ways of doing things.

Instrumental – Sustainability. The empirical investigation has shown that the period of 2012 to 2019 in the AAT was characterized mainly by the hesitancy of incumbent firms to leverage instrumental power in relation to sustainability concerns and the electrification of cars. Thus, the unwillingness to use their resources must be considered an important and deliberate form of maintenance agency.

There are several reasons for this behaviour. First, interviewees have pointed to the reluctance of higher-tier-firms to position themselves and described a downstream network effect that prevents lower-tier-firms from doing so too. For instance, a chief strategist of one of Austria's largest automotive incumbent firms said that '*the unwillingness of German OEMs, their fighting that something is not implemented, even if it should be [from an environmental perspective], that creates a field of tension for us*'. This statement points to the fact that while incumbent firms are powerful within the surrounding RIS, their influence in automotive GPNs is limited due to the AAT's semi-peripheral position (Mordue and Sweeney 2020). Moreover, some of the most important incumbents in the AAT are subsidiaries of multinational corporations with their HQs elsewhere[5] (see appendix). Accordingly, maintenance strategies of automotive incumbents in the region are – at least to some extend – outcome of external influences.

This situation conserves traditional supply chains and poses an immense system level challenge for smaller firms that lack the advantages of larger companies (e.g. financial capacities for R&D, see literature review), on which they depend due to the industry's systemic architecture. Thus, incumbents (within the AAT and broader GPNs) refusing to engage in change agency have a strong signalling effect on other elements in the RIS. This holds true not only for other firms but also for the education and research domain, on which incumbent firms traditionally exert a strong influence (Trippl et al. 2021). An analysis of the curricula of relevant degree programs, as well as our interviews with researchers confirmed that classic mechanical competencies are still predominant. In this respect, interviewees reported on active maintenance agency and vested interests of both firm and non-firm actors (e.g. in universities).

Second, the empirical analysis confirmed well-established reasons for the inertia of incumbent firms, such as sunk costs, the development of a distinctive specialized technological regime or a pool of skilled workers (Martin and Sunley 2006). These arguments have been brought forward throughout the interviews in relation to a historically developed excellence in combustion engine technology in the AAT. Hence, the reluctance to allocate resources to this transformation is clearly tied to a perceived danger of cannibalizing own existing offerings,

[5] Other work on the AAT has argued that the leeway of foreign owned firms is limited (Pichler et al. 2021). However, research conducted for this article has shown that incumbent firms with HQs elsewhere (in particular Magna) have been important forces of system reconfiguration/stabilization.

highly efficient production systems and profit streams (Kumaraswamy, Garud, and Ansari 2018).

Third and closely related, this hesitancy is connected to mutual dependencies between incumbent firms and policymakers (Geels 2014). According to some interviews, the conflict of interest (environmental protection vs. economic performance) with which policymakers are confronted resulted in a lack of directionality and pressure on dominant incumbent firms.

While the empirical investigation has drawn a clear picture, it is important to note that there are firms, both newcomer and incumbents, that have been engaging early in this transformation. The activities range from manufacturing cases for the modified engine compartment (ADG Austria Druckguss), to battery development (Kreisel Electronic) and simulating alternative powertrains (AVL).

Discursive – Sustainability. The analysis has revealed three framings in the AAT to counteract increasing sustainability concerns (similar strategies has been observed in Stuttgart, see Späth, Rohracher, and Radecki 2016).

First, a strategy commonly used by incumbent firms is to frame the combustion engine as a pillar of regional economic prosperity. This is related to expressed concerns about the far lower complexity of electric engines, lower potentials for value creation, high investments necessary and the potential loss of jobs (Högelsberger and Maneka 2020). Second, incumbents have framed their own role in this debate as one with little to no responsibility. Instead, they see either the customers/market or policymakers in charge. Thereby they drew a picture of passive actors merely reacting to external forces that strongly contrasts the self-image of a highly innovative regional industry. Third, incumbent firms have applied counter framings to delegitimize new ways (Kumaraswamy, Garud, and Ansari 2018). These revolve around two points. On the one hand it is often argued that – taking everything into account – e-mobility is not cleaner than conventional engines and on the other hand that there are better alternatives for clean mobility such as the fuel cell in the future (and thus engaging in this transformation does not pay off).

While it was not possible to assess the concrete impact of these discursive strategies on the process of regional path development, previous studies have shown that incumbents' rhetoric is a powerful tool to establish and reproduce the order of things in periods of socio-technical change (Patala et al. 2019). Moreover, in the context of regional development, the potential to influence others and frame their thinking can be seen as particularly significant, as regional change often rests on co-operation and co-ordination (Sotarauta 2009).

Material – Sustainability. There is strong evidence for material strategies of incumbent firms targeting the improvement of established technologies. This has been confirmed by interviewees but also becomes apparent through companies' own PR tools such as press releases or websites. In a booklet released in 2018, the large BMW engine plant stated that it is '*still fully committed to further developing the combustion engine*' and highlighted its

importance for the '*diesel-land Austria*' (BMW Group 2018). Incumbents such as Magna, AVL or miba have reported similar innovation endeavours and resources allocated to areas no longer needed in e-cars (mostly incremental changes in fuel systems, coupling systems or exhaust aftertreatment systems). While this behaviour is connected to a certain degree of novelty, it inhibits larger-scale alterations in the regional industry and can thus be seen as a form of maintenance agency (Bækkelund 2021).

This tendency to persist on the combustion engine has also been found by others. In their work on perspectives for a social-ecological transformation of the Austrian automotive industry, Högelsberger and Maneka (2020, p. 422) summarize: '*A high level of confidence in the ecological modernization of combustion technology can be observed. The majority of actors consider the internal combustion engine to be viable for the future, which is justified by its allegedly high optimization potential. […] This idea of an incremental innovation process - remaining within the framework of combustion technology - is often accompanied by scepticism towards e-cars*'[6]. Indeed, a survey conducted in 2018 with automotive suppliers has indicated that improvements of conventional powertrains were still considered the most crucial field of product innovation by many firms in the AAT (Pichler et al. 2021).

The interviews as well as other research have shown that this opinion is widespread in the RIS and shared by parts of the workforce and – at least to some extent – by the research domain (Pichler et al. 2021; focus 2017). Accordingly, spurred by material strategies of powerful companies and historically high levels of cooperation, a belief in the future viability of combustion technology has manifested in the AAT.

Importantly, some interview partners (particularly in the research domain) expressed concerns about lock-in tendencies, a system in self-satisfaction (Trippl et al. 2021) and outspoken criticism of this current development path. Others argued that perpetuation of old technology and business models is merely the basis for diversification endeavours. Thus – as is reasoned – maintenance agency can sometimes be a necessity to reap the resources to engage in change agency (particularly in relation to costly efforts towards digitalization).

Institutional – Sustainability. Incumbent firms also made use of their institutional power to withstand sustainability transitions. On the one hand, incumbents have leveraged this kind of power actively, that is, they have used their institutional leeway. Indeed, representatives of incumbent firms confirmed well-established connections to politicians (which is hardly surprising given incumbents' structural power), even to the highest levels of the Austrian government. However, they not only have exerted influence in the background. Very recently incumbent firms (such as Magna, MAN, KTM and others) also tried to apply public pressure through an open letter to the chancellor to speak out against a ban for combustion engines on the EU level, arguing that this would inhibit innovation, cost many jobs and lead to a loss in

[6] Quote translated by the author.

value of approximately five million Austrian cars (see also discursive strategies) (Wiener Zeitung 2021)[7].

On the other hand, there are passive forms of institutional power, which are connected to broader governance and political structures that privilege powerful incumbents, such as seemingly neutral 'hands-off' policies (Geels 2014). Indeed, being open to all types of technologies (e.g. hydrogen) to combat climate change is a recurring argument used by both representatives of the automotive industry and the federal government to legitimize 'continue as before' strategies based on the assumption that the 'solution is around the corner' (VCÖ 2018). Moreover, interviewees reported on institutionalized structures that favour maintenance agency, e.g. existing funding pools oriented towards established competencies. In this respect, a recent report on environmentally harmful subsidies in Austria found that the prevailing business model based on cars with combustion engines is supported with indirect subsidies amounting to 1.3 billion Euros per year (Pichler et al. 2021).

Digitalization: Incumbents as actors of change

Austria's automotive industry places high hopes in the digitalization of cars. In a period dominated by scepticism about the industry's future in light of the climate crisis, the emission scandal and the overall image of cars, the advent of increasing automatization is welcomed by many as a new field of innovation in accordance with AAT's profile (Trippl et al. 2021). Moreover, as Trippl et al. (2021) argue, there are several enabling (regional) conditions, ranging from general trends in the global automotive industry (e.g. de-verticalization) to the high innovation capacity in the AAT (based on R&D expenditure, patents, research collaborations). Moreover, Austria hosts an innovative and R&D-intensive microelectronics path that is traditionally interwoven with the automotive industry, sees opportunities for further diversifications and plays an important role in system reconfiguration. For all these reasons, incumbent firms have leveraged their channels of power mainly to actively engage in change agency in this transformation since around 2012.

Instrumental – Digitalization. Incumbent firms have used their many resources to reorient the RIS and thereby significantly influenced the direction of regional industrial path development. In light of the increasing complexity and need for cooperation, many incumbent firms have further strengthened their ties with other regional actors. Interviewees reported on renewed life in several consortia including traditional cluster organizations, well-established competence centres such as Virtual Vehicle in Graz and newly initiated corporations such as Silicon Austria Labs (a science-industry centre founded in 2018 working on – among other things – automated driving). Many well-known incumbents sit on the steering boards of these consortia.

[7] This letter was written in 2021 and must be seen in the context of increasingly widespread consensus that phasing out of the combustion engine in its current form is inevitable. Yet, it shows how widespread maintenance agency still is in the AAT.

Moreover, incumbent firms have begun to forge new strategic links between firm and system level actors, for instance between Siemens Mobility Austria and the federally owned infrastructural operator ASFINAG (that itself positioned early in this transformation) to further digitalize motorways and provide the basis for automated driving. Collaborations have also been institutionalized with projects like 'innoregio', a meeting between firm level and system level actors taking place every three months to coordinate activities in Styria.

Powerful firms have also made use of their historically strong influence on the research and education domain (Trippl et al. 2021). Firms like AVL und Infineon have funded new endowment professorships related to automated driving at universities in Graz and Vienna. AVL, Infineon, Magna and NXP have played a pivotal role in starting and funding the new master's program 'System Test Engineering' at Johanneum Graz (University of Applied Science). In 2017, German OEM Audi has partnered with Johannes-Kepler university Linz and opened the audi.JKU deep learning centre. In 2018, Magna and the technical university in Graz have reinforced their cooperation (existing since 2004) to also cover research in the area of automated driving (for an overview of most of these activities, see BMVIT 2018). In doing so, incumbent firms, on the one hand, gain valuable research results based on the dynamism and freedom of universities and, on the other hand, shape tomorrow's graduates.

As previous research has shown, these actions of system reconfiguration – often in cooperation with the federal ministry for transport (BMVIT) – have led to an increased coherence between an already highly cooperative industry and surrounding RIS elements (Baumgartinger-Seiringer et al. 2021).

Discursive – Digitalization. The empirical analysis has shown two main discursive strategies used by incumbents to legitimize the need for action: an opportunity and an urgency framing.

The opportunity argument is connected to a strong belief in the high innovation capacity. Accordingly, many interviewees and documents (particularly those in relation to the micro-electronic path) have emphasized that the right conditions to meet these new challenges and to tap new markets are in place regionally.

The urgency framing is underpinned by the conviction that the digital transformation will completely revolutionize the car and cannot be stopped. It is tied to the notions that the sources of revenue are shifting from hardware to software and that data-collection is vital to survive in a transformed automotive industry. Hence, the urgency framing echoes the fear of a potential loss of prosperity expressed in response to sustainability concerns, but this time around to motivate change rather than maintenance.

Albeit not as common, the necessity for digitalization is sometimes motivated by promises of more sustainable and safe cars. Accordingly, it is argued that lower levels of car production due to car-sharing and self-driving cars, intelligent traffic management and traffic harmonization offer new ways to promote safety and sustainability. Accordingly, there is some evidence that growing environmental concerns were redirected to promote the industry's digitalization.

Material – Digitalization. Incumbent firms in the AAT have been engaged in countless activities to propel the ongoing digitalization process, ranging from the development of intelligent lights used for automated driving (e.g. for communication with pedestrians or other analog road users) (ZKW) to testing services for ADAS (Advanced Driver Assistance Systems) both in virtual and real-world scenarios (AVL) and developments to digitalize the car key (NXP). The 2018 annual press talk of Bosch-Austria also presents an interesting example. Klaus Foquet (sole director at the time) highlighted both the need to invest in areas of connected mobility *and* the combustion engine (i-magazin 2018) and, hence, motivated material strategies for maintenance ('*Diesel has a future*') *and* change ('*creation of innovative solutions in areas such as connected mobility*').

Importantly, drawing on their experience in system thinking and high investments in R&D, microelectronic firms have played an important role in regional reconfiguration and become strategic partners of automotive OEMs (Trippl et al. 2021). Firms such as Infineon, AT&S or AMS have been engaged in developing a broad range of microelectronic solutions for automated driving. Microelectronic incumbents have traditionally strong ties to the automotive industry that will only strengthen as the demand for sensors will further increase (currently there are around 100 in a typical car, predictions say that it will be several 1000s in the future). Propelled by these circumstances, AMS – one of the most R&D-intensive firms in Austria – declared that its future lies in the automotive segment (Industriemagazin 2019).

Yet, it should be noted that all these changes do not come without frictions. Interviews and previous research (Trippl et al. 2021) have shown that there is an incompatibility between the historically developed trademarks of the AAT (determinism, safety, predictability, …) and new software-based methods (agile, flat hierarchies, short development horizons, …). It has turned out that this is a particular problem for traditional automotive companies. Thus, incumbents that – due to their size – often suffer from inertia (Kumaraswamy, Garud, and Ansari 2018), have begun to radically modify their firm cultures (Trippl et al. 2021).

Institutional – Digitalization. Due to a reported mismatch between rigid institutional assets and new demands tied to the inflow of IT knowledge (Baumgartinger-Seiringer et al. 2021), institutional change (e.g. questions of insurance) is seen as a necessity for the consolidation of change.

Interviews have shown that incumbents leverage their institutional power to put pressure on policymakers, e.g. to adjust regulative frameworks quickly to the technical status-quo or to better support international recruitment. Particularly in relation to testing automated solutions in real world environments, incumbent firms have been described as proactive – and successful. Today, there are two testing sites in the AAT: the ALP.Lab in Styria and DigiTrans in Upper Austria. The former was founded in 2017 by incumbent firms AVL and Magna together with scientific partners. The latter is run by a consortium of firm-level (e.g. incumbent firms Hödlmayr International, Reform-Werke Bauer and MAN) and system-level actors (such as the

university of applied science Steyr and the Austrian Institute of Technology). Both projects are supported by ASFINAG and BMVIT.

Despite mutual dependencies and these success stories, the situation has been described as difficult by some. Policymakers on the national level are confronted with very proactive incumbent firms and – fuelled by international competition – with their 'race to-the-bottom' demands on the one side and difficulties to align different governance levels (European and sub-national) on the other.

Discussion and Conclusion

The analysis has shown how incumbent actors in a mature regional industry have shaped industrial path development and regional innovation system reconfiguration/stabilization in their favour through change and maintenance agency. It has been argued that their agentic practices are best understood from a structure-agency perspective. Based on distinct structural conditions and driven by their perceived futures, incumbents leveraged their influence to either drive (digitalization) or resist (decarbonization) transformations.

In doing so, they made use of instrumental, discursive, material and institutional forms of power (Geels 2014). The empirical investigation has not only confirmed that these channels are indeed tools for both, maintenance *and* change, but also that they differ in significance. From a systemic perspective, those forms of power with the capacity to influence other RIS elements rank high in relative importance. In relation to decarbonization (maintenance), this has applied particularly to the material dimension of power that – in conjunction with discursive strategies – led to a manifestation of a strong belief in the future viability of the combustion engine and, thereby, contributed strongly to system stabilization. In contrast, instrumental power was paramount to reconfigure the system in ways that allow for more cooperation, which is seen as imperative for digitalization (change).

Overall, this paper aimed at disentangling *how* incumbents exert influence to drive or hinder regional industrial change. Future research should complement this research by putting more emphasis on who are those that strive for change or maintenance and – in particular – under what circumstances.

There are several further aspects worth underlining. First, incumbent firms have distinct advantages and disadvantages over other firms (see section 2). These are particularly pronounced in case of the AAT due to structural characteristics of the automotive industry. Accordingly, the power of incumbent firms might vary substantially between industries as it depends on factors such as the industry's architecture, capital-intensity and regional embeddedness. Hence, testing the analytical framework in the context of a less elaborated and backed industry/RIS would provide important additional insights. Second, the investigation has focused on the meso-level. On the micro-level it becomes clear that not all incumbents act identically. Both their power and strategies largely depend on their competencies, ownership, embeddedness in the RIS, markets, visions etc. Third, a dynamic understanding of agency is

needed (Jolly, Grillitsch, and Hansen 2020; Baumgartinger-Seiringer, Miörner, and Trippl 2021). While the empirical investigation focused on the period between 2012 and 2019 and provided a clear picture, the last years (2019-2021) have shown that the strong defensive stance towards e-mobility is increasingly fragile. For instance, Magna has recently started to assemble a niche e-car for Jaguar. This development is strongly connected to more political (including fines from the European level) and economic pressure (through US and Asian firms entering the market) and a trend reversal towards e-mobility in Germany starting in 2019 (Olle et al. 2020). Forth, this very influence of German OEMs is crucial to understand regional path development and system reconfiguration in the AAT. Thus, despite the weight of incumbent firms, even they depend strongly on extra-regional factors, reflecting power asymmetries between core and semi-peripheral regions in automotive GPNs (Pavlínek 2018).

More generally speaking, incumbent firms are not considered to play a major role in new path development, but rather portrayed as actors who tend to reproduce the status-quo. Indeed, incumbents can become strong barriers to change, their role is important to understand why paths fail (Blažek et al. 2020) or new path development does not succeed (questions hardly examined so far). Hence, maintenance agency has a dark side in the sense that it bars the way to progress. However, other research has cast light on positive forms of maintenance/reproductive agency oriented towards the consolidation of change that should be considered equally important for our understanding of regional industrial development (Bækkelund 2021; Baumgartinger-Seiringer, Miörner, and Trippl 2021).

Further, this article makes a strong case for advancing systemic perspectives on innovation-based regional change by incorporating the role of power. RIS reconfiguration or stabilization depends strongly on influential actors capable of shaping or maintaining their surrounding RIS in their favour. Hence, such actors possess 'systemic power'[8] to alter other elements (e.g. other firms, the organizational support structure or institutional setups). Accordingly, power is an important dimension of what Miörner (2020) has termed 'system selectivity': The power configuration within the RIS affects what is possible in terms of change (i.e. what type of change is 'selected').

Indeed, the empirical analysis has shown that the AAT was not conducive for development per se in the period of investigation, but for a certain type of regional industrial change. Led by powerful incumbent firms, the RIS was reconfigured in ways to support digitalization, while stabilized to constrain decarbonization. The reason is that the former upheaval – despite being very radical itself (Trippl et al. 2021) – was more compatible with the industry's regional setup or the 'system's architecture' (Kumaraswamy, Garud, and Ansari 2018). In other words, digitalization was less disruptive in relative terms and, hence, a more 'system-stabilizing' innovation.

This raises questions concerning the interdependence between different disruptions. On the one hand, there are hints that the increasing digitalization and sustainability transitions reinforced each other (e.g. observed discursive strategies to legitimize steps towards digitalization with

[8] This idea is not new, power is often defined as a capacity to control other actors or to produce intended effects on others (Sotarauta 2009).

growing sustainability concerns). On the other hand, it became clear that assets (e.g. financial ones, workforce) allocated to digitalization efforts are bound and, therefore, cannot be used to respond to – arguably more important – sustainability concerns. This poses a challenge for both research and policy to move beyond a hitherto often neutral or indifferent stance towards innovation.

Finally, this article offers insights in light of recent calls for regime destabilization and exnovation (Kivimaa and Kern 2016). Such measures will have to find answers to the power of incumbents and their different channels of influence. Moreover, the alliance between powerful firms and policymakers constitutes a particular challenge, as the latter are important actors of destabilization in the first place. One way to approach these problems is the implementation of directionality and challenge orientation on the innovation system level, thereby placing societal challenges at the core of innovation processes (Tödtling, Trippl, and Desch 2021) and recalibrating 'system selectivity'.

Disclosure Statement: No potential conflict of interest was reported by the authors.

References

Bækkelund, Nora. 2021. “Change Agency and Reproductive Agency in the Course of Industrial Path Evolution.” *Regional Studies* 55(4):757–68. doi:10.1080/00343404.2021.1893291.

Baumgartinger-Seiringer, Simon, Lea Fünfschilling, Johan Miörner, and Michaela Trippl. 2021. “Reconsidering Structural Conditions for Industrial Renewal.” Forthcoming in *Regional Studies*:1–21. Doi: 10.1080/00343404.2021.1984419.

Baumgartinger-Seiringer, Simon, Johan Miörner, and Michaela Trippl. 2021. “Towards a Stage Model of Regional Industrial Path Transformation.” *Industry and Innovation* 28(2):160–81. doi:10.1080/13662716.2020.1789452.

Blažek, Jiří, Viktor Květoň, Simon Baumgartinger-Seiringer, and Michaela Trippl. 2020. “The Dark Side of Regional Industrial Path Development: Towards a Typology of Trajectories of Decline.” *European Planning Studies* 28(8):1455–73. doi:10.1080/09654313.2019.1685466.

BMVIT. 2018. “Aktionspaket: Automatisierte Mobilität (2019-2022).” Accessed September 07, 2021. https://www.bmk.gv.at/themen/mobilitaet/alternative_verkehrskonzepte/automatisiertesFahren/aktionsplan.html.

BMW Group. 2018. “Modernste Technik. Maximale Effizienz. Gute Gründe Für Den Dieselantrieb.” Accessed September 07, 2021. https://www.bmwgroup-werke.com/content/dam/grpw/websites/bmwgroup-werke_com/steyr/highlights/LAY_181003_Dieselbroschuere_BMW-Group-in-Oesterreich_DIN-A5-Web.pdf.

Emirbayer, Mustafa, and Ann Mische. 1998. “What Is Agency?” *American Journal of Sociology* 103(4):962–1023. doi:10.1086/231294.

Fagerberg, Jan. 2009. “A Guide to Schumpeter.” In *Confluence: Interdisciplinary Communications 2007/2008*, edited by Willy Østreng, 20–22. Oslo.

focus. 2017. ““Es Gibt Einen Hass Gegen Verbrenner“: Motoren-Papst Rechnet Mit Elektromobilität Ab.” Accessed September 07, 2021. https://www.focus.de/auto/elektroauto/interview-mit-friedrich-indra-es-gibt-einen-hass-gegen-verbrenner-motoren-papst-rechnet-mit-elektromobilitaet-ab_id_6512817.html.

Geels, Frank. 2002. “Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-Level Perspective and a Case-Study.” *Research Policy* 31(8-9):1257–74. doi:10.1016/S0048-7333(02)00062-8.

———. 2014. “Regime Resistance Against Low-Carbon Transitions: Introducing Politics and Power into the Multi-Level Perspective.” *Theory, Culture & Society* 31(5):21–40. doi:10.1177/0263276414531627.

Grillitsch, Markus, and Markku Sotarauta. 2020. “Trinity of Change Agency, Regional Development Paths and Opportunity Spaces.” *Progress in Human Geography* 44(4):704–23. doi:10.1177/0309132519853870.

Hansen, Teis, and Lars Coenen. 2017. “Unpacking Resource Mobilisation by Incumbents for Biorefineries: The Role of Micro-Level Factors for Technological Innovation System Weaknesses.” *Technology Analysis & Strategic Management* 29(5):500–513. doi:10.1080/09537325.2016.1249838.

Hassink, Robert, Arne Isaksen, and Michaela Trippl. 2019. “Towards a Comprehensive Understanding of New Regional Industrial Path Development.” *Regional Studies* 53(11):1636–45. doi:10.1080/00343404.2019.1566704.

Henderson, Dylan. 2020. “Institutional Work in the Maintenance of Regional Innovation Policy Instruments: Evidence from Wales.” *Regional Studies* 54(3):429–39. doi:10.1080/00343404.2019.1634251.

Heyen, Dirk, Lukas Hermwille, and Timon Wehnert. 2017. “Out of the Comfort Zone! Governing the Exnovation of Unsustainable Technologies and Practices.” *GAIA - Ecological Perspectives for Science and Society* 26(4): 326–31. doi:10.14512/gaia.26.4.9.

Högelsberger, Heinz, and Danyal Maneka. 2020. “Konversion Der Österreichischen Auto(Zuliefer)Industrie? Perspektiven Für Einen Sozial-Ökologischen Umbau.” In *Baustelle Elektromobilität: Sozialwissenschaftliche Perspektiven Auf Die Transformation Der (Auto-)Mobilität*, edited by Achim Brunnengräber and Tobias Haas, 409–39: transcript-Verlag.

i-magazin. 2018. “Bosch Baut Aktivitäten in Österreich Erneut Aus: Jahres-Pressegespräch 2018 in Wien.” Accessed September 07, 2021. https://i-magazin.com/bosch-baut-aktivitaeten-in-oesterreich-erneut-aus/.

Industriemagazin. 2019. “AMS AG: Am Anfang Der „Dritten Welle in Der Halbleiterindustrie“.” Accessed September 07, 2021. https://industriemagazin.at/a/ams-ag-am-anfang-der-dritten-welle-in-der-halbleiterindustrie.

Isaksen, Arne, Stig-Erik Jakobsen, Rune Njøs, and Roger Normann. 2019. “Regional Industrial Restructuring Resulting from Individual and System Agency.” *Innovation: The European Journal of Social Science Research* 32(1):48–65. doi:10.1080/13511610.2018.1496322.

Isaksen, Arne, and Michaela Trippl. 2016. “Path Development in Different Regional Innovation Systems.” In *Innovation Drivers and Regional Innovation Strategies*, edited by Mario Parrilli, Rune Dahl-Fitjar, and Andrés Rodríguez-Pose, 66–84. Routledge studies in innovation, organization and technology 40. New York: Routledge.

Jolly, Suyash, Markus Grillitsch, and Teis Hansen. 2020. “Agency and Actors in Regional Industrial Path Development. A Framework and Longitudinal Analysis.” *Geoforum* 111:176–88. doi:10.1016/j.geoforum.2020.02.013.

Kivimaa, Paula, and Florian Kern. 2016. “Creative Destruction or Mere Niche Support? Innovation Policy Mixes for Sustainability Transitions.” *Research Policy* 45(1):205–17. doi:10.1016/j.respol.2015.09.008.

Kleebinder, Hans-Peter, Anna Kleissner, Christian Helmenstein, and Michael Semmer. 2019. “Auf Der Siegerstraße Bleiben: Automotive Cluster Der Zukunft Bauen.” Accessed December 17, 2019. https://www.bmvit.gv.at/themen/alternative_verkehrskonzepte/elektromobilitaet/zahlen/mobilitaetsstudie.html.

Kumaraswamy, Arun, Raghu Garud, and Shahzad Ansari. 2018. “Perspectives on Disruptive Innovations.” *Jour. of Manage. Stud.* 55(7):1025–42. doi:10.1111/joms.12399.

MacKinnon, Danny, Stuart Dawley, Andy Pike, and Andrew Cumbers. 2019. “Rethinking Path Creation: A Geographical Political Economy Approach.” *Economic Geography* 95(2):113–35. doi:10.1080/00130095.2018.1498294.

Martin, Ron. 2010. “Roepke Lecture in Economic Geography-Rethinking Regional Path Dependence: Beyond Lock-in to Evolution: Beyond Lock-in to Evolution.” *Economic Geography* 86(1):1–27. doi:10.1111/j.1944-8287.2009.01056.x.

Martin, Ron, and Peter Sunley. 2006. “Path Dependence and Regional Economic Evolution.” *Journal of Economic Geography* 6(4):395–437. doi:10.1093/jeg/lbl012.

———. 2010. “The Place of Path Dependence in an Evolutionary Perspective on the Economic Landscape.” In *the Handbook of Evolutionary Economic Geography*, edited by Ron Boschma and Ron Martin: Edward Elgar Publishing.

Miörner, Johan. 2020. “Contextualizing Agency in New Path Development: How System Selectivity Shapes Regional Reconfiguration Capacity.” *Regional Studies*, 1–13. doi:10.1080/00343404.2020.1854713.

Mordue, Greig, and Brendan Sweeney. 2020. “Neither Core nor Periphery: The Search for Competitive Advantage in the Automotive Semi-periphery.” *Growth and Change* 51(1):34–57. doi:10.1111/grow.12354.

Neffke, Frank, Matté Hartog, Ron Boschma, and Martin Henning. 2018. “Agents of Structural Change: The Role of Firms and Entrepreneurs in Regional Diversification.” *Economic Geography* 94(1):23–48. doi:10.1080/00130095.2017.1391691.

Olle, Werner, Daniel Plorin, Dirk Vogel, Andreas Wächtler, and Rico Chmelik. 2020. “Electric Mobility Defies the Automotive Crisis: Developments in Europe 2020–2025.” https://elcanetwork.eu/wp-content/uploads/2021/02/kurzfassung_studie_elektromobilitaet_entwicklungen-in-europa-bis-2025.pdf.

Patala, Samuli, Ida Korpivaara, Anne Jalkala, Aino Kuitunen, and Birthe Soppe. 2019. “Legitimacy Under Institutional Change: How Incumbents Appropriate Clean Rhetoric for Dirty Technologies.” *Organization Studies* 40(3):395–419. doi:10.1177/0170840617736938.

Pavlínek, Petr. 2018. “Global Production Networks, Foreign Direct Investment, and Supplier Linkages in the Integrated Peripheries of the Automotive Industry.” *Economic Geography* 94(2):141–65. doi:10.1080/00130095.2017.1393313.

Pichler, Melanie, Nora Krenmayr, Danyal Maneka, Ulrich Brand, Heinz Högelsberger, and Markus Wissen. 2021. “Beyond the Jobs-Versus-Environment Dilemma? Contested Social-Ecological Transformations in the Automotive Industry.” *Energy Research & Social Science* 79:102180. doi:10.1016/j.erss.2021.102180.

Schneider, Herwig, Peter Luptáčik, Roman Haas, Jonas Popko, and Daran Demirol. 2018. “Die Automotive Zulieferindustrie Österreichs Im Internationalen Wettstreit: Strukturstudie.” Unpublished manuscript, Accessed September 07, 2021. https://www.metalltechnischeindustrie.at/fileadmin/content/Dokumente/Branchenbetreuung/ARGE_Automotive_Zulieferindustrie/Publikationen/Strukturstudie_Automotive_Zulieferindustrie_2018.pdf.

Sotarauta, Markku. 2009. “Power and Influence Tactics in the Promotion of Regional Development: An Empirical Analysis of the Work of Finnish Regional Development Officers.” *Geoforum* 40(5):895–905. doi:10.1016/j.geoforum.2009.06.005.

Sotarauta, Markku, and Nina Suvinen. 2018. “Institutional Agency and Path Creation: An Institutional Path from Industrial to Knowledge City.” In *New Avenues for Regional Innovation*

Systems: Theoretical Advances, Empirical Cases and Policy Lessons, edited by Arne Isaksen, Roman Martin, and Michaela Trippl, 85–104. Cham: Springer International Publishing.

Späth, Philipp, Harald Rohracher, and Alanus von Radecki. 2016. "Incumbent Actors as Niche Agents: The German Car Industry and the Taming of the "Stuttgart E-Mobility Region"." *Sustainability* 8(3):252. doi:10.3390/su8030252.

Steen, Markus. 2016. "Reconsidering Path Creation in Economic Geography: Aspects of Agency, Temporality and Methods." *European Planning Studies* 24(9):1605–22. doi:10.1080/09654313.2016.1204427.

Steen, Markus, and Tyson Weaver. 2017. "Incumbents' Diversification and Cross-Sectorial Energy Industry Dynamics." *Research Policy* 46(6): 1071–86. doi:10.1016/j.respol.2017.04.001.

Stephan, Michael. 2013. "Theorien Der Industrieevolution." *Discussion Papers on Strategy and Innovation* (13-03).

Tödtling, Franz, Michaela Trippl, and Veronika Desch. 2021. "New Directions for RIS Studies and Policies in the Face of Grand Societal Challenges." *European Planning Studies*, 1–18. doi:10.1080/09654313.2021.1951177.

Trippl, Michaela, Simon Baumgartinger-Seiringer, Alexandra Frangenheim, Arne Isaksen, and Jan Rypestøl. 2020. "Unravelling Green Regional Industrial Path Development: Regional Preconditions, Asset Modification and Agency." *Geoforum* 111:189–97. doi:10.1016/j.geoforum.2020.02.016.

Trippl, Michaela, Simon Baumgartinger-Seiringer, Elena Goracinova, and David A. Wolfe. 2021. "Automotive Regions in Transition: Preparing for Connected and Automated Vehicles." *Environ Plan A* 53(5):1158–79. doi:10.1177/0308518X20987233.

Turnheim, Bruno, and Benjamin K. Sovacool. 2020. "Forever Stuck in Old Ways? Pluralising Incumbencies in Sustainability Transitions." *Environmental Innovation and Societal Transitions* 35:180–84. doi:10.1016/j.eist.2019.10.012.

VCÖ. 2018. "Was Bedeutet „Technologieneutralität" Im Verkehr?" Accessed September 07, 2021. https://www.vcoe.at/publikationen/blog/detail/technologieneutralit%C3%A4t-im-verkehr.

Wiener Zeitung. 2021. "Autolobby an Kurz: Kein Aus Für Verbrennungsmotor." Accessed September 07, 2021. https://www.wienerzeitung.at/nachrichten/wirtschaft/oesterreich/2097812-Autolobby-an-Kurz-Kein-Aus-fuer-Verbrennungsmotor.html.

WKO. 2019. "Automotive: Struktur, Zukunft Und Trends Der Branche." Accessed September 07, 2021. https://www.wko.at/service/aussenwirtschaft/automotive-branche-struktur-zukunft-trends.html.

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/