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System-level agency and its many shades: How to shape the system for path development?

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Abstract

Agency has become one of the critical themes in path development and several typologies of agency have been proposed. The notion of system-level agency has attracted particular attention. However, existing typologies of agency suffer from conceptual limitations and the many shades of system-level agency in the system of path development remain largely unclear. This article discusses the limitations of existing typologies of agency in path development, clarifies the notion of the system and its functions, and proposes a multidimensional framework that brings together the multiple shades of how agents shape paths along various angles, system functions, and a multiscalar perspective.

Keywords

evolutionary economic geography; agency; institutions; path development; regional development

Introduction

In recent years, evolutionary economic geography and specifically the path development literature (e.g., Grillitsch et al., 2018; Isaksen et al., 2018; 2019; Martin & Sunley, 2006; Tödtling & Trippl, 2013) has increasingly focused on the role of agency (e.g., Bækkelund, 2021; Boschma et al., 2017; Grillitsch et al., 2021a, 2021b; Jolly et al., 2020; Trippl et al., 2020). Various typologies of agency have been proposed such as the "trinity of change agency" (Grillitsch & Sotarauta, 2020), maintenance or reproductive agency (Bækkelund, 2021; Henderson, 2020), contributions drawing on Lawrence and Suddaby's (2006) institutional work (e.g., Fuenfschilling & Truffer, 2016), and the distinction between firm-level agency and system-level agency (Hassink et al., 2019; Isaksen & Jakobsen, 2017; Isaksen et al., 2018; 2019). These overlapping typologies and their use in the path development literature demonstrate that agency is a multifaceted concept whose many shades are still not precisely understood.

To deepen our understanding of the multifaceted role of agency in regional industrial path development, I argue for going beyond simplified typologies that focus on particular expressions of agency while underemphasizing or, at worst, ignoring others. The influential dichotomy between firm-level agency and system-level agency is a case in point. Despite its merit in correcting the traditional firm-centered focus of evolutionary economic geography (Baumgartinger-Seiringer et al., 2021; Dawley, 2014; Hassink et al., 2019; Isaksen et al., 2019; MacKinnon et al., 2019; Steen, 2016), this distinction does not capture the many shades of agency in path development. A more nuanced conceptualization should go beyond simple typologies and capture the multitude of agentic processes that shape the course of the multiscalar system surrounding path development (Benner, 2021b; Gong & Hassink, 2019; Hassink et al., 2019).

This conceptual article argues that that a more nuanced conceptualization of system-level agency has to (i) build on a characterization of the "system" for path development and its functions, (ii) allow for capturing system-level agency along several angles that draw attention to its many shades, and (iii) consider both multiscalar territorial and sectoral-technological dimensions. By proposing a framework along these lines, the article aims at capturing the complexity of different "patterns of agency" (Sotarauta et al., 2021, p.93) that drive path development.

In line with the empirical focus of the research project it stems from, the article draws primarily on empirical examples from Israel available in the literature. These examples serve to illustrate the conceptual arguments proposed. Given that the path development literature is particularly rife with examples from Nordic countries (e.g., Bækkelund, 2021; Isaksen et al., 2019; Jolly et al., 2020; Kurikka & Grillitsch, 2020; Miörner & Trippl, 2017, 2019; Nilsen & Njøs, 2021; Rekers & Stihl, 2021; Rypestøl et al., 2021; Simmie, 2012; Sotarauta et al., 2021) with their specific characteristics (Grillitsch et al., 2021c), the case of an economically developed, dynamic, non-European economy such as Israel can serve to broaden the empirical scope of the literature. As a small country not integrated into the complex architecture of overarching spatial policy frameworks such as the EU's cohesion policy, Israel offers an additional opportunity to zoom in on different shades of systemic agency in the same macro-level context (e.g., Benner, 2021a; 2021c; Schäfer & Henn, 2018; Shilon et al., 2021; Schmidt & Uriely, 2019).

The article is structured as follows. The next section reviews the role of agency in path development. Based on this overview, the article goes on to offer a sympathetic critique of the literature on agency in path development and proposes a multidimensional framework for analyzing the complex patterns of system-level agency. The article closes by drawing conclusions for further research.

Agency in path development

Starting from Martin's (2010) critique against "canonical" path dependence, paths have increasingly come to be seen as a process (Garud & Karnøe, 2001; Martin, 2010; Martin & Sunley, 2006). On this basis, a nuanced typology of positive and negative regional industrial paths has been developed in a rich body of literature (Blažek et al., 2020; Grillitsch et al., 2018; Isaksen et al., 2018; 2019; Miörner & Trippl, 2019; Tödtling & Trippl, 2013). In recent years, the literature has deepened its interest for the role of agency in driving processes of regional development and innovation (e.g., Bækkelund, 2021; Beer et al., 2021; Benner, 2021c; Boschma et al., 2017; Dawley, 2014; Grillitsch et al., 2021a, 2021b, 2021c; Jolly et al., 2020; Miörner, 2020; Miörner & Trippl, 2017; Nilsen & Njøs, 2021; Simmie, 2012; Steen, 2016; Stephens & Sandberg, 2020; Trippl et al., 2020; Uyarra et al., 2017). While empirically a more recent phenomenon, the focus on agency has been visible in early conceptual contributions. Garud and Karnøe (2001) and Martin and Sunley (2006) stress the role of agency in path dependence which extends to the role of agents' actions in shaping path development understood as a process

(Martin, 2010). For example, Dawley's (2014) case study on offshore wind power in North East England provides an illustrative example on the agency exerted by a regional development authority. Miörner and Trippl (2017) sketch the role of key individuals in the development of Scania's digital games industry. MacKinnon et al. (2019) stress the role of agency at the intersection of regional path development and strategic coupling in global production networks. Sotarauta et al. (2021) identify various roles of agents exerting change agency in green path development (see also Trippl et al., 2020). Rekers and Stihl (2021) examine the differing reactions of agents to crisis in two municipalities in South East Sweden.

Giddens (1984, p.9) simply relates agency to "events of which an individual is the perpetrator" and goes on to explain it in the sense that "whatever happened would not have happened if that individual had not intervened." Grillitsch and Sotarauta (2020, p. 707) propose a more precise definition by understanding agency as "intentional, purposive and meaningful actions, and the intended and unintended consequences of such actions" (see also Coe & Jordhus-Lier, 2011). Hence, agency is fundamentally related to agents' intentions (Huggins and Thompson, 2019; Mele, 2013; Sewell, 1992; Stephens & Sandberg, 2020). The definition proposed by Musiolik et al. (2020, p.2) refers to agents' power "to act independently in the world, i.e. to create and shape its surroundings." For Rekers and Stihl (2021, p.90), agency is "the capacity to act and produce a particular (intended or unintended) effect" in the three temporal aspects proposed by Emirbayer and Mische (1998). In their widely received article on the intertemporality of agency, Emirbayer and Mische (1998) view agency essentially as "temporally constructed engagement by actors of different structural environments (…) which (…) both reproduces and transforms those structures" (p.970). Agency is about filling time-specific, region-specific, and agent-specific "opportunity spaces" (Grillitsch & Sotarauta, 2020) and hence explains what may look like serendipity at first sight (Garud et al., 2010) by instead focusing on "mindful deviation" by agents (Garud & Karnøe, 2001).

When addressing agency in path development along Emirbayer and Mische's (1998) intertemporal conceptualization, the role of discourse (Battilana et al., 2009; Beer et al., 2021; Hardy & Maguire, 2017; Hindess, 1986; Lawrence & Phillips, 2004; Lawrence & Suddaby, 2006; Moulaert et al., 2016; Zilber, 2006, 2009) in its various temporal expressions needs to be considered. Imaginaries that include backward-looking narratives and forward-looking visions or expectations are important for understanding what motivates agency (Battilana et al., 2009; Beer

et al., 2021; Benner, 2020, 2021a; Borup et al., 2006; Emirbayer & Mische, 1998; Garud & Karnøe, 2001; Garud et al., 2010; Hassink et al., 2019; Miörner, 2020; Sotarauta, 2018; Steen, 2016; Stephen & Sandberg, 2020).

Recently the path development literature has generated different typologies of agency. The influential "trinity of change agency" proposed by Grillitsch and Sotarauta (2020) includes innovative entrepreneurship (Shane & Venkataraman, 2000), institutional entrepreneurship (Battilana et al., 2009; DiMaggio, 1988; Hardy & Maguire, 2017), and place-based agency (Bailey et al., 2010; Collinge et al., 2010; Sotarauta, 2018; Sotarauta et al., 2017). Drawing on Coe and Jordhus-Lier (2011) and similar to Hays (1994), Grillitsch and Sotarauta (2020) distinguish between transformative change agency and reproductive agency (see also Emirbayer & Mische, 1998; Giddens, 1984; Kurikka & Grillitsch, 2000). While reproductive agency can consolidate pathways through stabilization and incremental change (Bækkelund, 2021; Baumgartinger-Seiringer et al., 2021; Grillitsch et al., 2021b), when understood as maintenance agency it can aim at resistance to change and stasis (Baumgartinger-Seiringer, 2021; Boschma et al., 2017; Henderson, 2020; Jolly et al., 2020), although both terms tend to be used interchangeably and inconsistently in the literature. Hence, it makes sense to summarize both forms of non-transformative agency as stability agency (Benner, 2021c). Bækkelund (2021) further differentiates reproductive agency by complementing the trinity of change agency with three analogous but stabilizing forms of agency (replicative entrepreneurship, institutional work[1], and maintenance leadership), and Bellandi et al. (2021) focus specifically on negative effects of place leadership aimed at resistance. Despite these various categories, different types of agency can work in combination (Baumgartinger-Seiringer, 2021; Bækkelund, 2021; Grillitsch & Sotarauta, 2020; Grillitsch et al., 2021c). In an institutionalist perspective, the broader notion of institutional work (Lawrence & Suddaby, 2006; Lawrence et al., 2009) has informed path development contributions (e.g., Fuenfschilling & Truffer, 2016; Jolly et al., 2020).

In an attempt at conceptualizing the systemic role of agency in regional industrial path development which has been called for notably by Martin and Sunley (2006) and based on the distinction between actor-based and system-based approaches (Isaksen and Jakobsen, 2017; Isaksen et al., 2018), Isaksen et al. (2019) and Hassink et al. (2019) proposed a dichotomy that

[1] Since Lawrence and Suddaby's (2006) original concept of institutional work is broader, a more precise term would be institutional maintenance.

distinguishes between firm-level agency and system-level agency. This dichotomy can be seen as a reaction to a critique on the earlier firm-centered approach of evolutionary economic geography (e.g., Baumgartinger-Seiringer et al., 2021; Dawley, 2014; Hassink et al., 2019; Isaksen et al., 2019; MacKinnon et al., 2019; Miörner & Trippl, 2019; Simmie, 2012; Steen, 2016) and to Martin and Sunley's (2006, p.426) call that "it is not just strategic agency among entrepreneurs that is important in path creation", highlighting the role of policymakers (see also Dawley, 2014; Edler & James, 2015; Flanagan et al., 2011; Miörner & Trippl, 2017; Uyarra et al., 2017). Drawing on Isaksen et al. (2019), Trippl et al. (2020, p.194) define firm-level agency as "actors who found new firms or introduce innovative activities within existing companies" (see also Shane & Venkataraman, 2000) while system-level agency is exerted by "actors who transform innovation systems", thus using an agent-centric distinction (see also Grillitsch et al., 2021a; Stephens & Sandberg, 2020). Although firm-level agency does not only refer to "firms" as such but includes individuals engaged in firm-level actions such as setting up startup firms (Grillitsch et al., 2021a; Isaksen et al., 2019), the definition of both types of agency appears to center on the types of agents that exert them. While Jolly et al. (2020) criticize such an agent-centric distinction (see also Miörner & Trippl, 2017), Isaksen et al. (2019) apply a more action-centric definition by relating firm-level agency to innovation in firms or the setup of new firms while system-level agency refers to "actions or interventions able to transform regional innovation systems" (p.52). Similarly, according to Hassink et al. (2019, p.1638) "firm-level agency has its main field of influence within one firm or organization, while system-level agency exerts influences outside its institutional and organizational borders." System-level agency relates to Garud and Karnøe's (2003) notion of "distributed agency" that requires a variety of agents to work together and to combine both levels and different types of agency in path development or transformation (Baumgartinger-Seiringer et al., 2021; Grillitsch & Sotarauta, 2020; Hassink et al., 2019; Isaksen & Jakobsen, 2017; Isaksen et al., 2018; 2019; Musiolik et al., 2020; Nilsen & Njøs, 2021; Rekers & Stihl, 2021; Simmie, 2012; Sotarauta & Beer, 2021; Sotarauta et al., 2017, 2021; Trippl et al., 2020; see also Boschma et al., 2017; Sewell, 1993). Firm-level agency and system-level agency are based on different motivations. Isaksen et al. (2019) argue that while firm-level agency is aimed at a firm's competitiveness and thus has a commercial focus, it can exert system-level influence such as on a regional economy's institutional context (see also Benner, 2021a, 2021b; Grillitsch & Sotarauta, 2020; Jolly et al., 2020; Pacheco et al., 2010).

The firm-level/system-level dichotomy has become influential in the path development literature. To name just a few examples, Trippl et al. (2020) use it to classify agency patterns initiating green path development (see also Nilsen & Njøs, 2021), Rypestøl et al. (2021) draw on it in their analysis of cluster evolution, Grillitsch et al. (2021a) combine it with the trinity of change agency, and Stephens and Sandberg (2020) discuss the role of system-level agency in cluster emergence and propose a classification of practices of system-level agency in clustering.

Other contributions propose more elaborate agent-centric categorizations. For example, Huggins and Thompson (2019) distinguish entrepreneurial, political, and labor agency as forms of agency relevant to urban and regional development and link each of them to specific groups of agents such as entrepreneurs, investors, political leaders, or workers. Sotarauta et al. (2021) identify seven different roles of agency in path development, describe the patterns of agency associated with these roles, and acknowledge overlaps between these roles.[2]

This brief review of the various typologies of agency used in the path development literature suggests that we are still lacking a clear and nuanced understanding of the range of agency patterns that can systemically affect the evolution of regional economies. The next section presents a critique of these typologies by focusing particularly on the weaknesses of the present conceptualization of system-level agency, suggesting that one or two-dimensional conceptualizations are not sufficient to capture the intricacies of agency in path development.

Conceptual limitations of agency in path development

Both the trinity of change agency and the firm-level/system-level agency dichotomy are one-dimensional conceptualizations which makes it difficult for them to capture the complexity of agency in path development in a satisfying way. The notion of system-level agency when defined in contrast to firm-level agency serves as an example to highlight some major limitations of the state of research on agency in path development. First, due to since the interdependence between both types of agency (Trippl et al., 2020) it is almost impossible to determine on the outset which kind of change will remain limited to the firm level and which will extend to the system level which makes the distinction fluid, except when focusing a strictly agent-centric definition. The latter seems problematic because agents may be located at the firm level and still drive system-

[2] However, roles can differ from agents (Flanagan et al., 2011).

level change (Baumgartinger-Seiringer, 2021; Rypestøl et al., 2021) while even agents on the systems level can have firm-level interests.[3] Second, entrepreneurship and innovation are not limited to what happens in "firms" but also in other (often hybrid) organizations that act in a similar way as firms such as non-profit organizations or public service providers whose motivations mix commercial and common-good considerations such as museums, private universities, or non-governmental organizations (see also Edquist, 1997; Trippl et al., 2020). Third, what the system level refers to remains unclear: does the "system" refer to (i) an industry or sector, (ii) a regional economy, (iii), a regionalized industry, or (iv) a technological field? While the original concept exhibits a focus on regional innovation systems (Isaksen & Jakobsen, 2017; Isaksen et al., 2018; 2019; Nilsen & Njøs, 2021), what role do other systemic concepts such as sectoral (Breschi & Malerba, 1997), technological (Bergek et al., 2008), national (Lundvall, 1992a, 1992b; Nelson & Rosenberg, 1993), or global innovation systems (Binz & Truffer, 2017) play, and how do territorial and sectoral aspects (Benner, 2021b; Binz & Truffer, 2017; Nilsen & Njøs, 2021, Smith, 2013) of a system relate to each other? Fourth, how precisely do agents shape the "system" and its components, and how can the way they do so be understood systematically?

Departing from the firm-level/system-level dichotomy, more complex agent-centric typologies such as Huggins and Thompson's (2019) categories or the roles framework proposed by Sotarauta et al. (2021) raises similar but even more complex questions than distinguishing between firm-level and system-level agents. While Jolly et al. (2020) criticize equating agent types with agency types (see also Baumgartinger-Seiringer, 2021; Miörner & Trippl, 2017) and distinguish between both dimensions, these are still insufficient to capture the wide range of agency patterns relevant for path development. The underlying trinity of change agency and the analogous trinity of reproductive agency (Bækkelund, 2021) raise further questions. How do these types of agency differ between agents? Are their outcomes always beneficial for path development or what are the corresponding forms of agency whose outcomes can be detrimental (see also Sotarauta & Beer, 2021)? Do they differ in how they relate to structure, e.g., whether they focus at creating or destroying structures such as institutions (Lawrence & Suddaby, 2006; Lawrence et al., 2009)? Further, the analytical distinction between institutional entrepreneurship

[3] For example, municipalities can support economic development on the system level but at the same time own public companies (e.g., utilities) that take entrepreneurial, firm-level action.

and place leadership leaves open how precisely they differ.[4] While Kurikka and Grillitsch (2020) place collective interests place leadership pursues in contrast to individual interests ascribed to institutional entrepreneurs,[5] why could institutional entrepreneurship not follow collective interests? Indeed, place leadership will often be institutional but what other forms of place leadership are not "institutional", i.e., do not somehow affect institutions?[6] The answer to the latter question depends critically on how we define institutions which is subject to an ongoing debate (e.g., Bathelt & Glückler, 2014; Hodgson, 2006; Jepperson, 1991; North, 1990). For example, are organizations understood as institutions or different from them (Bathelt & Glückler, 2014; Glückler & Bathelt, 2017; Hodgson, 2006; North, 1990; Zukauskaite et al., 2017)? Are explicit rules understood as institutions or are they something different or "not yet institutions" (Bathelt & Glückler, 2014, p.346; see also Hodgson, 2006)?

While there are contributions that address the interplay between institutions and agency in path development (e.g., Rekers & Stihl, 2021), this literature often remains vague on the exact nature of institutions.[7] In particular, institutions are rarely defined which makes them a diffuse category that mixes laws, informal rules, governance structures, policies, networks, and organizations (Bathelt & Glückler, 2014; Edquist, 1997, 2006; Zukauskaite et al., 2017). Often, path development studies almost ignore or superficially engage with the rich literature in institutional economic geography, institutional economics, and neo-institutional sociology that has sought to provide more clarity on what institutions are (e.g., Bathelt & Glückler, 2014; Gertler, 2010; Glückler et al., 2020; Hodgson, 2006; Jepperson, 1991; North, 1990; Rodríguez-Pose, 2013; Scott, 2014; Williamson, 2000). Hence, a major weakness of the path development literature so far is that it risks treating the role of institutions as an explanation of last resort for any phenomenon that cannot be explained otherwise (Bathelt & Glückler, 2014), and therefore often fails to provide convincing and rigorous accounts of how agency and institutions are linked both

[4] Similar questions by analogy apply to Bækkelund's (2021) distinction between institutional work (or, more precisely, institutional maintenance) and place maintenance.

[5] Nevertheless, in their empirical study Kurikka and Grillitsch (2020) find overlaps between innovative entrepreneurship, institutional entrepreneurship, and place-based leadership.

[6] Sotarauta et al. (2021, p.96) introduce the notion of "institutional leadership" and acknowledge an overlap between institutional leadership, institutional entrepreneurship, and place leadership which raises further questions on how these concepts can be properly distinguished.

[7] For a notable exception, see Zukauskaite et al. (2017).

statically and dynamically. In particular, which institutions precisely are affected by what forms of agency exerted by which agents is rarely redrawn with sufficient rigor in economic geography, although the empirical neo-institutional literature provides examples for doing so (e.g., Greenwood & Suddaby, 2006; Lawrence & Phillips, 2004; Rao et al., 2003; Zilber, 2009), albeit usually not in a perspective of regional development. Instead, case studies often seem to assume that actions affect "institutions" instead of showing which ones and how. Similarly, presence of institutional entrepreneurship is often assumed instead of explaining which institutions precisely are modified by these entrepreneurs. Accordingly, the role of institutions in regional development is still not properly understood due to crucial gaps (Rodríguez-Pose, 2020).

Resorting to more or less observable practices (Jones & Murphy, 2010) does not solve the problem. While structuration theory (Giddens, 1984) regards practices as a link between agency and structure (see also Emirbayer & Mische, 1998; Hays, 1994; Hodgson, 2006; Lawrence & Suddaby, 2006; Seo & Creed, 2003; Sewell, 1993; Stephens & Sandberg, 2020), practices are not sufficient for institutionalization. Following a working definition of institutions[8] that sees institutions as "templates for action" (Lawrence et al., 2009, p.7), institutions overlap but are not identical with practices because institutions build on an aspect of legitimacy (Bathelt & Glückler, 2014; Benner, 2021b; Bergek et al., 2008; Glückler & Bathelt, 2017; Glückler et al., 2020; Lawrence & Suddaby, 2006; Rao et al., 2003; Scott, 2014; Seo & Creed, 2002; Smith, 2013). As "stabilized, routinized, or improvised social actions that constitute and reproduce economic space" (Jones & Murphy, 2010, p.367), practices can exist without being widely seen as legitimate while institutions can exist without being practiced (Hodgson, 2006). Hence, practices can shape institutional structure but do not necessarily do so. Hence, distinguishing patterns of industrial and institutional evolution is important because system-level agency can apply to either of them and affect their co-evolutionary relationship (Benner, 2021b; Gong & Hassink, 2019).

The constraints of the conceptualizations of agency in regional industrial path development discussed so far suggest a need for a broader, more nuanced, and multidimensional framework for system-level agency. The types of agency most relevant for path development are those that unfold a systemic impact, as opposed to those that exert an impact largely limited to organizations themselves (Hassink et al., 2019; Isaksen et al., 2019). Systemic forms of agency

[8] This definition draws on Benner (2021b).

can take a wide variety of shades along various angles on different spatial scales (Benner, 2021b; Binz & Truffer, 2017; Gong & Hassink, 2019; Hassink et al., 2019). Hence and summing up, a nuanced conceptualization of system-level agency in path development needs to be based on a clear understanding of the "system", its functions, and its scales, and capture a multitude of different types of agency beyond the existing categories and based on a more clarity on fundamental concepts such as institutions and their role.

Towards a nuanced conceptualization of system-level agency

Based on the conceptual limitations of current conceptualizations, establishing a more nuanced framework for system-level agency requires three steps. First, what constitutes a "system" needs to be established, drawing on the innovation systems literature. Second, the multiple shades of system-level agency need to be captured through several angles based on a clear understanding of fundamental concepts. Third, combining these perspectives yields a multidimensional framework that focuses attention on the variegated ways agency can shape path development in a multiscalar and system.

Characterizing the "system"

To conceptualize the role of agency in affecting the system in which path development unfolds, a clear understanding of what constitutes both this "system" and paths is needed. Binz et al. (2016, p.177) define a path as "a set of functionally related firms and supportive actors and institutions that are established and legitimized beyond emergence". Such a path can be traced in a territorial or sectoral dimension (Benner, 2021b; Binz & Truffer, 2017; Nilsen & Njøs, 2021; Smith, 2013). Hence, these dimensions give an indication of how the wider system that hosts a path can be defined. The different streams of the innovation systems literature provide some indications of the multiple meanings of a system.

According to Edquist (1997, 2004, 2006), the innovation systems literature highlights the interactive, interdependent, and institutionally embedded nature of evolutionary innovation and learning processes. An innovation system consists of organizations, institutions, and their relations that together generate innovation (Edquist, 2006). In their review of innovation system concepts, Warnke et el. (2016) add new elements commonly not in the focus of the innovation systems literature such as the role of consumers, philanthropy, non-technical innovation, or

sectors that do not strongly rely on research and development, thus widening the coverage of an innovation system and adding complexity.

Innovation systems can be defined in a territorial dimension, either on the national (Nelson & Rosenberg, 1993; Lundvall, 1992a, 1992b) or on the regional level (Asheim & Isaksen, 2002; Cooke et al. 1997; Tödtling & Trippl, 2005). Further, sectoral innovation systems have been proposed (Breschi & Malerba, 1997; Malerba, 2002), as have technological innovation systems (Bergek et al., 2008) that differ from a strictly sectoral perspective because sectors can include several technologies and technologies can span multiple sectors (Bergek et al., 2008; Edquist, 1997; Hekkert et al., 2007; Malerba, 2002).[9] These dimensions are well compatible. Hence, Nilsen and Njøs (2021) link sectoral and territorial aspects and Binz and Truffer (2017) combine a territorial logic on various scales with a sectoral or technological logic in the multiscalar notion of global innovation systems.

Hekkert et al. (2007) criticize static and deterministic tendencies in the established innovation system concepts and propose a focus for agency along activities conceptualized as "system functions". On a related note, Edquist (2004, 2006) identifies activities that shape an innovation system such as setting up organizations, changing institutions, networking, or providing education and research. Bergek et al. (2008) summarize seven systems functions as follows. According to them, *knowledge development and diffusion* is the traditional core focus of the innovation systems literature (Edquist, 2004, 2006; Tödtling & Trippl, 2005) but is extended by *entrepreneurial experimentation*. The *direction of search* includes, for example, visions and perceptions. *Market formation* refers to the demand side and is related to *legitimation* in terms of acceptance and institutional embeddedness. *Resource mobilization* addresses the mobilization of capital and other resources needed. Lastly, *positive externalities* can support growth of a path in an innovation system (Bergek et al., 2008).

System functions are interrelated and can reinforce each other which puts agency in setting in motion processes of systemic change to the fore (Bergek et al., 2008; Hekkert et al., 2007). For example, Binz et al. (2016) build on the functions of a technological innovation system (TIS) by viewing them as levers for distributed agency in path development. Miörner and Trippl (2019) describe how agents develop functions in a regional innovation system and how they access and

[9] I am grateful to Michaela Trippl for drawing my attention to this difference.

transplant functions from other places in processes of path transformation. Fuenfschilling and Truffer (2016) relate forms of institutional work to functions. System functions are shaped by agency in particular when "system builders identify systemic problems (e.g. deficits in TIS functions) and initiate activities towards their solution" (Musiolik et al., 2020, p.4) which can be understood as an expression of system-level agency (Isaksen et al., 2019). However, the increasing complexity of the innovation systems concept renders simplistic relationships between system functions and agency futile since agents can affect functions in multifaceted ways (Warnke et al., 2016). Rather, system functions can be understood as a dimension in a multidimensional conceptualization that encompasses the multiple forms of system-level agency.

The system provides the arena for contested agentic processes (Bergek et al., 2008; DiMaggio, 1988; Hindess, 1986; Seo & Creed, 2002; Sewell, 1993; Sotarauta et al., 2021) in which individuals and organizations act relationally (Bathelt & Glückler, 2003; Sotarauta & Beer, 2021), and how a path within the system develops is an outcome of these processes. System-level agency can be understood as those agency patterns that affect path development within a system described by a system functions dimension, a multiscalarity dimension representing the territorial logic, and a sectoral-technological dimension. These agency patterns share an ability to affect path development beyond what happens in and for individual organizations such as firms (Hassink et al., 2019; Isaksen et al., 2019). Hence, despite their variety, the many shades of system-level agency share characteristics of distributed and embedded agency (Battilana et al., 2009; Garud & Karnøe, 2003; Hardy & Maguire, 2017; Seo & Creed, 2002) that goes beyond idiosyncratic stories of individual heroes (Garud et al., 2010; Hardy & Maguire, 2017; Sotarauta et al., 2017, 2021).

Angles of system-level agency

Based on literature from neo-institutionalism, institutional economic geography, and the literatures on path development and regional innovation systems, the multiple patterns of system-level agency can be characterized along the following angles:

1. *Aim:* agency can aim at either change or stability (Hays, 1994), represented by change agency (Grillitsch & Sotarauta, 2020) and stability agency (Benner, 2021c), respectively, with the latter including forms purposive maintenance and reproductive agency (Bækkelund, 2021; Henderson, 2020; Jolly et al., 2020). Change agency is usually

proactive in seizing available opportunity spaces (Grillitsch & Sotarauta, 2020) while stability agency is often limited to reactively keeping the status quo (Isaksen et al., 2019). Schmidt and Uriely's (2019) case study of community-based desert tourism in Israel's Mitzpe Ramon provides an example for multiple transformative forms of change agency by newcomers settling in the town, setting up ecotourism businesses, and changing the landscape of municipal politics. While change agency may appear more exciting, stability agency has recently attracted increased empirical attention (e.g., Bækkelund, 2021; Henderson, 2020) though earlier institutionalist research such as Zilber's (2009) study of an Israeli rape crisis center has addressed stability maintenance. Despite the analytical contrast between both aims, change agency and stability agency can coexist (Baumgartinger-Seiringer, 2021; Benner, 2021c; Fuenfschilling & Truffer, 2016). However, outcomes need to be separated from aims since change is not automatically good for path development (Grillitsch & Sotarauta, 2020) while stability is not necessarily bad (see also Baumgartinger-Seiringer, 2021).

2. *Imaginary:* this angle refers to how agents interpret the past and envision the future, thus relating to Emirbayer and Mische's (1998) past and future-oriented aspects of agency (Battilana et al., 2009; Beer et al., 2021; Benner, 2021a; Borup et al., 2006; Hassink et al., 2019; Miörner, 2020; Moulaert et al., 2016; Sotarauta, 2018; Steen, 2016). If imaginaries are defined as including backward-looking narratives and forward-looking visions (Benner, 2021a), this angle ranges between a "persistent trajectory" with a vision that carries on an existing narrative or a "disruptive trajectory" towards a vision that radically breaks with the past (Benner, 2020, p.166; 2021a; see also Sotarauta et al., 2021). Bergek et al. (2008) mention the role of visions in the direction of search and Sotarauta et al. (2021) highlight the importance of an imagined future (e.g., Steen, 2016; Stephens & Sandberg, 2020) by discussing the role of imaginaries and visions, visionaries, and "vision brokers" in contested processes of green path development. For example, Zilber analyzes the societal base of imaginaries or "myths" in the Israeli high-tech industry (2006) and the role of narratives in institutional maintenance (2009). Drori and Landau (2011) sketch the agent-driven evolution of visions in an Israeli research institute under commercialization pressure. Accordingly, instead of being reified, imaginaries are better seen as tools for agents, given that "it is not the visions that differentiate the regions from

each other but the capacity to mobilise and coordinate collective action to execute them" (Sotarauta et al., 2021, p.107; see also Sotarauta, 2018; Sotarauta & Beer, 2021).

3. *Impact:* actions can be constructive or destructive in relation to structures (Benner, 2021c; Fuenfschilling and Truffer, 2016; Kivimaa & Kern, 2016; Lawrence & Suddaby, 2006; Lawrence et al., 2009; see also Baumgartinger-Seiringer et al., 2021; Frangenheim et al., 2020; Trippl et al., 2020). For instance, agents can engage in institutional work that creates new institutions or that destroys existing ones (Lawrence & Suddaby, 2006; Lawrence et al., 2009). Destruction can be beneficial though as path development often does not require constructive action alone but can also rely on agency that focuses on destroying existing institutions, policies, or other structures (Fuenfschilling and Truffer, 2016; Kivimaa & Kern, 2016).

4. *Outcome:* agency in path development can lead to the ultimate outcomes of growth or decline of regional industries, with the latter possibly resulting from a prolonged period of lock-in (Grabher, 1993; Hassink, 2010) or competitive inter-path relationships that negatively affect other paths (Frangenheim et al, 2020; Hassink et al., 2019). While the path development literature has primarily focused on positive path development driven by growth (Grillitsch et al., 2018; Isaksen et al., 2018, 2019; Martin & Sunley, 2006; Tödtling & Trippl, 2013), decline as an outcome of path development has recently gained attention (Blažek et al., 2020). For example, the downgrading of international tourism in Israel's Eilat during the 1990s (Mansfeld, 2001) provides an example for negative path development related to maintenance agency (Benner, 2021c). The outcome of agency needs to be distinguished from the impact since a destructive impact can contribute to positive path development by breaking resistance to change (Bækkelund, 2021; Boschma et al., 2017; Fuenfschilling and Truffer, 2016; Kivimaa & Kern, 2016). Further, when discussing place leadership Sotarauta and Beer (2021, p.5) refer to "toxic leadership" practices (see also Huggins and Thompson, 2019) but also stress the lack of a deterministic relationship even between "good" place leadership and positive outcomes.

5. *Coevolution:* agency can address industrial or institutional dynamics of regional economies which are distinct but interrelated (Benner, 2021b; Gong & Hassink, 2019). Both can be seen as the structure of an economy, with the industrial part covering the economic structural composition of a region with its firms, industries, and clusters while

the institutional part includes institutions (Benner, 2021b; Gong & Hassink, 2019), with the latter understood as "templates for action" (Lawrence et al., 2009, p.7). Coevolution is understood as a process of "reciprocal (bidirectional) causal mechanisms" (Murmann, 2013, p.60) that bind both dynamics together in way that makes them difficult to separate (Benner, 2021b; Gong & Hassink, 2019; Murmann, 2013; Nelson, 1998). Agency can provide an impulse for coevolution that starts in industrial dynamics and spills over to industrial dynamics or *vice versa*. For example, Israel's innovation policy during the 1990s that anchored a venture capital and incubation model of startup support can be seen as institutionally-oriented agency that drove coevolution with industrial change (Avnimelech & Teubal, 2004, 2006; Wonglimpiyarat, 2016).[10]

6. *Immediacy:* agency can relate to specific outcomes either directly or indirectly (Grillitsch et al., 2021a, 2021b; Warnke et al., 2016). In particular, institutional entrepreneurship can happen as a by-product of new business models or technological innovation and thus indirectly (Battilana et al., 2009; Bækkelund 2021; Benner, 2021a, 2021b; Garud and Karnøe 2001; Grillitsch and Sotarauta 2020; Jolly et al., 2020). Accordingly, Battilana et al. (2009) consider irrelevant "whether the initial intent was to change the institutional environment" (p.72). Schmidt and Uriely's (2019) case of Mitzpe Ramon provides an example for indirect agency in path development with Orthodox Jewish newcomers whose primary intention to move there was religious contributing to the development of community-based desert tourism.

7. *Rationality:* given that agents' actions can follow varying rationalities that are not predetermined by the agent's identity (Hindess, 1986), agency can be distinguished along the two poles of a commercial (in the sense of for-profit or capitalist) rationality and a non-commercial (non-profit, non-capitalist) one (Edquist, 1997; Grillitsch & Sotarauta, 2020; Pacheco et al., 2010; Warnke et al., 2016). For example, Shilon et al. (2021) discuss the role of a non-profit organization in supporting high-technology entrepreneurship among Israel's Arab minority. A commercial rationality aims at "the discovery and exploitation of profitable opportunities" (Shane & Venkataraman, 2000, p.217) and goes hand in hand with individual interests while a non-commercial rationality can (but does

[10] On the venture capital model as an institution see Saxenian and Sabel (2008).

not have to) involve collective action or combine both individual and collective interests (see also Grillitsch & Sotarauta, 2020; Kurikka & Grillitsch, 2020). A public-choice perspective suggests that regional policymaking is not necessarily driven by collective interests only but can serve the individual interests of policymakers or bureaucrats (Kiese & Wrobel, 2011). Rationalities include many shades between these two poles as agents can have mixed rationalities that enable actions combining commercial and non-commercial rationalities (Bækkelund, 2021; Battilana et al., 2009; Benner, 2021a, 2021b; Grillitsch & Sotarauta, 2020; Grillitsch et al., 2021a, 2021c; Sotarauta et al., 2021). For example, non-profit organizations or organizations with mixed objectives may still compete commercially on markets, as Israel's *kibbutzim* and their tourism offers show (Fleischer & Pizam, 1997).

8. *Temporality:* given that temporality is an essential feature of agency (Borup et al., 2006; Emirbayer & Mische, 1998; Steen, 2016), agency patterns can be classified along a continuum between long-term and short-term outlooks. Grillitsch et al. (2021b) discuss the temporality of different forms of agency and hold that change agency often follows a more long-term horizon of agents than will reproductive (or maintenance) agency. However, there is nothing automatic about long-term change agency and short-term stability agency. For example, innovative entrepreneurship in highly dynamic technological industries or in developing countries can be rapid, flexible, and often focused on short-term opportunities (Radjou et al., 2012). The model of venture capital-backed startups in the Israeli high-tech scene often aimed at entrepreneurial exit (Avnimelech & Teubal, 2004, 2006; Wonglimpiyarat, 2016) provides another example of highly transformative agency with a rather short-term outlook. In contrast, in industries characterized by a low degree of change or in parts of the public sector (e.g., Henderson, 2020), stability agency can follow a long-term horizon, underpinned by notions such as "bricolage" (Garud & Karnøe, 2003) or "tinkering" against a backdrop of long-term commitments (Glückler et al., 2020) that draw to a considerable degree on reproductive agency.

9. *Agent:* agency in path development can be exerted by individuals and organizations (Battilana et al., 2009; Hardy & Maguire, 2017; Mele, 2013; Moulaert et al., 2016; Wu, 2021), with the latter including firms, associations, government agencies, universities,

research institutes, and other formalized entities (Bergek et al., 2008; Hindess, 1986; Malerba, 2002; Simmie, 2012). Individuals do not need to have a formal position to exert specific forms of agency (Sotarauta & Beer, 2021; Sotarauta et al., 2017; see also Bækkelund, 2021; Grillitsch & Sotarauta, 2020). Notable examples for role of individuals in exerting systemic agency include the British investor behind the Iberotel and Isrotel hotel chains who introduced international-style mass tourism hotels to Israel's Eilat (Mansfeld, 2001) that led to path importation (Benner, 2021c) or the national minister of commerce and industry widely credited with shaping Israel's industrialization from the mid-1950s to the mid-1960s (Gradus et al., 1993). Another example is how a younger generation of Israeli mayors began taking a more active role in economic development since the 1970s (Gradus et al., 1993; Razin, 1990). However, these accounts tend to be anecdotal by implying the role of these key people is a form of serendipity by having the right person in the right place at the right time (Garud et al., 2010) or, according to Lawrence et al. (2009), by ascribing a "hypermuscular" (p.1) or "heroic" (p.3) role to them which is a common criticism towards institutional entrepreneurship studies (Battilana et al., 2009; Garud et al., 2010; Hardy & Maguire, 2017; Sotarauta et al., 2017, 2021). The role of migrant entrepreneurs in Tel Aviv's startup landscape (Schäfer & Henn, 2018) offers a more systematic example for the agency of individuals.

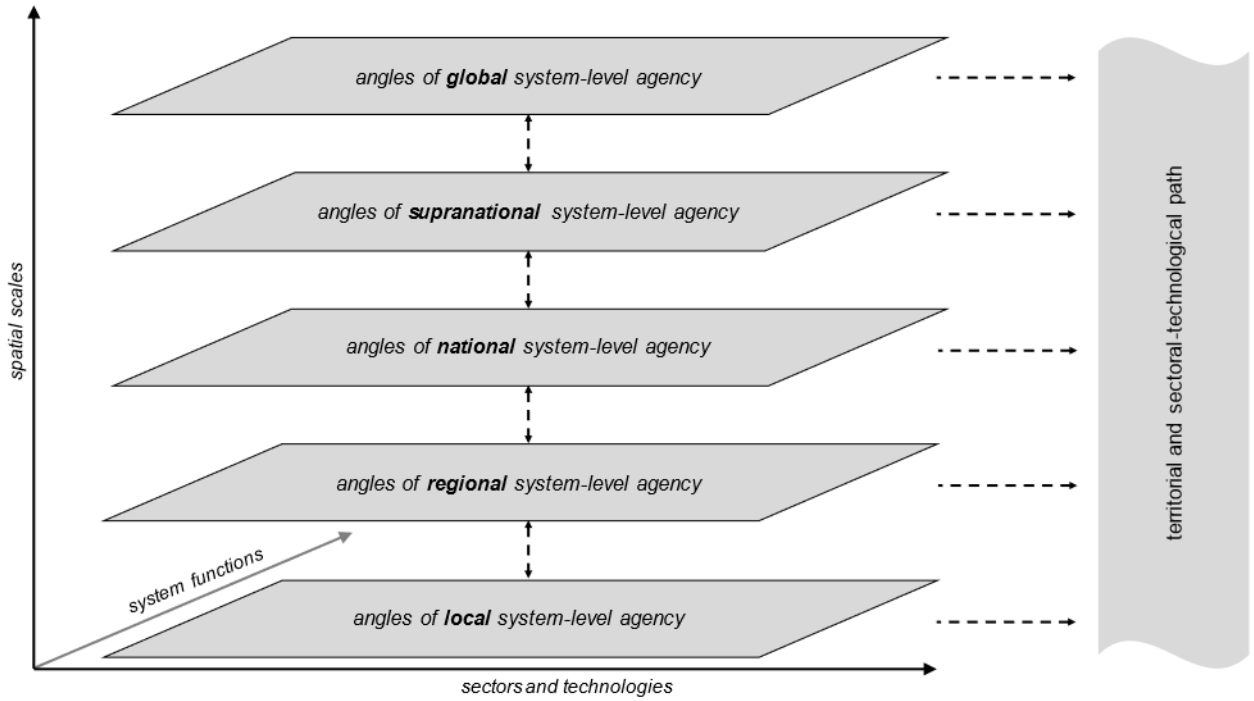
While according agency to individuals is fairly straightforward, the agency of organizations (see also Musiolik et al., 2020) hinges on whether they are seen, in North's (1990, p.4) words, as "rules" (hence, institutions) or as "players" in their own right (for a critique see Hodgson, 2006). If organizations are seen as distinct from institutions, they are capable of exerting agency in complex ways affected by the agency of individuals but also according to their own organizational objectives and strategies (Bathelt & Glückler, 2014; Edquist, 2004, 2006; Gertler, 2010; Grillitsch & Sotarauta, 2020; Hindess, 1986; Malerba, 2002; North, 1990; Zukauskaite et al., 2017). The examples of political parties, trade unions, or lobby groups and their campaigns or other forms of collective action (Coe & Jordhus-Lier, 2011; Huggins and Thompson, 2019; Rypestøl et al., 2021; Warnke et al., 2016) suggest that the strategies organizations pursue and the decisions they take represent agency that is to some degree independent of the agency of individuals (Bathelt & Glückler, 2014; Gertler, 2010; Greenwood & Suddaby, 2006; Grillitsch et al., 2021a;

Hindess, 1986; North, 1990). Israel's Office of the Chief Scientist provides an example of a governmental organization whose actions were highly influential in the country's innovation policy (Avnimelech & Teubal, 2004; Breznitz & Ornston, 2013; Wonglimpiyarat, 2016). However, it is important to note that conceptualizing organizations as agents is an abstraction from their inner dynamics (Hodgson, 2006).

A multiscalar framework for system-level agency

Agency for path development along all angles is multiscalar (Edquist, 2006; Gertler, 2010; Grillitsch et al., 2021c; Hassink et al., 2019; Martin & Sunley, 2006; MacKinnon et al., 2019; Miörner & Trippl, 2017; Wu, 2021; Zukauskaite et al., 2017). Inspired by existing multiscalar frameworks (Benner, 2021b; Binz & Truffer, 2017; Gong & Hassink, 2019), the framework for system-level agency in path development can be depicted on five scales (local, regional, national, supranational, global). Further, the innovation system functions described above help understand how patterns of agency, characterized along the angles, shape the system. Fig. 1 illustrates the framework for system-level agency which includes the system functions, multiscalarity on five spatial scales, and sectors/technologies as the main dimensions of the system. Combining sectors and technologies in one dimension is an analytical simplification that seems justified because the precise way technologies are adjusted and applied will often be sector-specific and for some sectors (e.g., hospitality), technological considerations will often be of lesser importance than other dynamics that shape the sector. The angles of agency define the concrete patterns of agency that shape path development in the multiscalar system along the three dimensions.

Fig. 1: Framework for system-level agency in path development



Source: author's elaboration drawing on Benner (2021b), Binz and Truffer (2017), Gong and Hassink (2019), and Hassink et al. (2019).

The path resulting from patterns of agency characterized by a specific profile along the angles in a particular configuration of scales, sectors and technologies, and system functions affected yields a path understood as a combination of spatial, sectoral, and technological features.

The case of Israel's tourism destination of Eilat described by Benner (2021a, 2021c) illustrates the multidimensionality of system-level agency. To benefit from increased international accessibility after Israel's air-traffic liberalization with the EU (Reich, 2015), a national hostel and tour operator entered the destination and introduced a model of small-scale, collaborative tourism in the region targeted at independent international tourists, building on the imaginary of Eilat as a crossroads between cultures and continents and between the sea and desert. While this example refers to one *sector* only, it highlights the territorial nature of agency on various *scales*. In terms of *system functions*, the national hostel and tour operator engaged in entrepreneurial experimentation, the imaginary that departed from established narratives of Eilat and the desert (Azaryahu, 2005; Zerubavel, 2019) affected the direction of search and supported legitimation of the emerging path, and supranational market liberalization and the national airline subsidization policy contributed to market formation. The firm's agency can be characterized as aimed at *direct*

and *constructive change* along a *disruptive* imaginary with a *commercial* rationality, simultaneous *industrial and institutional* coevolutionary dynamics, and a *long-term* temporality of introducing alternative tourism to Eilat (Benner, 2021a, 2021c).

Conclusions

This article offered a critical review of conceptualizations of agency in regional industrial path development. By summarizing the shortcomings of present conceptualizations, the article has proposed a more nuanced and multidimensional conceptualization of system-level agency. The angles proposed provide an analytical toolbox to examine the precise configuration of agency patterns in empirical settings and thus allow for a much more fine-grained perspective on the many shades of system-level agency that affect path development. Integrating system functions allows for focusing on the concrete mechanisms between agency and path development, and multiscalarity draws attention to connections between action on different scales.

While the discussion has referred to selected empirical studies with a particular focus on Israel, a country whose two-tier system of government outside the complex system of regional policies that characterizes the context for regional industrial path development in EU member states, provides an analytical magnifying glass for focusing on agentic processes, empirical work will be needed to apply and further refine the framework of system-level agency suggested here. The examples given show what multifaceted and diverse agency patterns can be found even in the single case of a small country with governance context of low complexity. Beyond the frequent focus on Nordic economies, empirical diversification into institutionally more complex contexts such as the transition economies in South East Europe (e.g., Lehmann et al., forthcoming) or Arab economies (e.g., Haddad & Benner, 2021) seems promising to reveal how agency patterns in path development there might differ from the common empirical cases known in evolutionary and institutional economic geography.

Another interesting avenue for further research is going beyond the agency of individuals and organizations by zooming in on the agency of individuals *in* organizations (e.g., Drori & Landau, 2011; Edler & James, 2015; see also Hodgson, 2006; Grillitsch et al., 2021a) and the resulting implications for system-level agency in path development. Here, integrating behavioral insights (e.g., Benner, 2020; Huggins & Thompson, 2019) could prove particularly useful.

This article has demonstrated that the patterns of agency that drive path development are multidimensional and can take many forms. While the space of possible combinations in the multidimensional framework is large and only a small part of this space will be relevant for any single empirical study, more research might elucidate whether any "typical" combinations can be identified as more important than others and whether any regularities that link these combinations to specific outcomes of path development can be found. In particular, a critical question is whether specific types of system-level agency marked by a particular combination of the angles lead to specific forms OF positive (e.g., Grillitsch et al., 2018) or negative path development (Blažek et al., 2020) or trigger path transformation (Baumgartinger-Seiringer et al., 2021; Miörner & Trippl, 2019). Further, it will be interesting to explore in more detail how particular shades of system-level agency characterized by specific constellations along the angles precisely affects path development and through which system functions. Answering these questions could significantly advance the path development literature and generate useful policy implications for different types of regions. To do so, the framework can be used in cross-sectional quantitative studies that could complement the largely qualitative, case-based research designs prevailing in path development studies and focus qualitative research on understanding *why* patterns revealed by quantitative methods occurred (Grillitsch et al., 2021c). Hence, the framework of system-level agency offers an opportunity for further methodological diversification that could help us understand better the many shades of agency that share a systemic impact on regional industrial path development but whose characteristics and outcomes differ widely.

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