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# Legitimation dynamics in industrial path development: new-to-the-world versus new-to-the-region industries

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## Abstract

While economic geography and regional studies have contributed deep insights into the knowledge-related determinants of industry emergence, our knowledge is limited concerning the societal embedding of new industries and the legitimacy that people confer to them. Based on a comparative case study in the potable water reuse industry in California, and the video games industry in Hamburg, this article explores the legitimation dynamics in regional industrial path development. We elaborate on how system building/reconfiguration and institutional work processes differ between industries that are new-to-the-world (potable water reuse) vs. new-to-the-region (video games). Our framework contributes to specifying the embedded agency that supports legitimation and thus path development in these two analytically distinct industry formation trajectories.

**Key words:** legitimation; industrial path development; new-to-the-world; new-to-the-region; institutional work

**JEL codes:** O3, Z1, R1

## 1. Introduction

Economic geography and regional studies show renewed interest in the question how new industries emerge in regions and how pre-existing regional capabilities, assets or knowledge stocks influence the likelihood of new industrial path development (Boschma, 2017; Isaksen and Trippl, 2016; Trippl et al., 2017). There is by now solid empirical evidence that regions are more likely to diversify into industries that are related to pre-existing capabilities or knowledge stocks (Boschma et al., 2017). Less work was devoted to the question how institutional structures influence path creation potentials and how actors might proactively alter these structures in order to make the new regional industrial paths socially acceptable (Boschma, 2017; Zukauskaite et al., 2017).

In particular, some conceptual confusion exists around the 'newness' of emerging industrial paths and the regional change processes that are needed to transform pre-existing institutional structures into a supportive environment (Hassink et al., 2019; Isaksen and Trippl, 2016; Trippl et al., 2018). We here take stock with a crucial lacking specification related to the question how the legitimation of 'new-to-the-world' vs. 'new-to-the-region' industries evolves in a dynamic process (Boschma et al., 2017).

Tackling this question is highly relevant, since legitimation dynamics influence whether resources can be mobilized for a new industrial path, whether demand is forming and whether the actors in the new industry acquire political influence (Battilana et al., 2009; Bergek et al., 2008b). Policy interventions aiming at creating new regional growth paths are also likely to fundamentally differ between industries that have already developed elsewhere and industries that have no predecessor in the social order (Battilana et al., 2009; Boschma et al., 2017; Rao, 2004). This paper addresses this gap by developing a conceptual framework that distinguishes the legitimation challenges for new-to-the-world vs. new-to-the-region industries. We argue that the 'liabilities of newness' and the related forms of system building/reconfiguration and institutional work needed to embed industries in regions differs systematically between the two cases. This argument is illustrated with a comparative case study of a new-to-the world industry (potable water reuse in California) and a new-to-the-region industry (video games in Hamburg). The legitimation dynamics in both cases are reconstructed from semi-structured interview campaigns and secondary data analysis.

Our argument is structured as follows: In section 2, we provide an overview of the literature on regional path development. We then draw on insights from neo-institutional sociology and transition studies to develop a conceptual framework on industry legitimation, which tackles issues concerning the 'newness' of industrial paths and the related system building/reconfiguration and institutional work processes. Sections 3 and 4 characterize our empirical cases and discuss in detail how the legitimation process differs between the two industries. Sections 5 and 6 juxtapose the defining characteristics of new-to-the-world vs. new-to-the-region legitimation dynamics and develop novel conceptual propositions on the sequencing of system building/reconfiguration and institutional work processes in both cases.

## 2. Legitimation dynamics in new-to-the-world vs. new-to-the-region industries: a conceptual framework

In recent years, the literature on regional industrial dynamics has increasingly been combined under the notion of 'industrial path development' (Isaksen and Trippl, 2016; Martin, 2010). The term 'path development' points out that firms and their internal production of routines, capabilities and knowledge cannot be explained without a deep understanding of their wider

'systemic' environment, containing supportive actors like the government, consultants, investors, universities, etc. (Binz et al., 2016b; Carvalho and Vale, 2018). Recently, it was increasingly argued that in order to develop a new industry in a region, not only 'production-side' system structures (related to technological capabilities, R&D infrastructures, vocational training, etc.) need to be considered, but equally importantly institutional dynamics, i.e. how new products, services and firms get embedded in - or actively change - the regulative, normative and cognitive 'rules of the game' (i.e. institutions) that exist in a given territory and/or sector (Battilana et al., 2009; Scott, 1995). Rather than addressing institutional change broadly, we here follow recent contributions from transition studies, which have used legitimation as a 'proxy-indicator' for assessing the complex institutional dynamics thet influence the embedding of a new industry in relevant structures (Bergek et al., 2008b; Markard et al., 2016).

## 2.1 Industry legitimation and system-level agency: key insights from the literature

Legitimacy is a foundational concept in social theory (Zelditch, 2001). The concept has been used to assess the creation, maintenance, and destruction of legitimacy for various social objects, ranging from global governance arrangements (Buchanan and Keohane, 2006) to organizations (Suchman, 1995), individuals (Johnson et al., 2006), or firms (Rao, 2004). Legitimacy is defined as a "generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995: 574). A social object's legitimacy thus directly depends on its consonance or conflict with relevant institutional structures.

More recently, scholars in transition studies and neo-institutional sociology have started to explicitly explore how emerging technologies and *industries* are construed as legitimate (Bergek et al., 2008b; Bork et al., 2015; Markard et al., 2016; Rao, 2004). This stream of thinking argues that an industry's legitimacy depends on how well its products, processes and services are aligned with the institutional order in a given sector or region (Markard et al., 2016). Since newly emerging industries generally suffer from the 'liability of newness' (Freeman et al., 1983), they are initially not aligned with pre-existing routines, norms and taken-for-granted ways of doing things and thus raise skepticism, misunderstandings or even outright opposition with the relevant audiences (Battilana et al., 2009). The actors trying to establish the new industry will thus be forced to either adapt the industry's features to existing social structures, or to proactively alter these structures in a way that they become more aligned with the emerging industrial path (Battilana et al., 2009; Markard et al., 2016).

Changing institutions is a highly complex task, which in most cases cannot be executed by single actors like an individual or firm. Institutional entrepreneurs (Battilana et al., 2009) that want to intervene in the institutional order rather have to build up a network of supportive actors, mobilize substantive resources and/or have formulated widely-shared visions and supportive narratives (Binz et al., 2016a; Fuenfschilling and Truffer, 2016; Gong, 2020; Lawrence et al., 2009). Put differently, they have to actively construct - or alter - supportive innovation system structures, which allow them to execute coordinated institutional interventions (Bergek et al., 2008a; Garud and Karnoe, 2003; Markard et al., 2016). Industry legitimacy is accordingly not an 'automatic' outcome of an industry's increasing market penetration or its success in raising financial investments, but rather results from embedded and distributed 'system-level' agency in which firm and non-firm actors create joint strategies for overcoming institutional barriers to the further development of the industrial path (Binz et al., 2016a; Gong, 2020; Isaksen et al., 2019; Markard et al., 2016).

System-level agency, which consists of both system building and system reconfiguration dynamics (see e.g. Binz et al. 2016b; Miorner and Trippl, 2019), plays a key role in both transition studies and path development literature. For transition studies, *system building* is at the core of interest. The key question here is how radically novel socio-technical systems develop and diffuse in locked-in sectors like energy, water or transportation. System building is seen as the process in which new technologies, actor networks & institutions co-evolve and ultimately form new socio-technical 'configurations that work', which can then scale up and challenge taken-for-granted sectorial regimes (Kemp et al., 1998). System building accordingly refers to processes like expanding the supportive actor base, creating intermediary organizations, or establishing focused research initiatives around new, potentially transformative industries (Bergek et al., 2008a; Kemp et al., 1998; Markard et al., 2016). Industry legitimation is explicitly part of the conceptual apparatus here, but transition studies have increasingly been criticized for being spatially rather naïve (Coenen et al., 2012).

Regional path development literature in turn considers system-level agency with a stronger focus on system reconfiguration processes in a broader set of sectors, for different regional path development trajectories and in regions with differing initial resource endowments (Martin, 2010; Miörner and Trippl, 2019). System reconfiguration, according to Miörner and Trippl (2019), refers to the multiscalar process of how regional innovation system elements are created or adapted to 1) target the build-up of innovation system functions (e.g., investment attraction, knowledge creation, market formation) regionally, 2) link up to system functions in other locations, and 3) transplant system functions from elsewhere. System reconfiguration happens when a local path is upgraded or transformed, or an industry is introduced to a region from elsewhere (i.e. path importation) (Grillitsch et al., 2018). While highly insightful, this literature has thus far primarily focused on the 'supply-side' aspects of supportive innovation system structures (knowledge spillover, financial support, R&D networks), whereas the issue of how to adjust the relevant institutional dynamics (market construction, adapting discourses and narratives to the legitimacy requirements of a local path) has received much less attention.

Overall, transition studies and the regional path development literature add to our knowledge on how system-level agency contributes to regional path development in a largely complementary way. In the next sections, we thus develop a conceptual framework that combines insights from both literatures for distinguishing the legitimacy-related system-building/reconfiguration and institutional work dynamics for two distinct path development processes. We follow Boschma et al. (2017) in labeling radically new industries "new-to-the-world" (NTW), and more mature ones as "new-to-the-region" (NTR) (for further elaboration see section 2.2). Two fundamental aspects will be further elaborated, namely, 1) The maturity and generic 'legitimation phase' an industry has achieved *globally* 2) The concrete forms of institutional work that actors may use when trying to embed an industry *regionally*.

## 2.2 Industry maturity and legitimation phases

Our conceptualization of an industry's maturity rests on a combination of industry lifecycle and legitimacy literatures. Seen from industry lifecycle theory, an industry can be classified as 'new-to-the-world' in its early development phases, i.e. before a dominant design/product architecture has emerged (Klepper, 1996; Vernon, 1966). In the early lifecycle stages, uncertainty is high, user needs are unclear, manufacturing volumes are low and small entrepreneurial firms compete with each other based on frequent product design innovation (Abernathy and Utterback, 1978). After a dominant design or product architecture has

emerged, manufacturing volumes increase, a shift from product innovation to process/subcomponent innovation happens; and firms increasingly try to reap economies of scale while decreasing input factor costs and increasing automation (Utterback and Abernathy, 1975).

Legitimacy literature provides a similar phase model for an industry's institutional embedding. Johnson et al. (2006) characterize legitimation as a non-linear, cumulative process going through four stages. In the first stage, an *innovation* (here: a new product/service and related industry) is created to address specific needs, challenges, or goals at the 'local' level (with local referring to either a spatial unit, a sub-section of an organization or even a small, specialized market segment).[1] After the innovation emerges, it needs to be institutionalized and validated with the relevant audience. *Local validation* can be realized either by actors' efforts to explicitly justify the link between the new products/industry and the pre-existing institutional environment. Or, the innovation may acquire local validation passively by not being explicitly challenged (Zelditch and Walker, 2003). After local validation, a new 'socio-technical template' or acceptable 'way of doing things' is born (Johnson et al., 2006). This template may then diffuse into other contexts to solve local problems (*diffusion*) (Walker, 2004). Over time, the innovation gains widespread acceptance, becoming part of society's shared culture, thus becoming *generally validated* (Johnson et al., 2006).

Combining these two perspectives, we posit that an industrial path is 'new-to-the-world' if the industry is still in an early lifecycle stage globally (no dominant design / product architecture has emerged), only locally validated, with limited spatial diffusion (or global diffusion that is restricted to small user segments), and depending on loosely institutionalized support structures. In that case, both the technological knowledge and first socio-technical templates have to be developed from scratch. In contrast, the industry would be considered as 'mature', if it has progressed into an advanced lifecycle stage globally (dominant design/architecture has emerged), successfully diffused to multiple regional contexts, and if it has developed deeply institutionalized support structures. The actors in a region trying to develop a path in such a case would thus depart from a different starting point, since knowledge, socio-technical templates, supportive narratives, etc. are already available and deeply institutionalized elsewhere. As a next step, we can now move on to characterize the concrete forms of institutional agency that will support industry legitimation in both cases.

## 2.3 Conceptualizing institutional agency as institutional work

Our particular focus on legitimation implies that we focus on a subset of the system-level agency that conditions an evolving path, namely the collective, strategic, yet often rather intangible and discursive practices actors employ for aligning regional and sectorial institutions, thus conferring legitimacy to the emerging industrial path (Binz et al., 2016a; Geels and Verhees, 2011; Heiberg et al., 2020; Markard et al., 2016). Relevant interventions may e.g. comprise the formulation of a new piece of regulation, changing normative associations through an image campaign or mimicking taken-for-granted cultural-cognitive schemas from related sectors. Other system resource formation processes that may also support industrial path development in a region, yet with more indirect effects on the

[1] Note that some industries exist (i.e. those based on digital platforms), that get legitimized at the global level from the beginning, but only within certain user groups (e.g., online banking, cryptocurrency, etc.).

institutional structure (like market formation, investment mobilization or knowledge creation) will in turn not be the focus here.

To further conceptualize the concrete practices actors may use to change institutional structures, transition studies and neo-institutional sociology have increasingly related to the concept of institutional work (Binz et al., 2016a; Fuenfschilling and Truffer, 2016). Lawrence and Suddaby (2006) provide a seminal summary of the forms of distributed and embedded agency that create, maintain and disrupt institutions (ibid, p.215). Creating new institutions incorporates strategic interventions like advocacy, defining, vesting, constructing identities, changing normative associations, constructing normative networks, mimicry, theorizing or educating (ibid, p.221). For maintaining existing institutions, actors need to engage with practices like enabling, policing, deterring, valorizing and demonizing, mythologizing, and/or embedding and routinizing (ibid, p.230). Finally, to disrupt existing institutions, actors may disconnect sanctions, disassociate moral foundations, or undermine taken-for-granted assumptions and beliefs (ibid, p.235). While a detailed discussion of all these processes is beyond the scope of this paper, it is important to highlight that all these practices can be employed by supportive or skeptical actors, thus leading to both positive and negative outcomes in industry legitimation (Markard et al., 2016). In the remainder, the analytical focus will be put predominantly on the institutional work by industry proponents, which has a positive effect on the legitimacy of the focal industries.

Another important recent specification is that the above mentioned forms of institutional work co-evolve with system building/reconfiguration processes. I.e. advocating for a radical innovation with the regional/central government may only be possible after the industry has actively created a supportive advocacy coalition (innovation system structure) and raised support by powerful incumbents (Binz et al., 2016a; Musiolik et al., 2018; Rao, 2004). In NTR industries, one can in turn expect more instances of institutional maintenance at the level of the mature global sector, combined with system reconfiguration and institutional creation / disruption activities at a regional level which draws on socio-technical templates validated in other regional contexts (Boschma et al., 2017).

## 2.4 Analytical framework

Based on the above discussion, we conceptually distinguish two fundamentally different approaches for legitimizing NTW vs. NTR industries in terms of the forms of system-level agency and institutional work, as well as the spatial contexts in which these dynamics play out (Table 1).

In NTW industries, legitimacy will need to be constructed bottom-up in an initial regional context or specialized global market segment through distributed *system building* processes (Boschma et al., 2017; Garud and Karnoe, 2003). The active construction of a supportive innovation system will be a particularly important pre-requisite to some of the more complex, resource-intensive forms of institutional work aimed at increasing legitimacy (Binz et al., 2016a). Furthermore, since NTW industries have no predecessor in the social order, they will often require institutional work that challenges deeply held cultural beliefs both in the respective region and the sector's dominant socio-technical regime[2] (Boschma et al., 2017; Fuenfschilling and Binz, 2018). The institutional work that legitimizes NTW industries will

[2] A socio-technical regime is defined as "… the semi-coherent set of rules that orient and coordinate the activities of the social groups that reproduce the various elements of socio-technical systems" (Geels, 2011, p.5)

thus comprise a mix of disrupting regime structures that hinder change, with the active construction of supportive narratives around the newly emerging socio-technical configuration (ibid.). Arguably, such work will be most easily initiated in regions that provide institutional structures, which support radical innovation in general or that provide institutional templates from loosely related industries (Carvalho and Vale, 2018).

The challenges for legitimizing an NTR industry differ substantively from the above situation, as the industry has already achieved a dominant design / product architecture elsewhere and taken on 'regime-like' structures globally. As such, the actors trying to embed the industry in a new region do not need to create a new socio-technical template from scratch, but can replicate or transplant extra-regional 'success models' in their institutional work strategies. System-level agency will thus not depend primarily on bottom-up system building, but rather on multi-scalar *system reconfiguration* and the transformation of regional institutional structures in such a way, that the new industry can profit from pre-established (regional, sectoral, technological) innovation systems (Boschma et al., 2017; Miörner and Trippl, 2019). This process likely depends on a different (though not necessarily less complex) portfolio of institutional work that incorporates more instances of sectoral-level institutional maintenance, combined with the creation/disruption and reconfiguration of institutions in a regional context. Arguably, this transformation of regional institutional structure will be easiest, if the pre-existing the region hosts closely related industries (Frenken et al., 2007).

**Table 1:** Characterization of new-to-the-world vs. new-to-the-region legitimation processes

| | **System-level agency** | **Forms of institutional work** | **Spatial context** |
|---|---|---|---|
| **New-to-the-world** | 'system building' | Creating / disrupting institutions, both in the relevant sector and region(s) | Endogenous creation in regional setting or specialized market segments |
| **New-to-the-region** | 'system reconfiguration' | Maintaining / imitating institutional templates in the global sector; creating / disrupting / maintaining institutions in the region | Multi-scalar interaction |

Source: own design, based on Boschma et al. 2017; Lawrence and Suddaby, 2006

## 3. Case selection and methods

The approach chosen for illustrating and validating our conceptual perspective is based on a comparative case study design (Yin, 2018). The rationale for choosing this research design derives from a desire to have an emblematic case covering an ideal type of an NTW and NTR industry, respectively (ibid.). Since NTR and NTW industries do seldom emerge in the same sector and region at the same time, our strategy was to select two 'extreme' cases that strongly vary in the system-level agency and institutional work processes underlying the industry legitimation process. The potable water reuse industry in California and the video

games industry in Hamburg were accordingly chosen as illustrative cases, based on the following case selection rationale.

First, both industries share key structural characteristics that make a legitimation perspective particularly pertinent: Both industries were morally contested throughout their path development processes; videogames were repeatedly associated with tragic mass-shootings while drinking wastewater relates to a deeply-held social stigma (the 'yuck-factor'). In both cases, legitimation processes were thus expected to play a particularly important role in explaining the success or failure of industrial path development processes (Binz et al., 2016a; Gong, 2019). Second, they are both set in highly developed regions with complex and diverse knowledge spaces and capability endowments (Hamburg and Los Angeles). This allows us to abstract from the influence of pre-existing knowledge stocks and related variety to some degree and to focus more exclusively on the relevant institutional agency processes.

The cases then vary in two dimensions that are central to our conceptual approach. First, they represent different levels of global industry maturity: Potable water reuse exemplifies a NTW industrial path that emerged largely from scratch. When first activities developed in California in the 1970s, the idea of turning wastewater into drinking water was largely unheard of globally. The industry thus had to go through the earliest local innovation and validation stages (Binz et al., 2016a). The Hamburg video games case, in contrast, exemplifies a NTR path that was very incremental in the sense that the global gaming industry was already generally validated and a dominant architecture for designing, selling and playing games had existed for decades, when actors began developing an industrial path in Hamburg in the early 2000s (Gong, 2020). In addition, the cases are set in structural contexts that are conducive to either NTW or NTR industry formation processes. The US and Germany are usually characterized as ideal-types of liberal and coordinated market economies in the Varieties of Capitalism approach (Hall and Soskice, 2001), meaning that the US provide an ideal institutional context for the emergence and institutionalization of NTW industries, while Germany is more conducive to incremental NTR industry formation dynamics.

The two cases accordingly vary maximally in terms of their lifecycle stages, as well as their embedding in institutional structures that support NTR and NTW industries, respectively. This approach shall allow us to bring out the generic differences in NTW vs. NTR legitimation processes as clearly as possible. Some important qualifications of this approach will be discussed in the concluding section.

For both cases, the relevant system building and legitimation activities were reconstructed based on multiple data collection methods, including secondary literature reviews, archival/media sources and semi-structured expert interviews. 21 interviews were conducted with key stakeholders in Hamburg and 20 in California. In both cases, interviewees were chosen based on a snowballing procedure informed by extensive desk research. The chosen experts comprised diverse actor groups that were actively involved in legitimation activities (see Appendices A&B).[3] All interviews were fully transcribed and coded in order to distill the institutional work processes that led to successful legitimation and industrial path development. The coding scheme comprised the different forms of institutional work by Lawrence and Suddaby, which were cross-coded with time tags in order to distill the sequencing of relevant institutional interventions in both cases. References to interviews will

[3] The interviews were conducted in the context of prior research projects (Binz et al., 2016a; Harris-Lovett et al., 2015), but reinterpreted in light of the current study.

be given in the format outlined in Appendix A and B, i.e. an expert from a company in California will be labeled as ‘CAL CO’ and numbered.

# 4. Results

## 4.1 Legitimizing a new-to-the-world industry: Potable water reuse in California

The potable water reuse industry represents a NTW industry that is associated with a particularly strong social stigma. Until the late 1990s, drinking purified wastewater was an unthinkable practice in most places, with the exception of Southern California, Windhoek (Namibia), and the international space station (Tchobanoglous et al., 2011). Today, about 20 potable reuse systems are in operation globally (WE&RF, 2019) and the industry is quickly diffusing, in particular into drought-prone regions in the USA, Australia and Southeast Asia (ibid.). Around 2010, a first socio-technical template for ‘advanced wastewater treatment processes’ emerged in Southern California, which by now has turned into a gold standard globally (Mosher and Vartanian, 2015; NWRI, 2013). The potable reuse industry has recently embarked on a diffusion and growth phase, but has not achieved ‘maturity’ yet. Also its legitimacy still varies considerably from place to place.

When the industry was initially created in California in the early 1970s, the pioneering actors (a local utility, together with firms and universities) had to solve complex technical problems while also dealing with deeply held psychological barriers related to wastewater and human excreta. In hindsight, working on the technological problems proved easier than convincing experts, regulators and the public that drinking wastewater was an acceptable social practice. The relevant legitimation processes evolved over 30 years and depended on closely co-evolving system building and institutional work processes (cf. Binz et al., 2016a; Harris-Lovett et al., 2015).

The potable reuse industry has gone through three generic development phases (ibid.): A first ‘local innovation and validation’ phase (1970-1990), in which a pioneering utility, ‘Orange County Water district’ (OCWD), together with partners developed a first pilot plant, which was then passively validated in the local context. Then, a ‘diffusion’ phase, in which the idea spread from OCWD to other Californian regions, as well as to Singapore and Australia. Most of these systems however raised fervent public opposition and the industry could only further diffuse after having developed an elaborate collective legitimation strategy. Finally, from 2010 on, the industry has moved towards a ‘general validation phase’, in which regulative frameworks are developed and public support strategically managed with an encompassing institutional work portfolio. The system building and institutional work processes in each of these phases will now be characterized in more detail.

### *1) Emergence, local innovation and validation (1970-1990)*

The first development phase was largely confined to Southern California. In 1968, OCWD started experimenting with the idea of injecting recycled wastewater into a local groundwater aquifer in order to mitigate a local seawater intrusion problem (Harris-Lovett and Sedlak, 2015). Together with local university and industry partners, this visionary utility developed a process that would treat the wastewater to a sufficiently high quality level that it could be pumped back into the local groundwater basin, which was also used as the local drinking

water source (CAL UT1, CAL GO2). Since such 'indirect' potable water reuse was an unheard of practice, OCWD and its partners spent considerable time in experimenting with this idea and outlining its potential for mitigating the regions' complex water scarcity issues *(theorizing)*.

While the initial development happened without any notice by the local public (CAL UT1), it caused conflicts with the pre-existing regulatory framework, which forbid any direct connection between wastewater and drinking water supplies. OCWD, the local regulator and experts from academia and private firms thus created a task force to jointly specify a temporary set of standards that legalized indirect potable water reuse (*constructing normative networks)*. A first water recycling plant took up operation in the early 1970s and stayed operational until the 1990s without any major problems (CAL UT1, CAL IO1). After 20 years, the idea was passively validated thanks to a local institutional entrepreneur (OCWD) that had constructed a socio-technical template for a 'successful' (indirect) potable water reuse system (Harris-Lovett et al., 2015).

### *2) Diffusion phase (1990-2010)*

When California was hit by a severe drought in the early 90s, interest in the innovation suddenly skyrocketed and several other cities started to plan potable reuse systems based on the technical template from OCWD. Yet, diffusing the idea proved much more challenging than expected. Between 1990 and 2000, several projects were halted due to organized public opposition. Protest groups ranged from concerned grandmothers to beer brewing companies to local politicians that feared for their reputation (CAL UT3, CAL CO1, CAL GO2). Key actors in utilities, firms and industry associations thus realized that a more proactive and coordinated legitimation strategy was needed that would actively create a more favorable institutional context for potable reuse.

A first important element of this strategy was that two newly founded intermediary actors (the WateReuse Association and the National Water Research Institute NWRI) took over some of the institutional work practices (CAL IO1, CAL IO2). NWRI became instrumental in *constructing* a particular *normative network* that supported the implementation of potable reuse systems. It instituted 'independent expert panels' that comprised highly regarded technology and public health experts, which would supervise the planning and implementation of new potable reuse projects and provide the regulators and local utilities with external advice on how to improve the treatment systems and their embedding in the relevant regulative contexts (CAL IO1, Cal SC2, CAL CO1). As one expert put it, *"the panels have served a very useful role. We've given a lot of [water] agencies a bit more backbone to pursue some of these [potable reuse] topics" (CAL IO1).*

Second, both intermediary organizations produced a set of reports and white papers that further explored the benefits of potable reuse and outlined a research agenda (*theorizing)* that would help regulators to quickly develop a set of quality standards for the new industry (CAL IO1, CAL IO2). They also established prestigious prizes that were subsequently allocated to key experts and projects in the potable reuse field *(valorizing)*. The management of OCWD furthermore realized that the public was not well-informed about where the water in their taps was coming from (CAL UT1, CAL UT3). When OCWD decided to expand their successful pilot plant, a massive public outreach campaign was initiated that strategically informed the leaders of local community groups about California's pressing water problems and the benefits that potable reuse could bring to their communities (*educating)*.

After some time, these distributed, yet loosely coordinated institutional work activities started to bear fruit and new potable reuse projects could start operations in Los Angeles, Texas, and New Mexico. This notwithstanding, overall support for the industry was still fragile and inconsistencies remained with the relevant regulative, normative and cognitive rules in most regions. As such, the key actors in utilities and intermediary organizations embarked on a further coordinated system building and legitimation strategy, which increasingly aimed for legitimation also at a state, national and international level.

### *3) Towards general validation (2010-)*

The last phase saw another significant expansion of the supportive innovation system structure, which now attracted additional utilities as well as large incumbent firms that donated money to push potable reuse with a dedicated research and lobbying program called the 'Direct Potable Reuse (DPR) Initiative' (*constructing normative networks)*. This initiative mobilized considerable resources to further *theorize* potable reuse, but its participants now also engaged in targeted *advocacy* and *political work* (WateReuse Association, 2014). Several Senate Bills were formulated and pushed into State legislation with the goal of clarifying the management responsibilities and quality standards for potable reuse (CAL IO2, CAL CO4, CAL GO2). At the same time, key figures in the DPR initiative were in direct contact with the governor of California and tried to push him to quickly clarify the regulative requirements for the industry (CAL IO2) *(political work).*

Concomitantly, utilities' outreach campaigns and the concrete terminology used when talking about potable reuse got standardized by professional communication consultants, which developed storylines that connected the industry with more positive mental frames (*educating, valorizing).* *"We realized we should not brand ourselves as "wastewater" because if we do, […] the public will continue to say, 'Wait a minute. I don't like that thought. That's yucky.'" (CAL CO6).* The resulting narrative explained to people that all water on earth is recycled and that potable reuse is a cleaner and safer option than normal drinking water, which is normally taken from rivers and groundwater wells that contain wastewater from upstream cities (CAL CO5, CAL UT2).[4]

With increasing resources and political clout of the industry, its proponents could also embark on institutional work that targeted deeply held normative assumptions and cultural-cognitive beliefs. Youtube videos were produced that explained potable reuse to a lay audience and even a Hollywood star was featured in a short clip, where one could see him drink a bottle of 'purified wastewater'[5] *(imagery). Normative assumptions* were *undermined* by inviting people to guided tours of treatment facilities, organizing beer brewing competitions with reused wastewater, or by serving people recycled wastewater in supermarket-style water bottles and from conventional taps (CAL CO5, CAL UT2) (*mimicry*).

This concerted system building and institutional work effort has created new institutional templates in the global water sector and manipulated the relevant social contexts in Southern California to such a degree, that potable reuse is not openly contested there anymore. By 2020, a regulative framework has been largely outlined, resourceful firms in Silicon Valley and other US States openly support the industry and key intermediaries like NWRI and the

[4] See e.g. https://www.youtube.com/watch?v=GVm-d-zOxJs
[5] https://www.youtube.com/watch?v=ll_YlUDAv3c

WateReuse Foundation have merged their activities, gotten internationally connected and are now actively diffusing California's socio-technical template to other parts of the world.

Table 2 summarizes the sequence of system building and institutional work activities that enabled the legitimation process outlined above. The observed spatial dynamics resemble a bottom-up process, with the industrial path emerging and being validated in one regional context and then gradually scaling up and out into other regions with increasing legitimation activities at national and international scales. The initial highly localized innovation & validation phase was followed by increasingly multi-scalar interactions in the diffusion phase, especially between California and various other US States, as well as with actors in Singapore and Australia. System building and institutional work closely co-evolved in a gradual legitimation process that is poised to continue in the current general validation phase.

**Table 2:** Summary of institutional work and system-level agency in the Californian potable reuse case

| **Forms of institutional work** | | |
|---|---|---|
| **Local innovation, validation** (1960-1990) | **Diffusion** (1990-2010) | **Towards general validation** (2010-) |
| Constructing normative networks (c)<br>Theorizing (c) | Constructing normative networks (c)<br>Theorizing (c)<br><br>Valorizing (m)<br>Advocacy (c)<br><br><br>Education (c) | Constructing normative networks (c)<br>Advocacy (c)<br>political work (m)<br>Education (m)<br>Imagery (m)<br>Changing normative assumptions (c/d)<br>Mimicry (c)<br>Undermining normative assumptions and beliefs (d) |
| **System-level agency** | | |
| Local utility as a visionary institutional entrepreneur, first supportive actor network in Southern CA | Foundation of two system intermediaries, creation of 'independent expert panels' and water prizes | Expansion of supportive actor base (region, state, int.), joint R&D agenda, incumbent firms & policy makers join the network |

Note: c— creating; m — maintaining; d — disrupting

### 4.2. Legitimizing a "new-to-the-region" path: the Hamburg video games industry

The Hamburg video games industry provides a contrasting case, which started at a later global industry lifecycle stage and in a sector with weaker path dependencies than urban water management. Digital games had already existed for more than 30 years and the global industry had long since entered the general validation phase when actors began developing an industrial path in Hamburg. From 2000 on, the games industry developed quite rapidly in Hamburg (Quinke, 2004) and gained national first-mover advantages thanks to dedicated support from city and State actors (Plum and Hassink, 2014). In 2015, there were 87 companies located in Hamburg, and Hamburg was only second to Hessen in terms of turnover generated by video games (Castendyk and Müller-Lietzkow, 2017).

This industry has also gone through three distinct development phases, which however differ from the potable reuse case in that they all happened in the 'general validation' phase of the global industry lifecycle. Before 2005, the local industry was passively validated by being invisible and thus unchallenged. Between 2006 and 2012, the local industry grew strongly and came under increasing moral scrutiny after mass shootings at German schools. The third phase started in 2013, when legitimacy built in previous phases started to play a positive role, so the local actors could increasingly engage in legitimacy management and maintenance work.

*1) Passive legitimation and self-justification phase (before 2003)*

In the early 2000s, the early entrepreneurs in Hamburg, who were gamers themselves, started developing simple games as 'hobby businesses'. The early industry then went through a 'passive legitimation' period in which it was largely unrecognized, and thus unchallenged. A first wave of nationwide criticisms of video games emerged after a school massacre happened in 2002 in Erfurt (HAM SC4; ZDF, 2016). Politicians were quickly calling for a ban of so-called "killer games". While such proposals were supported by parents and certain politicians, game developers and players argued against it. "*Such an aggressive inhibition undoubtedly ran the risk of 'throwing the baby out with the bathwater'*," recalled on interviewee (HAM IR5), "*…and lots of game players and developers have reacted strongly against such a stigmatization*." (*undermining assumptions and beliefs,*). Voices from players and developers had some effects. The early proposal to ban violent games was not implemented due to the strong resistance of game players and industrial practitioners (*deterring*). However, as a compromise, the federal government urged the industry's self-regulating body USK to develop legally binding age signs for videogames, in line with pre-existing national age labelling systems, i.e. in the film industry (HAM IR2) (*mimicry, policing*).

*2) Intensive legitimation phase (2003-2012)*

Although the early autodidacts only intended to develop games for themselves and friends, they soon found out that their games were played by a quickly increasing number of people. Many early developers thus decided to quit their jobs and to start their own game businesses (Hamburger Abendblatt, 2008). In this context, concerns about whether working in the gaming industry was a stable career for young people started to grow (HAM IR4&5). In order to give workers in the industry their own identity, numerous measures were taken by companies, local intermediaries and politicians (*enabling work*). One of the most prominent efforts was to converge the games industry with support structures in other established media sectors (*constructing identities*). Two pre-existing industry network bodies subsequently started to initiate and catalyze cooperation between game companies and the local creative industries through workshops, informal meetings, networking and joint projects (HAM IR6 & IO1) (*embedding, routinizing*).

While the legitimacy issue at the local level mainly concerned whether the games industry was a serious and stable business, at the national level, the discussion on killer games and violent behavior became more prominent during this phase, due to two additional shooting events (ZDF, 2016). Through discussions in the media, games became more of a political issue, or an object of politics (Sørensen, 2013). Whereas the federal government admitted that violent games should be strictly controlled, it also suggested that parents, educators and the public should increase their media competence and take more responsibility in avoiding similar tragedies (HAM SC5) (*political work*). The national industry association BIU,

together with other federal authorities, thus organized a series of media courses for parents and educators (HAM IO4) (*educating*).

In parallel to promoting the discussion about pros and cons of games, the federal government also initiated a series of support schemes in order to change the stigmatized image of games and gaming (*changing normative associations*). The German Games Awards were launched with the aim of promoting creative and culturally-rich games that are produced domestically (*valorizing*). Moreover, G.A.M.E. and the BIU, the two national industry associations, got accepted as members of the German Cultural Council, which strengthened the image of games as an essential part of the creative economy (HAM IO3) (*constructing normative networks*). Furthermore, national industry associations also actively promoted the positive aspects of video games (*valorizing*). Among others, serious games were promoted by BIU and GAME. Emphasizing the practical functions of games, the facilitators sought to convey the message that games did not only serve entertainment purposes, but that they also had educational value (HAM IO4) (*changing normative associations*).

### *3) Legitimacy management and maintenance phase (2013-)*

Transforming to a mobile gaming era, local concerns on whether the industry was a stable source of income surfaced again, as the restructuring process of big firms led to the dismissal of several hundred employees (Hamburger Abendblatt, 2016). A new round of institutional work was initiated by local cluster networks in order to convince the public of the permanency of the industry. "*Based on our intensive discussions with several industry representatives, we believe this problem has more to do with the strategies and plans of certain companies than with a general slowdown in the industry as a whole*," argued one manager of Gamecity Hamburg (HAM IO3) (*disconnecting sanctions*). In this context, Innogames, which experienced growth during this fluctuation, was used as an example to illustrate the vibrancy of the industry (*exemplar*) (Jones and Massa, 2013). After the major job cuts before 2017, the local industry continued growing again without any major layoffs in the recent past.

At the national level, people's understanding of the creative industry increased steadily also due to institutional work by actors from related sectors (IT, visual arts, new media). Hence, the discussion on the prohibition of violent games has dwindled both in media and in political campaigns. Even when shocks such as shooting accidents happened again, the discussion in mainstream media remained rather neutral (HAM SC5). At the same time, key actors increasingly argued that the lack of a nationwide funding and support infrastructure was one of the biggest disadvantages of the German game companies when compared with their foreign competitors (HAM SC4). Industry associations thus drew heavily on successful support structures in other countries, such as France, the UK, Poland, and Canada, in justifying the essentiality of nationwide financial support (*mimicry*). Thanks to the lobbying and collective efforts of industry associations, key entrepreneurs, scientists and politicians, a nationwide game-specific funding scheme, named 'German Games Fund', has finally come into shape in 2018 (*lobbying*).

Moreover, in recent years, as games have become increasingly accessible on different platforms (e.g., consoles, pcs, mobile devices), parents' concerns about children's addiction and the negative influence of excessive gaming on the mental and physical fitness of players, have led to further discussion (Zeit, 2018). In order to prevent excessive gaming, industry associations, together with youth protection centers thus have initiated a series of activities to

promote the media competence of parents (*educating*), so that they could directly or indirectly be involved in the prevention of media-related risk behavior (Rehbein and Baier, 2013). Table 3 summarizes the forms of system-level agency and institutional work adopted during the whole legitimation process. In the case of the video games industry, legitimation depended on system reconfiguration and institutional work driven by actors both from the focal and related industries and from different scales. Institutional work tended to be particularly intensive in the second phase, when the industry was under increased moral scrutiny, and thus had to repeatedly draw on socio-technical templates validated elsewhere (i.e. mobilizing international narratives around successful age-labelling systems, industry associations, funding schemes, etc.).

**Table 3:** Summary of institutional work and system-level agency in the Hamburg video games case

| **Forms of institutional work** | | |
|---|---|---|
| **Passive legitimation and self-justification** (before 2003) | **Intensive legitimation** (2003-2012) | **Legitimacy managing** (since 2013) |
| Demonizing (m)<br>Undermining assumptions and beliefs (d)<br>Deterring (m)<br>Policing (m) | Enabling work (c)<br>Constructing identities (c)<br>Embedding and routinizing (m)<br>Educating (c)<br>Political work (c/m)<br>Changing normative associations (c/d)<br>Valorizing (m)<br>Constructing normative networks (c)<br>Disassociating moral foundations (d) | Disconnecting sanctions (d)<br>Exemplar (m)<br>Mimicry (c)<br>Lobbying (c)<br>Educating (d) |
| **System-level agency** | | |
| Emergence of self-organizing 'hobby-businesses', which targeted global gaming communities. Industry's self-regulating body USK mimicked the national film age labelling system in response to shocks | Advocacy coalition built among various actor groups, convergence with local media sector. Launch of the German Games Awards. Acceptance of BIU and GAME as members of the German Cultural Council | Expansion of supportive actor base (region, state, international). National education campaigns for parents. German Games Fund launched |

Note: c— creating; m — maintaining; d — disrupting

## 5. Discussion

Table 4 summarizes the main characteristics of the system-level agency and legitimation activities in the two industrial paths. Going back to the conceptual framework developed in Table 1, we can now compare the two cases in more detail.

Our first conceptual contribution concerns system-level agency and the relevant spatial contexts. Our results mostly support the conceptual assumptions formulated in section 2.4. I.e. the Californian NTW case as expected depended on an endogenous, bottom-up system building process, which initially evolved in a (spatially) rather delimited context (Southern California). This case furthermore shows that local actors first had to develop, expand and validate an effective technological solution and related innovation system structures - i.e. through the creation of intermediary actors and dedicated research initiatives, as well as new regulations, norms, values, narratives - before the industry could successfully diffuse to other contexts. In the case of the Hamburg video games, system reconfiguration based on socio-technical templates validated elsewhere and active embedding in pre-existing and related regional (and national) innovation system structures, as expected, played a more crucial role. The system reconfiguration processes that led to the legitimation of this NTR industry furthermore from the start involved actors from several (regional, national and international) levels, thus following a more pronounced multi-scalar logic.

Secondly, concerning the forms of institutional work that underpin legitimation dynamics in NTR vs. NTW industries, we observed interesting patterns that allow us to formulate conceptual propositions about the sequencing of system-level agency and institutional work, which we hope could be further explored and validated in future research. In the Californian case, our results suggest that local actors focused almost exclusively on the *creation* of new institutional elements in the *local innovation and validation phases*, before active *disruption or maintenance* strategies could be observed in the later *diffusion phase*. We thus hypothesize from these results that in NTW industries, disrupting institutional structures depends on the existence of supportive innovation system structures and the buy-in of resourceful (incumbent) actors, which is not available in the earliest industry formation phases. We thus propose that NTW industrial paths depend on ***a sequence of system building and institutional creation strategies, which are followed by pro-active disruption and maintenance strategies, after a first socio-technical template has been locally validated***.

The case of Hamburg's video games industry shows a different sequencing pattern: Although sectoral institutional maintenance has been argued to be important for developing a NTR industry (e.g., Boschma et al., 2017), at least in our specific case, relevant actors also had to repeatedly create and/or disrupt territory-specific institutions in order to introduce the relevant discourses and practices from the global sector into the local context. Regional institutional disruption and creation strategies were especially important in the event of exogenous crises and shocks. This industry thus depended on a complex mix of maintenance, creation and disruption strategies, that fluctuated with the level of (media / policy) attention directed towards the industrial path. Overall, embedding a globally validated industry in a new region seems to require an equally complex portfolio of institutional work, which can however be enacted in a different spatial setting. We propose that NTR industrial paths depend on ***multiscalar, cross-industrial legitimation strategies, and mixes of creation, maintenance and disruption of institutional structures that fluctuate in parallel with external shocks and (media, government, public) attention.***

**Table 4:** Characterization of system-level agency and institutional work processes in NTW and NTR industries

| | System-level agency | Forms of institutional work | Legitimation process | Spatial context |
|---|---|---|---|---|
| **NTW (potable reuse)** | Active system building (i.e. creation of new system intermediaries, dedicated research programs, regulative frameworks, etc.) | Creation of new institutions in the early stage; followed by combined creation, disruption and maintenance strategies in the later stages | From local innovation/validation and template creation, to legitimacy diffusion, to more recent legitimacy maintenance and management | Bottom-up emergence in the early stage; multi-scalar interaction intensifying in parallel with increasing spatial diffusion in the later stages |
| **NTR (video games)** | System reconfiguration (i.e. connecting new industry to supportive structures in related industries, emulating institutionalized practices from related industries, etc.) | Mixes of creation, maintenance and disruption of institutional structures, depending on external shocks | From passive legitimation and self-justification to intensive legitimation (in the face of crisis and shocks), to legitimacy management and maintenance | Constant multi-scalar interaction with regional, national and international actors and institutional structures |

## 6. Conclusions

Recent contributions in economic geography have argued that our knowledge is limited on how institutional structures influence the industrial path development potentials in regions and how industry promoters could proactively alter these structures in order to legitimize an industrial path. Taking transition studies and institutional sociology as departure points, this paper addressed this gap by developing a conceptual framework for distinguishing the legitimation challenges and strategies for new-to-the-world vs. new-to the-region industries.

Our framework contributes to the literature in three key respects. First, our elaborations on legitimation dynamics in NTW vs. NTR industries helps clarifying some conceptual fuzziness in the industrial path development literature. While previous studies have typologized the path development trajectories in different regions and industries (Isaksen and Trippl, 2016; Trippl et al., 2018), empirical work often conflated industry formation in NTW and NTR industries without further problematization (for a critique, see Boschma, 2017). Our analytical framework suggests that, with the exception of the 'new path creation' model (Trippl et al., 2018), which resembles the development of a NTW industry, all other types of regional industrial path development are associated with legitimation processes in NTR industries. This implies that system reconfiguration and the mobilization and anchoring of extra-regional system elements should be put more center stage in this literature overall (Binz et al., 2016b; Trippl et al., 2020). Our juxtaposition of two extreme cases will allow future

work to further specify the system-level agency and legitimation activities in NTR-type industrial pathways (i.e. path importation, path diversification, path renewal/upgrading).

Secondly, our framework contributes to the literature in evolutionary economic geography and in particular the framework by Boschma et al. (2017) with more elaborate hypotheses on the sequencing of system-level agency and institutional work processes in NTW vs. NTR industries. Our process-based perspective is particularly valuable in this respect, as it allows researchers to capture how initial resource endowments and institutional structures in regions are actively transformed in path development processes. Expanding on the process perspective and the hypotheses on the sequencing of system-level agency and institutional work developed here, one could aspire to explain the success or failure of regions in developing new industrial paths with a combination of static models assessing initial conditions and a process-based examination of institutional barriers and how actors strategically circumvent them.

Third, our results point to two fundamentally different policy strategies to support NTW vs. NTR industries. In transition studies, the main policy concern around NTW industries is providing protected spaces for experimentation and actively encouraging system building and collective learning processes (Kemp et al., 1998). Our results confirm that consistent and long-term policy support (e.g. patient capital, subsidies) from the local/national government or other institutional investors will be a crucial factor in giving a NTW industry sufficient time to construct and locally validate a first socio-technical template that works and to align itself with relevant institutional structures (ibid.). Developing NTR industries in turn necessitates policies that focus more strongly on connecting local actors with global resource flows (Bathelt et al., 2004), and connecting the industry to pre-existing, regional/national/sectoral supportive innovation system structures also in related sectors. Our results have furthermore shown that even in the general validation phase, regional and national intermediaries and policy makers play a key role in mitigating the negative effects of external crises and shocks. Policy making should explore ways in which this intermediary function both within and between regions could be strategically supported.

It goes without saying that our analysis comprises some limitations that warrant further research. First, our argument highlights the generic differences between legitimation dynamics in two highly diverse sectorial and regional contexts. To complement this initial 'extreme-case' sample, to further validate our conceptual propositions, and to disentangle in how far sector-level and national specificities influence the observed legitimation dynamics, our framework would have to be more explicitly connected to recent industry and regional taxonomies (Binz and Truffer, 2017; Isaksen and Trippl, 2016) and/or VoC perspectives (Gong, 2019). Also, the relevant actor strategies could only be treated superficially in this text and we had to largely abstract from exploring what actor types (i.e. in terms of resource endowments and social position) played the most important role as institutional entrepreneurs. We thus encourage additional research in different sectoral/regional contexts and with a more deeply conceptualized actor perspective (see e.g. Farla et al., 2012) to further validate and improve the framework developed in this paper.

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**Appendix A.** Basic information of Interviewees in the potable reuse case

| California | Interview groups | No. of interviewees |
|---|---|---|
| | Managers of local utilities (CAL UT) | 6 |
| | Managers of local engineering companies (CAL CO) | 8 |
| | Directors of intermediary organizations (CAL IO) | 2 |
| | Scholars (CAL SC) | 2 |
| | Governmental officials/ regulators (CAL GO) | 2 |
| | **Total** | **20** |

Source: Binz et al 2016a

**Appendix B**. Basic information of Interviewees in the video games case

| Hamburg | Interview groups | No. of interviewees |
|---|---|---|
| | Founders/managers of local firms (industry representatives) (HAM IR) | 10 |
| | Directors of intermediary organizations (HAM IO) | 4 |
| | Scholars (HAM SC) | 5 |
| | Governmental officials (HAM GO) | 2 |
| | **Total** | **21** |

Source: Gong, 2019

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