

[Forthcoming in Isaksen, Arne, Roman Martin, and Michaela Trippel, eds. 2018. *New Avenues for Regional Innovation Systems - Theoretical Advances, Empirical Cases and Policy Lessons*. New York: Springer]

**Markku Sotarauta & Nina Suvinen**

University of Tampere, Finland

Faculty of Management

## **Institutional Agency and Path Creation**

Institutional Path from Industrial to Knowledge City

### **1 Introduction**

Regional development and related innovation-oriented studies have faced interesting challenges. On one hand, micro-level analyses do not usually provide much insight into structural changes. On the other hand, more structurally oriented studies tend to “read off” actors from national (or local/regional) institutional structures (Gertler 2010, 5). In this paper, we argue for the need to focus more explicitly on institutions and the related agency to gain a better understanding of the relationship between micro and macro levels and thus of path creation.

Many studies have shown how institutions mediate economic development and path creation in subtle but pervasive ways. Institutions frame many actors’ choices and actions, as well as their interactions. Consequently, institutions frame the emergence of new industrial paths and are potential sources of lock in. More specific conceptualisations of institutional agency and related strategies are called for, as path creation is about (a) releasing the future potential underlying existing institutions and (b) institutionalising the released potential. Understanding institutional agency in the context of path creation is crucial because it aims to mould and is simultaneously affected by many kinds of history-informed social practices and routines.

Following the work of Dawley (2014, 92), who stresses the importance of moving beyond firm-centric accounts of path creation, we study “a wider array of actors and multi-scalar institutional contexts that mediate the emergence and development of growth paths”. We also follow Isaksen’s (2015) argument that the new regional industrial path development includes both renewal and creation. We extend his view beyond the growth of new activities and industries via regional branching (path renewal) and the growth of entirely new industries (path creation) to include *institutional* path creation. It would serve us well if we knew more about institutional strategies of local, national and international actors and learn more about how they influence one another in time. Sotarauta (2017) contends that these issues and the secrets of institutional path creation may be tackled best by adopting an actor-centric bottom-up view on institutions to complement the dominant top-down perspective. The main aspiration of an actor-oriented approach is to strengthen the ways that the concepts of institution and institutional agency can be used as analytical tools to investigate path creation, as well as the relationships between agency and institutions.

From these premises, we investigate the core concepts related to path creation and institutional agency. What are the main institutional strategies adopted by intentional actors, independently or in collaboration, in their efforts to boost institutional path creation and renewal? We scrutinise these questions in the context of a knowledge-city development and use Tampere, Finland as a case in point. We focus on the main institutional changes and the related agency, shedding light on how Tampere has been transformed from an industrial to a knowledge city. Carillo et al. (2014) maintain that one of the key ingredients of any knowledge city constitutes high quality higher educational institutions that also undertake scientifically excellent quality and economically and socially relevant research. In this regard, we pay special attention to how Tampere has become a university town and how university–industry collaboration has become one of the defining features locally.

We continue our efforts to appreciate the ways that local actors work to construct local institutional arrangements, but we focus on institutional meta-strategies instead of following our earlier more detailed studies on agency, institutions and strategies. The case illustrates the conceptual discussion and suggests future avenues for research rather than providing conclusive empirical evidence for institutional agency and path creation. In line with Dawley's (2014) position, we believe that by dismantling and making sense of long processes of regional evolution and path creation, we would learn much about not only local and regional development but also the relationships between institutions and agency.

This paper presents a re-analysis of the extensive empirical data that has been collected for four independent research projects (see Kostiainen & Sotarauta 2003; Suvinen 2014; Sotarauta & Mustikkamäki 2015; Sotarauta & Heinonen 2016). The data is based on (a) secondary data, including online materials; relevant journals; dozens of related newspaper articles; policy documents from different levels of governance; various business, technology and other strategies related to the national, regional and local-level industries; funding decisions of external funding bodies, as well as meeting minutes and other official documents from critical junctions in time; and (b) a total of 77 interviews<sup>1</sup> with key actors.

## **2 Towards a bottom-up approach to institutional change**

### **2.1 Basic tenets of institutions**

Institutions are habitually defined as recurrent patterns of behaviour (habits, conventions and routines) (Morgan 1997) and socially constructed rule systems or norms that produce routine-like behaviour (Jepperson 1991). North (1991) simplifies institutions as the rules of the game. Martin (2000) distinguishes between the institutional environment and institutional arrangements, defining the former as consisting of generic social conventions, rules and routines, which determine the informal incentives of innovation systems. Institutional arrangements shape specific institutional forms, defining the ways that political choices and policies are framed and how formal economic incentives are identified and enacted (Rafiqui 2009).

Scott (2001) further divides institutions by using three pillars – regulative, normative and cultural-cognitive. The regulative pillar underlines the rule settings and rewarding and sanctioning activities that control and constrain behaviour and hence influence future behaviour. The normative pillar comprises values and norms. It points out rules, introducing

---

<sup>1</sup> We express our gratitude to Nina Mustikkamäki and Tuomo Heinonen, who conducted 52 interviews.

obligatory, prescriptive and evaluative dimensions of behaviour and highlighting factors that aim at preferred and/or desirable behaviour. It also includes standards on which existing values and norms are built (Scott 2001, 51–54). The cultural-cognitive pillar serves as a reminder of how external frameworks shape internal interpretation processes (Scott 2001, 57). Cognitive-cultural institutions frame the way that actors perceive, interpret and understand themselves, as well as their actions and positions in broader structures.

The kinds of institutional changes framing the journeys from an industrial to a knowledge city are sometimes approached as if institutional changes would be easily detected and explicitly initiated and directed by market-based entrepreneurs or policy makers. Of course, in the case of Tampere, it would be easy to list some of the critical incidents, such as the establishment of universities, a science park, some national and local development programmes, reorganisations of firms, changes in legislation affecting local development, and so on. These are undoubtedly crucial junctions in a long journey. Some of them are mentioned below, but the true nature of institutional path creation cannot be fully appreciated by analysing only the changes in formally defined top-down institutions. Nonetheless, in the course of the decades, the Finnish institutions regulating and setting normative expectations for science, technology and innovation (STI) were both transformed and fine-tuned with a top-down approach. Towards the 1990s, the institutional arrangements eventually changed to centre explicitly on innovation.

## 2.2 Path dependency and institutions

The regional studies community has shown a growing interest in how socioeconomic systems change over time. A series of studies using metaphors, ideas and models drawn from evolutionary sciences has emerged (e.g. Boschma & Martin 2010). Consequently, among many other concepts, path dependency has also become a household term in regional development studies, reflecting, for its part, the evolutionary turn (Djelic & Quack, 2007; Martin 2010).

In path dependency, “events occurring at an earlier point in time will affect events occurring at a later point in time” (Djelic & Quack 2007, 161). Expressed slightly differently, path dependency explains a current state of affairs from its history (Boschma & Frenken 2006). In a stronger sense, “path dependency characterizes historical sequences in which contingent events set institutional patterns with deterministic properties into motion” (Djelic & Quack 2007, 161–162). Path dependency explains how existing institutions preserve what is already present and how economic restructuring may be slowed down because of this, as well as how the indigenous potential and creativity in regions may neither be fully developed nor exploited. As Martin (2000) reminds readers, institutions preserve social practices and routines; hence, they are the carriers of history, passing institutional ingredients into the future. Importantly, Martin (2010) argues that in its dominant lock-in oriented form, the path-dependence model affords a restrictive view on local and regional industrial evolution. He shows how it emphasises more continuity than change. Moreover, much remains to be done to fully understand how an industry emerges, how a new path is created, drawing on already existing resources in a region (Simmie 2012), or how new unrelated resources and capabilities can be constructed to support path creation (Boschma 2017).

Tampere is a city that has experienced several institutional transformations and has witnessed its share of lock-in situations. In the 19<sup>th</sup> century, it developed from a small village into Finland’s first large-scale industrial city. Over 100 years later, it belongs to the group of

leading Finnish knowledge city-regions, with its 380,000 inhabitants. It is the second research and development (R&D) centre in the country, with a 13% share of national R&D spending in 2015 (public and private), the peak year being 2010, with a 16% share of R&D in Finland (Statistics Finland: PX-Web Database). Its transformation from an industrial to a knowledge city has not been a straightforward path from one era to another but a bumpy road with industrial restructurations and the unemployment rate occasionally rising above 20% or close to it.

Martin's (2010) canonical path-dependence model of spatial industrial evolution can be used to describe the industrial evolution in Tampere. The founding of the town in 1779 was a historical accident; its location between two lakes and the rapids flowing through it provided hydro power and hence an ideal site for industries. Moreover, the King of Sweden,<sup>2</sup> and later the Tsar of Russia, provided it with freedom of enterprise; thus, Tampere became established as a free industrial town (Rasila 1988, 379–398). It enjoyed similar kinds of privileges as only Eskilstuna did at that time, among all the Swedish towns; trade and industrial enterprise were unimpeded in these two towns. The industrial path began to emerge due to the “development of self-reinforcing autocatalytic processes of agglomeration economies” (Martin 2010, 5). Martin's model proposes that early path creation, stemming from a historical accident, is followed by a path-dependent lock-in, which is caused by getting bogged down in increasing returns (agglomeration economies). From the 1970s to the 1990s, Tampere was in many ways locked into its industrial heritage. External shocks hit it hard, including expanding industrial automation, the oil crisis in the 1970s, upheavals in Eastern Europe in the late 1980s and the consequent loss of export markets, as well as the severe recession of the early 1990s. The city struggled to bounce back, but it eventually did with considerable success.

Tampere's industrial paths consisted of three main developments (with several more specific sub-trajectories not discussed here). First, the earlier dominant textile industry faced difficulties and declined in the 1970s, and Tampere faced a 'life-cycle type trajectory', per Martin's model (2010, 10). Second, Tampere went through 'rejuvenation' (Martin 2010), as the engineering industry faced severe difficulties in the early 1990s but was able to renew itself and maintain its position by infusing new technology and services into its product portfolio. The third of the main economic trajectories was the rapid growth of the ICT cluster in the 1990s. Since the 2000s and the 2010s, it has faced Nokia's and Microsoft's reorganisation and is struggling to renew itself. For its part, it can be described as experiencing an 'ongoing change and mutation' (Martin 2010). Parkinson et al. (2012) conclude that the continuous reinvention of Tampere has been influenced by proactive local development policies, business sector activities and forward-looking, relatively young universities (Benneworth 2007). In this paper, we focus on the universities.

### 2.3 Institutional agency and path creation

Path creation is a highly complex process involving sequences and the accumulation of events over long periods of time. In line with Garud et al.'s (2010) argument, we emphasise the power of reflexive agency and cumulative processes of gradual change as forces in path creation. Garud and Karnøe (2001) highlight that instead of being given, initial conditions are constructed by actors; thus, various incidents shaping paths should not be approached as exogenous and manifesting something unpredictable, non-purposive and random but as

---

<sup>2</sup> Finland was a part of Sweden until 1809 and after that, an autonomous grand duchy of Russia until 1917.

emergent and serving as embedded contexts for agency. Garud and Karnøe's framework of path creation and hence of institutional change differs slightly from those that stress the political nature of path creation (Djelick & Quack 2007) or those that observe institutional change emerging due to entrepreneurial efforts of science and policy actors despite the lack of business entrepreneurs (Sotarauta & Mustikkamäki 2015). Djelick and Quack (2007) conclude, "different societal actors with different economic and political interests, normative orientations and social identities strive to shape the institutional rules used to govern the overall societal system or specific subsystems" and thus path creation. With this thinking, it follows that the many self-reinforcing mechanisms are rather strategically manipulated than simply given from the outside. Therefore, if the path-dependency literature highlights how lock-in happens through adherence to a path, the view opened by path creation states that lock-in situations are "provisional stabilizations within a broader structural process" but not permanent (Garud & Karnøe 2001).

Drawing on Emirbayer and Mische (1998), we define agency as an "action or intervention to produce a particular effect". Interestingly, they highlight both the path-dependent and the path-creative nature of agency by noting that it is informed by the past but performs a simultaneously channelling action towards the future. As such, agency is a temporally embedded process of social engagement, calling for a strong capacity to interpret past habits and future prospects (Emirbayer & Mische 1998). The complexity of actor constellations means that the paths are likely to develop emergent qualities, that is, characteristics not directly intended by any of the actors involved but stemming out in direct or indirect interaction with the multiplicity of them (Djelic 1998). Therefore, agency is best studied in its full complexity by situating it in the flow of time. The reason is that actors often amend their agentic tendencies. Their capacity to intervene is not static; the way that they make choices or push for transformation fluctuates in time due to changing situations and their own capacity in relation to such situations (Emirbayer & Mische 1998, 963).

We dissect institutional agency into two distinct but interrelated concepts – institutional entrepreneurship and institutional navigation. Institutional entrepreneurship refers to conscious efforts to pool and mobilise resources and capabilities to create and/or change institutions (Battilana et al. 2009). As Schumpeterian entrepreneurs, institutional entrepreneurs also grasp new opportunities and emerging combinations of knowledge and markets. Their major faculty is the will to accomplish something (Weik 2011, 470). Entrepreneurs' primary interest is to "map unknown terrain, to move where no-one dared venture before" (Weik 2011, 470–471). Entrepreneurs are not inventors who create new possibilities but aim at the practical execution of these. Entrepreneurs are thus involved in non-routine strategies, and in doing so, they encounter social resistance from those who want to defend the prevailing institutions (Weik 2011, 471).

Institutional navigation focuses on the ways that actors deal with mixed messages of many institutions and comply with them, all the time formulating and implementing their own strategies. Institutional navigation allows us to understand institutions and institutional manoeuvres through the experiences of actors who are not necessarily able to mould institutions but are aware of their effects and work to navigate through often conflicting institutional arrangements (Sotarauta 2017). In practice, the concepts of institutional entrepreneurship and navigation overlap and do not describe the static functions of actors but the forms of agency and how agential roles fluctuate in time.

### 3 Institutional agency and meta-strategies – from institutional opportunism to institutional offensive

We broadly discuss institutional evolution in Tampere but select a few incidents that, according to many other analyses (e.g. Parkinson et al. 2012), illustrate well the nature of institutional changes in this specific case. As stated, we do not focus on industrial but on institutional path creation that provides the local playground and rules of the game for the prospective industrial path developments. Therefore, the phrasing reflects institutional agency rather than changes in industrial trajectories, the aim being to specify a generic top-down description with the agency-oriented bottom-up observations.

The institutional influences shaping path creation are similar to tides, going back and forth. Webster's dictionary defines tide as "the alternate rising and falling of the sea [...] due to the attraction of the moon and [the] sun". It is also "a powerful surge of feeling or trend of events". Inspired by these definitions, institutional tide is perceived here as the alternate rising and falling of belief systems due to the attraction of models in global circulation, top-down institutions and local needs. The phases of institutional tides and the related agency discussed here are as follows:

- working against the institutional tide with an *opportunistic* institutional strategy,
- adapting to a turning institutional tide with an institutional *protection* strategy,
- going with the institutional tide and exploiting the innovation hype with an institutional *expansion* strategy and
- launching an institutional *offensive*.

The institutional strategies introduced here are not actual planned or deliberate strategies but long-term meta-strategies that can be identified in retrospect. Of course, meta-strategies paint an unnecessarily neat picture of institutions and path creation. In practice, they always include arrays of deliberate strategies of many actors and many kinds of incidents, as well as conflicts and moments of joy. Meta-strategies are used to illustrate the overarching development patterns that provide the many other strategies with a broader meaning and link to agency in the long run.

#### 3.1 Working against the institutional tide with opportunistic institutional strategy

Universities are institutions in their own right. They frame local actions and choices of many actors in many ways, generate new opportunities and attract knowledge and insights from afar. The history of higher education and scientific research in Tampere is recent, dating back to the 1960s. From the late 1950s to the early 1980s, the Finnish higher education system grew rapidly by expanding spatially, and the government established new universities in different parts of Finland to secure equal opportunities to education and promote balanced economic development (Tirronen 2005). Instead of being a beneficiary of national-level decisions, Tampere had to rely on local agency, and it basically ended up usurping two universities from Helsinki. First, following colourful events and cunning ploys, the local actors successfully convinced the small private College of Social Sciences to relocate from Helsinki to Tampere in 1960 (see Seppälä 1998). In 1966, it was renamed the University of Tampere. As the local desire for higher education in engineering dated back to the 1850s, soon after acquiring the College of Social Sciences, the city government began to fulfil another

institutional dream. In 1964, it established a committee to formulate a strategy to set up a technical university in the city (Wacklin 1995, 16). This ambition was supported by the local conviction about the need to generate new industrial fields. The institutional dream materialised in 1965 when a filial unit of the Helsinki University of Technology was established in Tampere. The rector and the board of the Helsinki University of Technology were in favour of it, but the professors and the Union of the Electrician Engineers did not support it (Wacklin 1995, 16–17). As planned in advance by the local actors, the filial unit was turned into an independent university of technology in 1972 (Ahonen 1993; Wacklin 1995, 53; Ayres 2005). Similar to every university in Finland, the two new Tampere-based universities became state universities in 1974 (Kaarninen 2000).

Usurping the two universities from Helsinki was not actually supported by the government; neither was it forestalled, although the process also met resistance. In a way, in the early days of its knowledge-city strategy (not explicitly defined as such yet), Tampere applied an approach that can retrospectively be labelled as institutional opportunism. Institutional opportunism is a strategy of knowledge-race coevolution, in which a weaker party taps into a stronger ecosystem and aims to exploit the latter to strengthen its own institutions. Tampere tapped into the strongest science concentration in Finland and quickly constructed a local institutional capacity for the future. As shown in retrospect, the universities have played a central role, not only in the attractiveness of the city but more specifically, in several industrial path developments, including the rapid growth of the ICT industry in the 1990s, upgrading of the engineering and the automation industries since the early 1990s and the emergence of medical technology and optoelectronics.

To highlight the cases in point, all these developments were supported, first, by the two universities' efforts to profile themselves differently from the other Finnish universities by establishing future-oriented professorships starting in the 1960s. For example, the professorship in computer sciences established at the University of Tampere in 1965 was the first in the Nordic countries. The two universities also pioneered in other fields of study (Kaarninen 2000; Häikiö 2015). For its part, the strategy adopted by the universities paved the way for new fields of industry to emerge in the following decades. Second, the local-level understanding of especially enhancing the technological skills of the local labour force soon met the national-level policy to increase the overall number of university students in the country. The two Tampere-based universities started to grow rapidly.

Third, the early institutionalisation of the university–industry collaboration proved crucial for the subsequent industrial path creation. Since day one, Tampere University of Technology (TUT) has emphasised collaboration with industry and labelled itself as a university for industry (Häikiö 2015). However, in the early days, the institutional arrangements from above were not supportive at all, and close collaboration between universities and industries was not regarded as desirable. On the contrary, it was considered a threat to the purity of science, and the Ministry of Education issued a strict regulation against academic research services for companies (Häikiö 2015). The restrictive policy concerning collaboration with industries was locally deemed harmful; indeed, despite strong institutional pressure from above, TUT continued its collaboration with firms. As Hassi states, “if discrepancies of interpretation occurred with the Ministry, the interpretations were consistently made in the university” (1993, 381–382).

However, the question was about not only the unfavourable national institutional arrangements regulating university–industry collaboration but also the minimal structures

supporting collaboration even until the mid-1980s. To some extent, the question also involved the lack of a structured dialogue among different institutional actors to overcome the implementation gaps (see Brömmelstoer & Schrijnen 2010). Interaction was quite largely based on (a) close personal-level contacts between professors and industry leaders, (b) an explicit conviction that strengthening local institutional capacity would be important for the future and that close collaboration in several technology fields was an imperative and (c) the cunning institutional navigation of local leaders to work against the will of the Ministry of Education without harming the university's future. Indeed, the city government's obstinacy was decisive in establishing two universities in town, and TUT's obstinacy was crucial in securing its role as a "university for industry".

In sum, regulative and normative top-down institutions regulated against university–industry collaboration, and Tampere was not in a position to receive a government-established university. The local leaders in Tampere were convinced of the need to have universities, not only for education and science but also for city and industrial development. Local cognitive-cultural institutions concerning higher educational institutions and collaboration between universities and industries somewhat conflicted with the national institutions, and proactive local agency proved crucial.

### **3.2 Adapting to a turning tide with an institutional protection strategy**

If the 1970s were characterised by strong top-down regulation and normative institutional pressure against university–industry interaction, in the 1980s, the institutional environment and thus institutional arrangements gradually began to become less hostile towards university–industry collaboration and to emphasise its significance. Suddenly, the still smallish science and innovation community in Tampere was well positioned to exploit the changing national institutions and gradually increasing R&D funding. The opportunistic strategy was left behind, and institutional protection began.

In Tampere, as well as in some other Finnish city-regions, technology centres and technology-transfer agencies were founded, and more proactive local business development strategies were adopted in the 1980s (Linnamaa 2002; Männistö 2002; Pelkonen 2005). Normally, this kind of phase might be characterised using policy or organisational terms. However, from an institutional perspective, the question was about taking several steps forward in institutionalising university–industry interaction, in other words, protecting it against other ideas requiring public attention and funding. Since protection refers to efforts to preserve something, institutional protection is an elemental part of an institutionalisation process. Institutionalisation involves "a process of a new practice, activity, norm, belief, or some other institution, becoming an established part of an existing system, organization or culture" (Sotarauta & Mustikkamäki 2015, 343). There was no need to protect the two universities as such, as they had earned their places in the Finnish higher educational system, but it was necessary to establish new structures and mechanisms to secure a well-functioning but non-structured university–industry interaction and take steps forward. By institutionally protecting university–industry interaction, the aim was to attain a higher degree of resilience. Thus, such collectives of actors were also added in the local system, whose mission was to develop and protect new social practices.

Although in the 1980s, the national institutions became more permissive towards university–industry interaction, and local structures supporting it were constructed, the somewhat conflicting situation prevailed. For example, organisations under the state

government (including universities) were not allowed to own any property, make commercial acts or establish specialised companies to perform certain functions. As the universities' hands were still somewhat tied, locally emerging support communities, often led by the local government, proved important. Many of the new mechanisms institutionalising university–industry collaboration were initiated by the local government in cooperation with other stakeholders and were based on extensive collaboration among firms, public-sector actors and higher educational institutions. Eventually, the new models have led to a situation where many of the Finnish universities have not been strategic in their own engagement efforts, as there is usually a network of actors around them, constructing collaborative models with and for them.

In sum, the tide was beginning to turn. Cognitive-cultural institutions supporting university–industry interaction, complemented by several regulative and normative ones, were constructed but were still in their early stages of development. Several institutional discrepancies remained, sending conflicting messages to local actors.

### **3.3 Exploiting the innovation hype with an institutional expansion strategy**

In the early 1990s, the institutional tide turned more comprehensively, and Finland became a star pupil in the global class of innovation students. The policy emphasis was laid on innovation; thus, university–industry interaction was also stressed. The policy focus shifted explicitly to global competitiveness, innovation systems and clusters; formal institutional arrangements began to be transformed and to expand accordingly. Indeed, Finland was among the few countries in the world that began to construct a new type of innovation and cluster-oriented policies already at that time (Sotarauta 2012). Lemola (2016) calls the 1990s a “golden decade” of the Finnish innovation policy but notes that the tide started to turn in the 1980s, and seeds of change were planted even earlier, also nationally. Prior to the economic recession of the early 1990s, Finnish public R&D policy focused primarily on individual enterprises and macro-economic factors rather than on the contexts of innovation (Romanainen 2001, 381). The new policy's meta-rationale was reflected on the idea of perceiving the innovation process and policies from a broad perspective, spanning from education and science to firms' innovative activities and commercialisation of technological innovations (Miettinen 2002).

In the expansive phase, the public policies related to STI increased at all levels of governance; all this was also enhanced by Finland joining the European Union in 1995. It is not possible to introduce all the institutional changes that aimed at boosting technology and innovation, but we illustrate the thinking of that time by using national and local development programmes as cases in point. They provided national and local contexts for increasing collaboration among the main parties and aimed to boost specialisation. Nationally, these included the Centre of Expertise Programme (1994–2013), Centres of Excellence for Science, Technology and Innovation (2006–2016/2017) and the Technology Programmes of Tekes. The programmes constructed a platform for ongoing dialogues among (a) national and local policy actors; (b) the public sector, firms and universities across the governance levels; and (c) the public sector, firms and universities at the local level. In a way, these were efforts to create focused and co-ordinated ‘multi-scalar triple helix policies’ to support clustered specialisation. The flagship programmes were tools in network management to cross the institutional divides. To complement the national programmes, the City of Tampere launched a series of local development programmes to further develop the strongholds of the local economy,

provide platforms for collaboration and collective contemplations and continuously search for new directions. The local programmes focused on information society (2001–2005), biotechnology (2003–2009), creative economy (2006–2011) and open innovation (2012–2018).

Overall, Tampere was quick to exploit the more supportive national institutional arrangements for STI, as well as the continuously expanding R&D funding. The rapid growth of the Finnish ICT cluster was dominated by Nokia. Tampere became one of the hotspots of Nokia-led growth, along with the Helsinki and the Oulu city-regions. Indeed, R&D expenditure grew by 481% from 1995 to 2010 but has slowly declined since then (Table 1).

Table 1. The increase of R&D expenditure (€ million) in Finland and the city-regions of Helsinki, Tampere and Oulu, and the shares of the leading city-regions (Statistics Finland: PX-Web Database)

City-regions	1995		2000		2005		2010		2015	
	R&D exp.	Share (%)	R&D exp.	Share (%)	R&D exp.	Share (%)	R&D exp.	Share (%)	R&D exp.	Share (%)
<b>Finland</b>	2172	100	4423	100	5474	100	6971	100	6071	100
<b>Helsinki</b>	1027	47	1965	44	2275	42	2958	42	2842	47
<b>Tampere</b>	<b>189</b>	<b>9</b>	<b>606</b>	<b>14</b>	<b>835</b>	<b>15</b>	<b>1099</b>	<b>16</b>	<b>758</b>	<b>12</b>
<b>Oulu</b>	174	8	493	13	688	13	935	13	633	10
<b>Turku</b>	141	7	268	6	317	6	379	5	345	6
<b>Others</b>	641	29	1091	25	1360	25	1601	23	1493	25

In addition to witnessing the rapid growth of the ICT cluster, in which the universities also played a central role, the expansive phase also saw the emergence of other specialised industrial paths. For example, a locally new industry – optoelectronics – emerged from one of the research groups of the Department of Physics of TUT. The key actors were able to institutionalise it and expand on the platforms constructed earlier. Eventually, an optoelectronics industry with several spin-off firms, a specialised intermediary organisation and related research activities became rooted in Tampere (Suvinen 2014). Another case in point is regenerative medicine (human spare parts industry); from its humble beginnings in the late 1990s, it has become one of the nationally acknowledged profile areas, with a joint research institute of the two universities and over 250 scientists. It represents a new field of science and a potential new industry that is an outcome of specialisation based on integrated institutions of the two universities and strong national support (see Sotarauta & Mustikkamäki 2015; Sotarauta et al. 2016). Moreover, the mechanical engineering and automation industry, often in collaboration with TUT, was able to upgrade its offerings and thus survive hard times.

If institutional opportunism and protection were essentially reinforced by individual actors and small active groups and were accelerated by their interaction, in the expansive phase, the question was not only about increasing volumes of resources but also institutionalising knowledge and innovation-oriented thinking more broadly in Tampere. Even though Tampere had built local institutions for science and innovation, renewed, protected and expanded them, even in the 1990s, the new thinking was not fully institutionalised in local policy spheres (Kostiainen & Sotarauta 2003). The strong perceptions and local collaboration patterns shaped by the industrial culture and traditions slowed down the institutional transition in the

cognition from an industrial to a knowledge city, and the new perspectives were constantly confronted by the supporters of the old order. Nonetheless, step by step, the institutional changes initiated earlier started to pay off, manifested in several local economic development strategies and specialised development programmes. The new institutions crept in, and when the changes in the economy and the top-down institutions providing the country with normative directions moved to highlight STI, Tampere also began to gain a broader understanding of its own institutional strategies.

Interestingly, despite top-down institutions becoming in favour of university–industry collaboration, some institutional conflicts have remained. While the university act explicitly maintains that the Finnish “universities must interact with the surrounding society” (MoE), interaction is not supported by the funding system that is used by the government to allocate funds from the state budget to universities. All the 13 indicators emphasise excellence in research and education, not engagement; therefore, increased tension exists between research excellence and various forms of engagement. Only time will tell whether strong university–industry interaction will prevail in Tampere or whether the strong funding related to regulative institutions will guide universities to focus increasingly on scientific excellence even though the normative institutions demand otherwise.

### **3.4 Launching an institutional offensive**

After the expansive phase, Finland has moved to a no-growth era in its R&D. Both public and private R&D expenditure has been in decline since the 2010s. The innovation policy community in Finland seems to be reaching beyond the R&D-oriented, STI-dominated policy and is seeking to find inspiration from such concepts as the Doing, Using, Innovation (DUI) mode of innovation, innovation platform and innovation ecosystem. It is too early to assess where the policy thinking is heading, and what kind of institutional agency is in the making. In Tampere as well, the new approach revolves around innovation ecosystems and platforms; again, new ways to organise local development work are sought. At this point in time, it is difficult to know whether the question is about minor deviations or a somehow novel policy paradigm in the making.

From the institutional perspective, the most important of the latest institutional strategies is the prospective amalgamation of the University of Tampere, TUT and the Tampere University of Applied Sciences that is planned to take place in 2019, which would create a university with more than 35,000 students. The amalgamation of the most social science-oriented Finnish university with the most engineering-based one is a story of its own, especially when the forthcoming higher education concern crosses the strictly regulated gulf between research universities and polytechnics (universities of applied sciences). Our data does not cover the latest phase. Thus, we need to be content with acknowledging that the University of Tampere has made the initiative and has gained wide support from the government and the Ministry of Education and Culture, as well as local stakeholders. It should also be acknowledged that the amalgamation process in itself is a bumpy road with many kinds of incidents. At all events, the main objectives of the amalgamation are to provide students, scholars and scientists with new learning environments, as well as multidisciplinary platforms for producing new types of combinatorial knowledge. Of course, perhaps most importantly, the goal is to institutionally secure the national position as the second largest higher education, science, and innovation concentration in Finland. At least implicitly, another

objective is to challenge the dominant position of the capital city. An institutional opportunist has launched an offensive.

## 4 Discussion

Market-related entrepreneurial agency is usually considered important in the early phases of industrial path creation. Relying on Mazzucato's (2014) study, we emphasise the need to acknowledge, identify and analyse the institutional influences that not only constrain but also make market-related entrepreneurial agency possible. In line with Holmen and Fosse's (2017) position, we argue that the early stages of new path creation can be explained by both institutional factors and/or the strong presence of entrepreneurial agency, as well as highlight the institutional agency shaping the rules of the game and the playing field for industry-oriented efforts. It is not only economic agency that shapes the emergence of new paths, but many kinds of agency are involved and needed (see also Dawley 2014). The main difficulty here lies in identifying the significance of the institutional agency of the past for the industrial path creation of the present. For example, the local actors in Tampere have been cultivating local institutions for STI since the 1950s. Thus, they have been engaged in simultaneous capacity building here and now and the cultivation of local conditions for serendipitous developments in the future. Many developments that appear to many observers as accidental or pure luck have in fact been influenced by institutional agency years or decades earlier.

We have used a broad brush to illustrate the institutional changes and the related agency in Tampere and to discuss how institutions are moulded over the long term and how the fruits of the institutional meta-strategies become visible much later. At this stage of conceptual development, the brush is so broad that the link between the concepts of meta-strategy and agency is not fully utilised and remains to be strengthened in forthcoming studies. Additionally, labelling a complex series of development phases and related incidents as comprising a shift from institutional opportunism to protection to expansion to offensive is an outright simplification of institutional evolution over decades. It contains several specific institutional and industrial trajectories and endless series of decisive incidents. As such, the case under scrutiny supports the view that institutional change is not straightforwardly Lewinian by nature (melt the old, change and freeze again [Lewin 1951]) but Confucian, that is, processional and as such, continuously equilibrium seeking (Weick & Quinn 1999). Inspired by our case analysis, as well as Streeck and Thelen's (2005) study, we suggest that new institutional arrangements creep into the old institutions. Continuous combinations of abrupt and incremental institutional changes are neither transformative (path creative) for nor reactive/adaptive to the protection of the past path but simultaneously both. Institutional agency operates in the nexus of the past, the present and the future, as well as many kinds of institutions. This type of approach seems to bring forward a fairly voluntaristic perspective on agency (see also Männistö 2002).

Especially in the early phases of new institutional developments, institutional entrepreneurship and the related navigation are often unplanned, highly personal and intuitive forms of agency (Ritvala & Kleymann 2012; Sotarauta & Mustikkamäki 2015). Actors simply do what they believe must be done without fully realising what might follow and what kinds of institutions they end up confronting, on one hand, and explicitly changing, on the other hand. When the time is right, it is possible to establish new organisations or carry out other institutional reforms that superficially appear new and fresh but have been boiling

under the institutional surface for some time before emerging. It is possible to identify the core institutional entrepreneurs at different phases and detect master navigators, but it is just as important to acknowledge that they neither accomplished their ambitions alone nor quickly. In Tampere, several institutional entrepreneurs and navigators paved a way for both institutional expansion and offensive by shaping the local institutional arrangements by means of forging new structures, constructing a collective belief system, enriching the dialogue among the main players and renewing identities step by step. In a way, they were champions of creeping change. Actors collectively learnt new ways of thinking and constructed such new interpretations of themselves and the city that transformed cognitive-cultural institutions and in time, were also institutionalised regulatively and normatively that again shaped cognitive-cultural institutions. Reinterpretation is crucial because the institutional influence from the national level sanctions, one way or another, actions deviating from what is framed as suitable (Battilana et al. 2009), which, more often than not, leads to compliance, as local actors tend to bend to a wish, regulation or another institutional factor from above. However (as shown), in some cases, the local actors may successfully challenge the top-down influence and benefit from it later. Of course, it is always a risk to challenge institutional influence from above, but what institutional entrepreneurs do is to recognise opportunities and take risks.

The creeping nature of institutional change easily shadows all the institutional manoeuvres made earlier in time. The four meta-strategies – institutional opportunism, protection, expansion and offensive – comprise many kinds of influence tactics, encompassing coercion, networking, reinterpretation, belief formation, knowledge justification, professionalisation, lobbying, and so on. This kind of multidimensional and deviating behaviour is a challenging form of local agency and demands skilled institutional navigators who construct local institutions while navigating through the top-down influence without damaging prospects. Institutional path creation is indeed a political process. At all events, entrepreneurial activity is by necessity at the centre when institutions are consciously shaped for new paths to emerge. As the case of Tampere suggests, not only firms but several other types of actors can act entrepreneurially for path development. Additionally, any study on institutional agency requires openness to recognise the potentially unintended effects of complex social processes and thus the emergent qualities of institutional change processes.

## 5 Conclusions

This paper corroborates earlier studies showing institutional agency as a patchwork of action, as well as institutional entrepreneurship as a collective and processual form of agency (Drori & Landau 2011; Ritvala & Kleymann 2012; Sotarauta & Mustikkamäki 2015). It is collective as actors are both directly and indirectly dependent on one another's activities (also temporally). Often, they do not even perceive the interdependencies but simply build on what already exists without recognising the ways that institutions were moulded to allow a new phase to unfold. Institutional entrepreneurship and institutional navigation should not belong to the attributes of individual actors but be present in the relationships that connect actors in the emerging institutional path. We add to the earlier literature the notion of institutional navigation, that is, the ways that actors navigate through multilayered and conflicting sets of institutions. Organised institutional navigators not only comply with institutions, but when

consciously aiming to find their way through them, they simultaneously end up promoting creeping change. Institutional navigation is a gentle form of institutional entrepreneurship.

In innovation studies, institutions are usually approached more instrumentally than by delving deep into the social structures of a given spatial entity. This may be the result of institutions being notoriously difficult to operationalise and the institutional theory still operating at an abstract level (Rodriguez-Pose 2013). Therefore, in regional innovation system studies, institutions are often specified by using predefined lists of institutions (Grillitsch 2014). Top-down institutions are relevant to have, but (as stressed throughout this paper) we might lose analytical power by focusing only on normative and regulative aspects of top-down policies, as well as cognitions prevailing at the national level. It might be impossible to fully appreciate the current position of Tampere, for example, without scrutinising local institutional strategies in relation to the top-down influences. It is believed here that to fully grasp the complex social-political-economic nature of path creation and the related institutionalisation, we need to reach beyond the top-down view on institutions and seeing only their national layer and find ways to study institutions in a bottom-up manner, through the local actors' intentions, strategies and preferences. As Sotarauta (2017, 589) points out, "if we focused solely on the top-down effect of institutions, we would neglect the diversity of actors and assume that they are all the same, while it is institutions that differ".

### Acknowledgments

With this piece of writing colleagues from Tampere, Finland wish to congratulate Björn on his birthday, and appreciate his longstanding contribution to the field and warm friendship. As a highly-cited scholar Björn is used to seeing his name in the list of references. As a token of appreciation, we decided not to cite Björn's work in this Chapter, and thus provide him with a rare opportunity to see a scholarly piece without his name. It is about time.

The authors are grateful to Kevin Morgan and Jon P. Knudsen for very constructive and useful pieces of advice.

### References

- Ahonen, P. (1993). *Tampereen teknillisen korkeakoulun synty* [The Birth of Tampere University of Technology]. Tampere, Finland: Tampereen teknillinen seura.
- Battilana, J., Leca, B. and Boxenbaum, E. (2009). How actors change institutions: Towards a theory of institutional entrepreneurship. *The Academy of Management Annals*, 3, p. 65–107.
- Benneworth, P. (2007). *Leading innovation: building effective regional coalitions for innovation*. Research report. London, UK: Nesta.
- Boschma, R. (2017). Relatedness as driver of regional diversification: a research agenda. *Regional Studies*, 51(3), pp. 351-364.
- Boschma, R., and Martin, R. (2010). The aims and scope of evolutionary economic geography. In: R. Boschma and R. Martin, eds. *The handbook of evolutionary economic geography*, Cheltenham, UK: Edward Elgar. pp. 3–39.
- Boschma, R., and Frenken, K. (2006). Why is economic geography not an evolutionary science? Towards an evolutionary economic geography. *Journal of Economic Geography*, 6, pp. 273–303
- Brömmelstroet, M. T., and Schrijnen, P. M. (2010). From planning support systems to mediated planning support: A structured dialogue to overcome the implementation gap. *Environment and Planning B: Planning Design*, 37(1), pp. 3-20.

- Carrillo, F. J., Yititcanlar, T., García, B and Lönnqvist, A. (2014). *Knowledge and the City: Concepts, Applications and Trends of Knowledge-Based Urban Development*. Abingdon, Oxon, UK: Routledge.
- Dawley, S. (2014). Creating New Paths? Offshore Wind, Policy Activism, and Peripheral Region Development. *Economic Geography*, 90(1), pp. 91-112
- Djelic, M-L. and Quack, S. (2007). Overcoming path dependency: path generation in open systems. *Theory and Society*, 36(2), pp. 161–186
- Drori, I. and Landau, D. (2011). *Vision and Change in Institutional Entrepreneurship*. Berghahn Books, New York, US.
- Emirbayer, M. and Mische, A. (1998). What is agency? *The American Journal of Sociology*. 103(4), pp. 962–1032.
- Garud, R, Kumaraswamy, A. and Karnøe, P. (2010). Path dependency or path creation? *Journal of Management Studies*, 47, pp. 760–74.
- Garud, R., and Karnøe, P. (2001). *Path dependence and creation*. London and Hillsdale, N.J. Lawrence Erlbaum.
- Gertler, M. S. (2010). Rules of the game: The place of institutions in regional economic change. *Regional Studies*, 44(1), pp. 1-15
- Grillitsch, M. (2014). *Institutional change and economic evolution in regions*. Papers in Innovation Studies 2014/1 Lund, Sweden: Lund University.
- Hassi, O. (1993). Tampereen teknillinen korkeakoulu vuosina 1975-1992 [Tampere University of Technology in 1975-1992]. In *Tekniikan Tampere*. Tampere, Finland: Tampereen teknillinen seura.
- Isaksen, A. (2015). Industrial development in thin regions: Trapped in path extension? *Journal of Economic Geography*, 15(3), pp. 585–600.
- Jepperson, R. L. (1991). Institutions, Institutional Effects, and Institutionalism. In W. W. Powell and P. DiMaggio, eds. *The New Institutionalism in Organizational Analysis*. Chicago, USA: The University of Chicago Press.
- Kaarninen, M. (2000). *Murros ja mielikuva. Tampereen yliopisto 1960–2000 [Period of transition and image: University of Tampere 1960–2000]*. Tampere, Finland: Tampereen yliopisto and Vastapaino.
- Kostiainen, J. & Sotarauta, M. (2003). Great Leap or Long March to Knowledge Economy: Institutions, Actors and Resources in the Development of Tampere, Finland. *European Planning Studies*. 10(5), pp. 415-438.
- Lemola, T. (2016). Finland: Building the Base for Telecom Breakthrough. A paper presented in *Industrial Policy for New Growth Areas and Entrepreneurial Ecosystems*. Helsinki 28.-29. November 2016
- Linnamaa, R. (2002). Development process of the ICT cluster in the Jyväskylä Urban Region. In: M. Sotarauta and H. Bruun, eds., *Nordic perspectives on process-based regional development policy*. Stockholm, Sweden, Nordregio report 2002:3.
- Martin, R. (2000). Institutional approaches to economic geography. In: T. Barnes and M. Sheppard, eds., *A companion to economic geography*, Oxford, UK: Blackwell. Pp. 77-94.
- Martin, R. (2010). Roepke Lecture in Economic Geography—Rethinking regional path dependence: Beyond lock-in to evolution. *Economic Geography* 86, pp. 1–27.
- Mazzucato, M. (2014). *The Entrepreneurial State: Debunking Public vs Private Sector Myths*. London, UK: Anthem Press.
- Miettinen, R. (2002) *National Innovation System: Scientific Concept or Political Rhetoric*. Helsinki, Finland: Edita.
- Morgan, K. (1997). The learning region: institutions, innovation and regional renewal. *Regional studies* 31, pp. 491-503.
- Männistö, J. (2002). *Voluntaristinen alueellinen innovaatiojärjestelmä: Tapaustutkimus Oulun ict-klusterista, [A voluntaristic regional innovation system: The ICT cluster in the Oulu area]* Rovaniemi, Finland: Acta universitatis lapponensis 46.
- North, D. C. (1991). *Institutions, institutional change and economic performance*. Cambridge, UK: Cambridge University Press.

- Parkinson, M., Meegan, R., Karecha, J., Evans, R., Jones, G., Sotarauta, M., Ruokolainen, O., Tosics, I., Gertheis, A., Tönko, A., Hegedüs, J., Illés, I. Lefèvre, C. and Hall, P. (2012) *Second Tier Cities in Europe: In an Age of Austerity Why Invest Beyond the Capitals?* Liverpool, UK: Liverpool John Moores University.
- Pelkonen, A. (2008). *The Finnish Competition State and Entrepreneurial Policies in the Helsinki Region*. Research Reports No. 254, University of Helsinki, Department of Sociology. Helsinki, Finland: Helsinki University Print.
- Rafiqi, P. (2009). Evolving economic landscapes: Why new institutional economics matters for economic geography. *Journal of Economic Geography*, 9(3), pp. 329–353.
- Rasila, V. (1988). *Markkinapaikasta tehdaskaupungiksi* [From market place to industrial city]. In: Tampereen historia I. Tampere, Finland: City of Tampere.
- Ritvala, TY. & Kleymann, B. (2012). Scientists as midwives to cluster emergence: An institutional work framework, *Industry and Innovation*, 19, pp. 477–497.
- Rodríguez-Pose, A. (2013). Do institutions matter for regional development? *Regional Studies*, 47(7), pp. 1034–1047.
- Romanainen, J. (2001). The cluster approach in Finnish technology policy. In: *Innovative Clusters: Drivers of National Innovation Systems* (OECD, Paris), pp. 377–388
- Scott, W. R. (2001). *Institutions and organizations*, 2nd edition. Thousand Oaks, US: Sage
- Seppälä R. (1998) *Hyökkäävä puolustaja. Maakunnan selviytymistaistelu ja Tampereen Kauppakamari 1918-1998* [Offensive defender: Regional fight for survival and Tampere Chamber of Commerce 1918-1998]. Helsinki, Finland: Otava.
- Simmie, J. (2012). Path dependence and new technological path creation in the Danish wind power industry. *European Planning Studies*, 20, pp. 753–72.
- Sotarauta, M. & Heinonen, T. (2016). The Triple Helix Model and the Competence Set: Human Spare Parts Industry under Scrutiny. *Triple Helix*, 3(8), pp. 1-20.
- Sotarauta, M. & Mustikkamäki, N. (2015). Institutional entrepreneurship, power, and knowledge in innovation systems: Institutionalization of regenerative medicine in Tampere, Finland. *Environment and Planning C: Government and Policy*, 33(2), pp. 342 – 357
- Sotarauta, M. & Pulkkinen, R-L. (2011). Institutional entrepreneurship for knowledge regions: In search of a fresh set of questions for regional innovation studies. *Environment and Planning C: Government and Policy*, 29, pp. 96–112.
- Sotarauta, M. 2017. An actor-centric bottom-up view of institutions: Combinatorial knowledge dynamics through the eyes of institutional entrepreneurs and institutional navigators. *Environment and Planning C: Politics and Space*, 35(4), pp. 584-599
- Sotarauta, M., Heinonen, T., Sorvisto, P. & Kolehmainen, J. (eds.) (2016). *Innovation Ecosystems, Competencies and Leadership: Human Spare Parts and Venture Finance Ecosystems under Scrutiny*. Tekes Review 329/2016. Helsinki, Finland: Tekes.
- Statistics Finland, PX-Web Database.
- Streeck, W., & Thelen, K. (2005). Introduction: Institutional change in advanced political economies. In: W. Streeck and K. Thelen, eds., *Beyond continuity: Institutional change in advanced political economies*, Oxford, Finland: Oxford University Press. pp. 1–39
- Suvinen, N. (2014). Individual actors building an innovation network. In: R. Rutten, P. Benneworth, D. Irawati and F. Boekema, eds. *The social dynamics of innovation networks*. Abingdon, UK: Routledge. pp 140–156
- Tirronen, J. (2005). *Modernin yliopistokoulutuksen lähtökohdat ja sivistyskäsitys*. Kuopio, Finland: Kuopion yliopiston julkaisu E. Yhteiskuntatieteet 122.
- Wacklin, M. (1995). *Lainahöyhenissä kohti teknopolista. Kronikka 30-vuotiaan TTKK:n vaiheista* [In borrowed plumes towards technopole: 30 years chronicle of Tampere University of Technology]. Tampere, Finland: Tampereen teknillinen korkeakoulu.
- Weik, E. (2011). Institutional Entrepreneurship and Agency. *Journal of the Theory of Social Behaviour*, 41(4), pp. 466-481

