# Endogenous Rerouting and Longevity in Systemic Organisations of Production


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**Abstract** Recent debate in regional studies has focused on place-based approaches to local development that are associated more and more to the investigation of systemic features able to trigger sustainable innovation paths and resilience against shocks and challenges. This chapter draws on the interpretative arguments related to the endogenous processes of innovation and systemic mechanisms of longevity and long-term competitiveness in industrial districts and local production systems. A critical review of the recent contributions on this topic allows a novel understanding of how—under certain conditions—local production systems can benefit from endogenous rerouting, especially in the face of the recent technological changes strongly impacting on traditional industrial organisations. The activation of latent mechanisms of transition may recombine embedded competences and useful knowledge to deliver path-breaking economic solutions that create new competitive advantages and allow longevity to local production systems.

**Keywords** Industrial districts and local productions systems · New wave of technological change · Rerouting and longevity

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## 1 Introduction

In many areas of industrialised countries, economic growth and competitiveness emerged from local models of industrial organisation, such as industrial districts (IDs) and local production systems (LPSs). They were characterised by populations of small- and medium-sized firms, highly specialised in traditional manufacturing sectors (see Becattini 1990; Porter 1998). The analyses of structural change in IDs and LPSs spread across different research fields during the 1990s and early 2000s, aiming at understanding their capability of adjustment in the face of gradual and non-gradual changes or instead path dependency and lock-in conditions (see Grabher 1993; Bellandi 1996). The balance depends on the trade-off between the positive and negative effects of local specialisation in terms of learning and innovative activities (Visser and Boschma 2004; Storper et al. 2015). Knowledge that is specialised and accumulated over time would either favour the adaptation of IDs as evolutionary systems or weaken their adaptability in the face of radical and rapid changes.[1] Indeed, while according to some authors industrial specialisation still plays a key role in economic growth (Storper et al. 2015), the recent debate on the constraints of specialisation has led others to suggest that diversity or 'related variety' (Frenken et al. 2007) might be a better driver of regional economic development in the longer term.

The nature of learning processes and knowledge accumulation within IDs and LPSs has been the object of in-depth analyses (see Becattini et al. 2009; Belussi and Sedita 2012; Lombardi 2003; Menzel and Fornahl 2010). In this relation, Crevoisier and Jeannerat (2009) have introduced the concept of 'territorial knowledge dynamics' as a systemic process that takes place thanks to different components of endogenous and exogenous type. Knowledge in IDs and LPSs is not a datum: various features affect its capacity to face both gradual and rapid changes and to identify multiple path alternatives, including possible switching across renewed development paths (Bellandi and Santini 2017). Contemporary challenges in global markets and technologies may lead to the emergence of a new generation of IDs, as the so-called ID Mark 3 models (Bellandi and De Propris 2015). Here, local structural configurations, strongly related to the inherited identity of the place, and combined with regional, national and global networks, assure customisation and *servitisation*, bringing to renewed opportunities of competitive advantage.

In this chapter, we introduce the concept of *endogenous rerouting* to suggest that the realisation of structural transitions (or *traverses*) may ensure the longevity of socio-economic ecosystems, like an ID and a LPS. The changes are characterised by the combination of many tendencies, internal and external, and the preservation of a strong local identity: *the one in the many and the many in the one* (the motto of Marshall 1919). To explore this issue, Sect. 2 presents the gradual and non-gradual

[1] See the concept of 'rigid specialisation trap' caused by the negative correlation between adaptation and adaptability in path of development of specialised industries embedded into a defined area (Grabher 1993).

sources of instability and the related systemic adjustments which may justify crises as well as changes in IDs and LPSs. Section 3 illustrates IDs' learning processes and the spawning of new know-how nuclei thanks to endogenous processes drawing on the concept of 'useful knowledge' (Kuznets 1965). We explore here processes of knowledge accumulation and the roots of endogenous rerouting in IDs, in particular in face of the new wave of technological change. Section 4 applies this framework to outline endogenous rerouting processes. Section 5 offers some concluding remarks.

## 2 Gradual and Non-gradual Changes in Mature IDs

During the past few years, the debate about the capacity of LPSs to promote long-lasting development and competitiveness has become more and more relevant, because of several cases of crises in mature IDs (see Staber 2001; Hodson 2008) apparently related also to the challenges posed by globalisation and the recent financial and political shocks (e.g. Martin 2011).

It is worth mentioning that in that debate, different units of analysis were used making it difficult to compare findings (Becattini et al. 2009). Let us recall among such units: IDs with their typical manufacturing specialisation and SMEs prevalence, more general classes of LPSs[2] or other types of local socio-economic ecosystems, if not generic local or regional contexts (e.g. Iammarino and McCann 2006); local SME clusters of main, complementary and subsidiary industries typical of IDs or more generic types of territorial business clusters (see Porter and Ketels 2009; Asheim and Isaksen 2003); referring to either IDs, LPSs or local clusters, various cases distinguished as regard to different factors and processes[3]; and within ID models, various types like the Marshallian ID (see Becattini 1990) and the Italian models (e.g. Dei Ottati 1994).

In this chapter we will consider IDs, in particular the Mark 2 and 3 types proposed by Bellandi and De Propris (2015). The industrial component of the ID will be referred as the local cluster including the main industries in which the cluster is specialised with complementary and subsidiary industries. An ID may host secondary industries with independent external factor and good markets.

A seminal work by Grabher (1993) investigates the Ruhr area as a famous case of a regional ID that fell in deep lock-in conditions, because of 'the very socioeconomic conditions that once made these regions stand out against the rest' (p. 256). After that paper, a large stream of literature, in evolutionary economic geography, has highlighted the tension between positive and negative effects of the agglomeration

[2]Sometimes, in literature, the term Local "Production" System is used to refer to the local business cluster featuring the industrial component of an ID.

[3]For example, in terms of path of development, shape and phase along a life cycle, types and plurality of sectors of specialisations, types of industrial organisation (heterarchical, hierarchical), types of local relations between the business organisation and the social and institutional context and types of relations with external agents and systems (see Cooke 2009; Hervas-Oliver et al. 2014).

of specialised industry, in particular regarding the adaptation and adaptability capacities of the system (see Ter Wal and Boschma 2011; Hassink 2017). Other authors stress the diversity and the complexity of the economic structure (e.g. Hausmann and Hidalgo 2011), or the so-called related variety (Frenken et al. 2007), as crucial resources for regional economic development.

The case study of the Baden-Wurttemberg district by Staber (2001) confirms the important role played by the mono-specialisation of the production system, together with the support given by a specific institutional context, in promoting the generation of a compact set of shared knowledge, values, languages and norms. The same can be strong sources of inertia when exogenous shocks occur, even if this is not a necessary effect. According to Belussi and Sedita (2012), heterogeneous evolutionary patterns follow from similar initial conditions and/or resource endowments and comparable opportunities. The systemic capability to adjust its economic structure is not only related to the number and size of local companies, as well as to the relations between them within the core industry, and to the heterogeneity and variability of the knowledge embedded in the local cluster (Menzel and Fornahl 2010). Access to different sources of knowledge plays a key role in promoting positive dynamics able to support innovation and competitiveness. IDs in Montebelluna (Italy) and Mirandola (Italy) are examples of diversification process strategies, whereas the IDs of Matera and Arzignano (also in Italy) exemplify differentiation and product upgrading strategies. These case studies show that there might be a variety of factors triggering an evolutionary change with positive dynamics (Belussi and Sedita 2012). The local cluster at the core of an ID can renew itself, when it exploits the heterogeneity of the local production knowledge. As stressed by Menzel and Fornahl (2010), an increasing heterogeneity may result from knowledge linkages with external organisations either locating into the system (e.g. the leather district in Arzignano and the microelectronics LPS in Catania) or acquired by the ID firms (as, e.g. the packaging LPS in Bologna and the eyewear district in Belluno).

The renewal of IDs' sets of knowledge rests on what external inputs they favour or support. A critical role is played here by the cultural background of the system. This includes not only traditions of productive, trade and welfare practices within the place but also the inherited institutional framework, together with business and social jargons, symbols, rituals, norms and values.

For example, the institutional framework can be the basis for initiatives that upgrade the local skills, strengthen the authenticity of local products with cultural-based activities (e.g. the Boot Museum in Montebelluna or the museums in the Jura Watch Valley), allow the absorption of knowledge flows and support the building and working of multilevel platforms for networks of innovators (MacNeill and Jeannerat 2016). On the other hand, barriers in exploiting new knowledge tend to increase along a path of development, because of the growing weight of the relational capital sunk in the same cultural background.

The next sections focus on variation and heterogeneity of production knowledge in IDs, comparing, in particular, Mark 2 and Mark 3 types (Bellandi and De Propris

2015), and considering the possibility of rerouting a mature ID Mark 2 to a renewed Mark 3 path, in face of contemporary technological and organisational challenges. Mark 2 IDs are characterised by a local innovation system largely dominated by endogenous processes of creation and diffusion of practical knowledge in the local cluster of specialised SMEs. Instead, in Mark 3 IDs, the internal structure and the production organisation are a 'global reference point for the exchange of ideas on specific professional and socio-cultural issues' (ibid. p. 75), and positive dynamics relates to the variation and heterogeneity of the productive knowledge located into the area. A Mark 2 type may have developed some latent Mark 3 features along its development path, and such features can emerge in the face of challenges if supported by specific strategies.

Before exploring such dynamics of endogenous rerouting, the next section introduces an explicit framework on the ID's learning processes and the accumulation of productive knowledge and competences.

## 3 IDs' Learning Processes and the Generation of New Know-How Nuclei

The issue of knowledge generation includes the sourcing and sharing of new knowledge (see Granovetter 1973; Burt 2004), the relations with different modes of innovation and the way in which various socio-economic ecosystems are able to absorb and promote innovation over time (Malerba 1992).

The ID mode of innovation is consistent with the doing, using and interacting (DUI) mode (Jensen et al. 2007), which is an experienced-based mode of collective learning. Concepts of 'decentralised industrial creativity' (Bellandi 1996), 'semi-automatic cooperation' (Dei Ottati 2009) and 'collective action and leadership' (Bailey et al. 2010) were proposed for the analysis of ID processes of innovation, which may be applied also for understanding processes of endogenous rerouting.

### *3.1 Accumulation of Knowledge in Processes of Long-Term Exploration and Exploitation*

The ID may be seen as a complex socio-economic adaptive system (Lombardi 2003) characterised by paths of accumulation of 'localised technological knowledge' (Antonelli 1999). If irreversibility and inertia prevail along such paths, 'rigid specialisation trap' phenomena emerge (Grabher 1993), with a progressively decreasing knowledge variety.

Studies on learning processes in various types of socio-economic ecosystems have investigated the relation between the exploration of new knowledge bases and

the exploitation of a set of acquired knowledge (March 1991).[4] For example, the early development phase of an ID, as well as its de-maturing phase, may be characterised by a high degree of exploration, which includes search, experimentation and discovery. Differently, maturity would be characterised by a more extensive exploitation, with phenomena such as refinement, efficiency and implementation. Systems that focus on exploration suffer high costs of experimentation, while those focussed on exploitation may be trapped in suboptimal stable equilibria. Therefore, an ID, in order to enjoy longevity, should be able to balance exploration and exploitation in a reproductive way.

The accumulation (or loss) and the balances (or unbalances) are regulated by the structural features of the ID, in terms of its institutional and cognitive frames. The latter, focus of this section, may be illustrated starting from the concept of 'useful knowledge' (Kuznets 1965), which concerns the manipulation of nature for human material gain throughout inventions and design of new techniques (Mokyr 2002). As highlighted by Mokyr, this notion includes two types of knowledge: 'propositional knowledge' that concerns natural phenomena and regularities and 'instructional or prescriptive knowledge' that includes instructions and techniques that can be executed. Propositional knowledge refers to what 'we today would call "science" (formalised knowledge)' (Mokyr 2002, p. 5); in particular, it relates to basic scientific researches, while prescriptive knowledge 'consists of a monstrous book of blueprints, whether codified or tacit, of techniques that society could carry out if it wanted' (ibidem, p. 5). Every specific socio-economic ecosystem, such as an ID, may apply just a small subset of the whole knowledge potentially available in a period, in relation to the productive specialisation and to the institutional features of the system. This is also related to the fact that part of the prescriptive knowledge is specific to the context of constitution, i.e. it combines tacit components within sets of knowledges not easily transferable outside the context (Fig. 1).

The agents rooted in an ID, with their competences, carry out in a distributed way a subset of specific prescriptive knowledge and the intersecting parts of easily transferable (codified, formalised) propositional knowledge. The selection of knowledge available within an ID, combined with the available competences, identifies the 'manifest entities of knowledge' (B*), i.e. the repository of productive (and social) practices adopted or that may be adopted by the agents of the ID (see Fig. 1). These components of the cognitive frame evolve through agents (within firms, families, public and collective agencies) who learn and upgrade localised knowledge, thanks to direct activities (e.g. specific investments in exploration of new manifest entities) and continuous feedbacks (e.g. effect of exploitation processes) (see lines Fig. 1).

The agents of innovation and change within the ID more or less intensively explore and seek interesting items of knowledge that circulate outside the selected set, and that could be incorporated in some ways within it. While all the ID agents work for the exploitation of knowledge, some act as 'gatekeepers' in processing

[4]Here the concepts of 'absorptive capacity' (Cohen and Levinthal 1990) and 'cognitive distance' (Nooteboom 2000) could be fruitfully considered and applied.

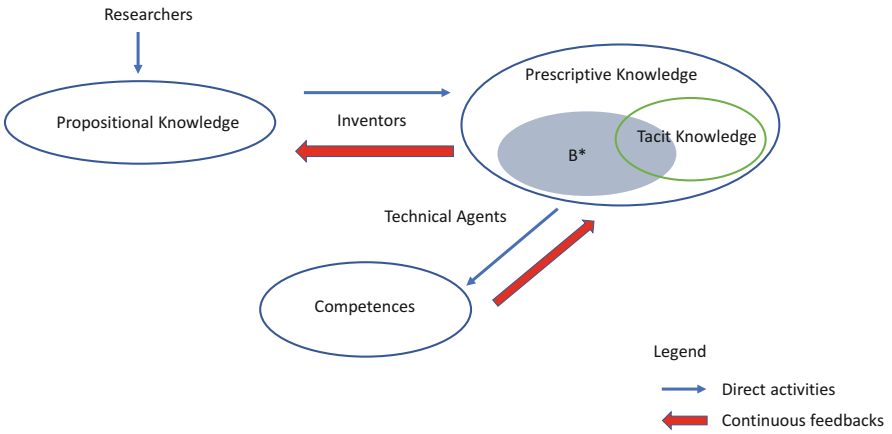


**Fig. 1** The Mokyr's model of useful knowledge and competences. Source: Authors' elaboration

selected knowledge for reproducing and developing specific knowledge and practices. Following Mokyr's framework, the ID cognitive frame is identified by a mix of propositional knowledge, prescriptive knowledge and competences accumulated through time. Under a dynamical perspective, knowledge and competences grow, hybridise, disseminate continuously and variously and sometimes disappear.

The selected set of useful knowledge is not just distributed among the single ID agents, but it has an intermediate structure, made of subgroups of agents who have relatively homogeneous characters related to the cognitive frame, which we call the 'know-how nuclei' (Fig. 2). The distribution can change from one period to the next one.

The exploitation of 'useful knowledge', within and among the know-how nuclei of an ID, leads to a bottom-up generation of new knowledge to be explored. It may be argued, however, that without exploration activities spanning the not selected knowledge, the processes of bottom-up generation of new knowledge have decreasing returns, as it is suggested by Antonelli (1999) in the model of 'localised technological knowledge'. The 'not selected prescriptive knowledge' represents opportunities to be explored but yet to become manifest (dotted area in Fig. 2).

The institutions, as a set of rules and conventions, acting upon or within the ID, and the related political and collective bodies give differential incentives and coordination support to exploration and exploitation processes but may also imply barriers related to rent-seeking and inertia (Bailey et al. 2010). The institutional context has to adjust consistently both to the generation of new know-how nuclei and the incorporation of resources that are able to promote renewed paths of development. Barriers and contradictions in such process generate lock-ins (Santini 2016).

The cognitive core is therefore constantly exposed to new knowledge. Some knowledge can be found in the area, albeit not yet manifest. Other sets of knowledge, floating outside the area, can be accessed by gatekeepers, drawn inside the IDs, and

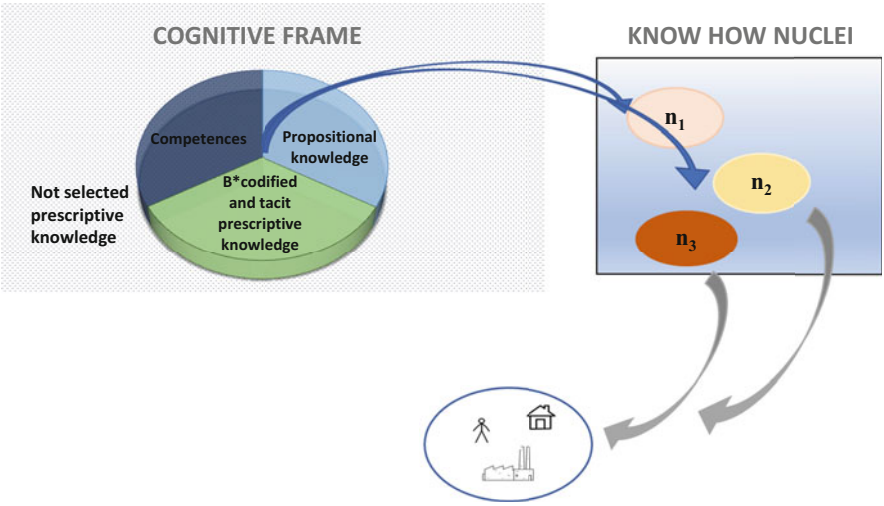


**Fig. 2** Adaptation of the Mokyr's model to the ID cognitive frame. Source: Authors' elaboration

incorporated into the existing know-how to generate new know-how. In various periods and even recently, some IDs have performed exceptionally well in difficult competitive environments, pivoting around DUI-type of innovation processes. However, the current technological paradigm will soon be superseded by a new wave of technologies that will completely change the organisation of production inside and between firms. Such technological change will be perceived by IDs as an exogenous shock that will challenge most of the know-how and the innovation dynamics most ID firms might have been used to. We are suggesting, nevertheless, that IDs have endogenous capabilities to switch development path and avoid lock-in and decline.

## *3.2 Pervasiveness of Digital Technology and New Opportunities*

Innovation always matters, and the process of creating new knowledge that can be translated in innovations has driven the competitiveness of firms, industries and places. However, it has been argued that technological change occurs in waves that start with the introduction of radically new technologies and unfold with the latter branching out applications, together with the emergence and stabilisation of a new techno-economic paradigm (Kondratieff 1979; Perez 2010). The idea is that there is a suite of new technologies, which will have a pervasive impact on the economy by generating countless of minor and incremental innovations able penetrate every

aspect of the economy, both on the production and consumption sides, and the society in general.

There is some consensus on the identification of three more important waves, called 'industrial' revolutions (Perez 2010; Corradini and De Propris 2016). A cluster of new technologies and sectors is currently driving what could be seen as a fourth revolution. Think of the internet, information and telecommunications technology, nanotechnology, bioscience, electronics, micro- and nano-components for microsystems, green and renewables, 3D, artificial intelligence, robotics, sensoring and space technology and autonomous vehicle technology. The embryos of some of these new technologies can be traced back to the mid-1980s, but to witness their impact on production and sectors, we have to wait really until the turn of the century. This current wave is creating a completely new production model inside the factory and between firms. It is already referred to as 'Industry 4.0' or 'Manufacturing 4.0' or again 'Smart manufacturing'.

Four main changes capture the emerging manufacturing model. Firstly, digital technologies are increasingly adopted throughout the production process and between producers and customers. Secondly, new pathways to value creation are activated, for instance, with 'servitisation'. Thirdly, some of the new technologies lend themselves to efficiently scale down production processes and open up new opportunities for small producers that can tap into market niches for personalised, customised and innovative products. And, finally, almost all new technologies can be deployed to enhance the environmental sustainability of production processes and consumption via energy saving, bio-based products and fuel, remanufacturing and reusing of components.

For our argument, there is one important point worth making. Each wave of technological change is the outcome of scientific exploration, inside and across disciplines, leading to breakthroughs in the propositional knowledge we have of our world and in extended parts of prescriptive knowledge. Its effects ripple across the economy through a myriad of channels and over time. Technological change alters the organisation of sectors and places, institutional frameworks, consumption models, as well as the distribution of wealth, income and jobs across regions and classes. The awareness, access to and adoption of such new technologies on behalf of firms and systems vary depending on their absorptive capabilities and creative processes. Inevitably, technological changes will tend to be perceived as exogenous shocks by firms, IDs, production and socio-economic systems. The last wave introduces a complete new array of knowledge, whose usefulness and applicability are still to be fully revealed.

In particular, in IDs the ability to capture, decode, translate, integrate and leverage this new knowledge determines how it is combined, and recombined, with the existing sets of useful knowledge and competencies, to create what we have called 'new know-how nuclei'. In other words, those IDs which have endogenous mechanisms of adaptation and adaptability, allowing them to hybridise their embedded know-how, will be able to reroute their development path towards new ascending trajectories.

## 4 Endogenous Rerouting as Robust Transition Capacities

As stressed in the previous sections, the introduction of disruptive technologies in the global models of production is likely to impact on the traditional industrial organisation and its knowledge configurations. The balance between external economies among firms, specialisation economies within small firms and internal economies within larger firms should be adjusted to allow the IDs benefiting from the new wave of technological changes. The great opportunities offered to new artisans and makers (Porter and Heppelmann 2014), together with the organisational difficulties of giving standardised global solutions to the application of mass customization processes, tell that managing such balance in ways consistent with the ID nature is not only crucial but also possible. However, the mechanisms and resources of knowledge accumulation and innovation in IDs may be unable to explore, and embed, the technological opportunities exposed in Sect. 3.2 into new production, trade and organisational solutions. IDs follow different paths depending both on their embedded cognitive frame shaped by the knowledge accumulation dynamics and on the institutional frame that determines the opportunities for integrating and recombining new and existing sets of knowledge. In Mark 2 IDs, the not-yet selected prescriptive knowledge can be explored, potentially exploited and enlarged (enlargement of B*), especially by means of processes of doing, using and interacting by the agents of the different know-how nuclei, assuring in some cases the longevity of the system. It is a bottom-up accumulation of knowledge shaped by the idiosyncratic characteristics of the cultural heritage of each ID (Sect. 2). When a traditional set of know-how nuclei, embedded in the ID main industry, is at the core of such processes, the innovation capacity of the ID increases, bringing about gradual adjustment, and incremental innovation, but at a decreasing rate (see Antonelli 1999; Bellandi and Santini 2017). Under the hypothesis of a constant accumulation of 'localised technological knowledge' inside an ID over time, Fig. 3 describes an ID development path related to the change of local innovation capabilities (Santini 2016).

These self-reinforcing mechanisms of innovation and change may generate systemic incapacity to reshape the economic structure and face non-gradual changes,

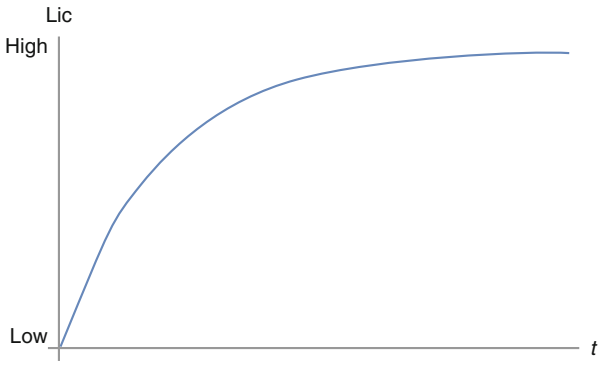


**Fig. 3** Local innovation capacity (Lic) accumulating over time at a decreasing rate within a given ID structural configuration. Source: Authors' elaboration

such as those implied by the exploration and exploitation of useful knowledge related to the last wave of technologies. As the competences and knowledge cumulate into an ID within and around a well-defined specialised field, also the risks of irreversibility and inertia increase, since the set of knowledge embedded into the system becomes progressively obsolete, unable to hybridise, or to renew, its know-how configuration. The exhaustion of innovation thrust due to lock-in clashes with the constantly increasing innovation capacity of external competitors. Therefore, remembering the 'rigid specialisation trap' concept (Grabher 1993), the negative effects of an ever-deeper local specialisation on learning, and innovative activities, seem to be unavoidable and put at risk the ID longevity (see Staber 2001; Visser and Boschma 2004; Boschma 2005; Frenken et al. 2015).

Nonetheless, included in the knowledge generation processes drawn in Sect. 3.1, endogenous mechanisms of reaction may activate, under some conditions. Indeed, *decentralised industrial creativity* based on a DUI mode may seed new know-how nuclei more or less related to the traditional ones (Bellandi 1996), combining new external knowledge through gatekeeper activities (Hervas-Oliver and Albors-Garrigos 2014) and anchoring trans-local actors.[5] This embeddedness of external knowledge is particularly important for a proactive and rapid response to current technological challenges and to the massive mobility of knowledge, capital, individuals and goods, in general. However, it is somewhat underdeveloped in the Mark 2 models that have characterised the IDs re-emerging and championing the second half of the twentieth century (Bellandi and De Propris 2015). Furthermore, even when decentralised industrial creativity was able to promote multiplicity, and to inject the local knowledge pool with snippets of the new wave of technological change, a structural reconfiguration of the ID is not assured by Mark 2 models.

The embedding of new knowledge and competencies is regulated by the institutional context that supports knowledge exploration and exploitation in IDs, but this may also present barriers, and inertia, related to rent-seeking and coordination problems (Bailey et al. 2010). The latter factors are quite effective in IDs Mark 2 when these are challenged by the new technological waves, because of their very structural configuration, cognitively and institutionally focused on local networks of strong ties, presiding exploration and exploitation of new useful knowledge. This is the root cause of lock-in, and reduced growth, that hit even before the great international crisis, unleashing dramatic phases of crisis and decline (Bellandi and Santini 2017).

Some IDs have nonetheless been able to react and adjust, or even grow (Belussi and De Propris 2013). They have acquired ID Mark 3 features, such as an evolving sectoral variety and the inclusion in global networks of production, developing international knowledge flows coordinated by locally anchored actors (Bellandi and De Propris 2015). These same dynamics are bringing risks of fragmentation in ID processes, and loss of local identity, given the centrifugal tendencies related to the

[5] See, for example, Bellandi and Caloffi (2008); Crevoisier and Jeannerat (2009); Hervas-Oliver and Boix-Domenech (2013).

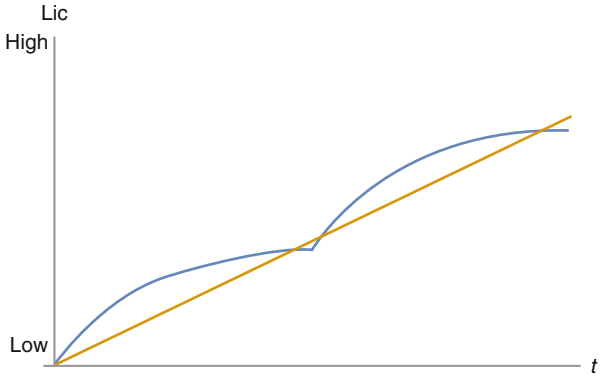


**Fig. 4** Endogenous Rerouting promoting a boost in Local innovation capacity (Lic) against a constantly increasing capacity of external competitors along the time (*t*)

openness to extra-local networks and the disruptive tendencies related to an increasing rate of absorption of external knowledge and innovation. However, the defining ID nature may be preserved even with Mark 3 features, when the place has a cultural background supporting a large variety of interconnected firms that represent *life projects*, innervating the specialised fields of business and giving 'chorality' to the local social life (Becattini 2015). The rerouting of ID Mark 2 towards Mark 3 types in face of the new wave of technological challenges needs the presence and activation of latent mechanisms and resources of robust transition (Martin and Sunley 2015), embedded into the cognitive and institutional paradigms of an ID (Bellandi and Santini 2017). These can be:

(a) Local secondary industries hosting know-how nuclei related to new technologies that, partly replacing the traditional core, fertilise change by opening new fields of production and markets
(b) Producers within the traditional cognitive core who, being 'redundant', enter skill updating programs and support the development of new fields together with digital native workers and entrepreneurs
(c) Local leadership and participatory processes that, triggering plasticity in the institutional frame, help the transformation of the cognitive core and preservation of local identity and authenticity
(d) Local business and policy actors who, being involved in multi-territorial networks, promote the anchoring of international enterprises and the engagement of institutions related to digital, higher education, research and cultural fields

Both the multiplicity of non-obsolete know-how nuclei and the activation of latent mechanisms and resources are consistent with the local inherited identity and play a propelling role for IDs' longevity. Renewed paths of development branch out, driven by the growth of local innovation capacity (as illustrated in Fig. 4).[6] In this sense, the evolution described in Mark 3 IDs is neither so surprising nor accidental.

[6]See the case of the Swiss Watch Valley (Kebir and Crevoisier 2008), the reshoring phenomena in the UK automotive sector (Bailey and De Propris 2014) and many cases of Italian IDs (Belussi and De Propris 2013).

## 5 Conclusions

This paper has discussed how endogenous dynamics of IDs and LPSs may embed sets of knowledge, and mechanisms of rerouting, able to promote longevity of the same systems, even if the risks of lock-in, fragmentation and inertia cannot be underrated, as discussed in Sect. 2.

Section 3 explores the nature of learning processes and knowledge accumulation within IDs, referring in general terms to the new wave of technological change with digital manufacturing, servitisation, new makers and circular economy processes. As discussed in Sect. 4, some adapted forms of ID configurations (Mark 3) may be able to explore, absorb and exploit creatively the knowledge related to a new wave. Here, the endogenous rerouting is supported by the cultural background of the place that virtuously combines regional, national and global networks, together with a multiplicity of competences and know-how nuclei spawned into the ID area. However, the embedding of new knowledge and competencies may be blocked by the local institutional context, because of the dominance of strong ties limiting exploration and exploitation of useful knowledge. This would stifle the lively exchange of experiences within the local variety of interconnected firms that represent *projects of life*. The system, failing to access and exploit new external knowledge, loses innovative capacity and enters systemic fragmentation and decline of its unique identity.

Without the interpretative frame presented in this paper, misleading interpretations of ID development paths—in terms of lock-in and decline or rerouting and longevity—could be easily expressed. To explore the processes of endogenous rerouting, empirical research needs to align 'place-based' and 'cross-sectoral' perspectives. In future researches it will be crucial to understand and verify empirically the key elements of endogenous rerouting, in particular in face of the new wave of technological change.

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