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Collective efficiency and commons in local productive systems

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Abstract. This paper goes back to the topic of collective efficiency (CE) in local productive systems and paths of territorial development. In general terms, such CE needs the integration of markets mechanisms with systemic conditions that have nature of public goods. The discussion of an extended framework of specific public-like goods helps unearthing related important commons' features, as the involvement of communities of local agents may be implied in their provision, use, and regulation. The paper aims at giving a solid foundation to the study of such features, and to show how the same foundation helps shedding light on various topics related to CE, commons, and territory.

Key words: collective efficiency, local productive systems, industrial districts, territorial development, specific public goods, commons

1 Introduction

The paper focuses on the relations between commons, local productive systems, and territorial development. A local productive system (LPS) is a place (or milieu) identified by the active daily overlapping of familial, civic, business and work experiences; and characterised by a prolonged and evolving presence of one or several localized industries (e.g. Dei Ottati 1994, Kebir et al. 2017).

Collective efficiency (CE) is at the core of healthy and autonomous paths of development in LPS, i.e. a class of territorial development. Unhealthy paths are based on pure exploitation of labour and natural resources; non-autonomous paths depend on the strategies of external and/or dis-embedded agents (Garofoli 2002). CE includes various forms of external economies and economies of joint action (Schmitz 1999), and refers in general to the differential and non-easily transferable realization of the advantages of a technical division of labour by means of a social division of labour, where the contributions of independent specialized firms, embedded within the LPS, complement in coordinated ways (Konzelmann, Wilkinson 2017). Market exchanges link the specialised contributions, but transactional and strategic difficulties hinder an effective integration if a joint access to public-like goods does not help (Brusco 1992, Amin 1994, Bellandi 2006, Crouch et al. 2004).

The paper goes back to this kernel of the literature on LPSs, industrial districts, and local development[1]. Firstly, it proposes a systematization of the kernel throughout an

[1]Industrial districts are a class of LPS whose main industries are characterized by a dense population of largely local specialized small and medium sized enterprises (Becattini 1990).

extended and unifying framework of related public-like goods built upon the classical matrix of Ostrom (2009). The frame allows looking at deep (i.e. sunk in more self-evident characters) 'commons' features. They refer to conditions where the LPS agents enjoying easy access to the public-like goods also support, in various ways and at different institutional levels, their provision and regulation. Indeed, a recent stream of research on industrial, cluster or innovation commons has already started to look at such features (Pisano, Shih 2009, Solvell 2015, Allen, Potts 2016, Jeannerat et al. 2017). This paper aims precisely at giving a solid foundation to the study of the same features, thanks to both the framework on public-like goods in LPS and the fertilization with concepts taken from core research on commons (e.g. Ostrom 2009). We will see how such a foundation helps to shed light on various related topics, such as the complex complementarities of individual, collective and public action at the root of CE in LPSs, the hindering factors that hit such complementarities and weaken CE, and the role of territory within multi-scalar evolutionary relations. References to case-studies in the LPS literature will help the conceptual articulation.

Following this, Section 2 recalls the sources of CE and how they need the integration of local and non-local markets with systemic conditions that have nature of public goods. Section 3 extracts a classification of public-like goods from the previous section and points out their specificity to CE in LPS. Section 4 identifies the commons' features of such public-like goods and relates their forms of provision and regulation to CE. Section 5 proposes an integrated foundation, i.e. the networked ecology of commons, which helps broaden the discussion to evolutionary questions. The paper does not enter the general debates on agglomeration economies in urban and regional sciences (Duranton, Puga 2004). Nonetheless, the conclusive Section 6 presents some related implications, together with suggesting routes to policies of territorial development and feedbacks to the literature on commons.

2 Collective efficiency and systemic conditions in LPS

Resounding classical Smithian thinking on the advantages of division of labour, a stream of contributions from Alfred Marshall (1927), on external economies in industrial districts to contemporary regional and urban studies, elaborates concepts on CE in LPS[2]. This section starts from a summary of the main fields of potential CE advantages and their traditional classification as specialisation, learning, and creativity economies.

2.1 Fields of CE in LPS

Firstly, in specialization economies, the advantages come from the efficient use of an extended and differentiated bundle of specialised production capacities already in place for the realization of complementary productive activities. The advantages include the sharing of resources that present an indivisible capacity of production, covering cases of both large infrastructures and combinations of multiple resources with smaller yet significant indivisibilities. The advantages also extend to the matching of differentiated needs and capacities in complementary productive activities, covering cases of both intra-industry organization of comparative advantages and massed reserves of non-routine service capacities or spare parts supplying lines with non-correlated risks.

Secondly, the collective development of human capital is supported by learning by interacting, which increases the impact that learning by doing and using has within the specialized firms of a LPS. This favours the adaptation of complementary know-hows and specializations to the evolving division of labour, as well as the matching of demand and supply of differentiated productive competences. Convergent educational

[2]The roots and fields of Marshallian external economies have been discussed for example by Robinson (1958), and since 1979 by Becattini (1990) and other neo-Marshallians trying to understand increasing returns in industrial districts (Konzelmann, Wilkinson 2017). Related concepts resonate for example in the classification of sharing, matching, and learning advantages of agglomeration in economic geography and spatial analyses (Duranton, Puga 2004), as well as in research on innovative milieus, local production systems, regional and national innovation systems, business clusters etc. (e.g. Kebir et al. 2017, Jensen et al. 2007).

investments complement the specific class of learning that develops from interactions of skilled producers (workers, entrepreneurs) with young people within families and other out-of-work encounters.

Thirdly, a rich variety and sequencies of novelty in technologies, organization, products/services emerge from a dense interplay between exchanges of complementary products/services and matching of ideas, within an open population of competent specialised producers helped by convergent investments in formal knowledge development, appropriation, and channels of external knowledge. This is the creative side of collective processes of learning by doing, using, and interacting.

2.2 CE and the communitarian market

An effective exploitation of the advantages mentioned above implies high levels of coordination and alignment of incentives among independent specialized economic and social agents. Competition and market mechanisms have an important role. Yet the evolving fine-grained division of labour is only partially regulated by general markets. Particular markets with small number of local actors and networks of relational contracts impregnated by information asymmetries and uncertainties are instead the norm (Dei Ottati 1994). The density of transactions within the agglomerated context of a LPS tend to reduce such problems. However, in many competitive contexts of LPSs, as for examples those featuring high level of variety/variability in demand of final users and a flexible quasi-decomposability of production processes (Salais, Storper 1992), the weight of transactions costs and/or non-regulated external effects could overwhelm the potential returns from specialization and division of labour and cancel CE results.

On that point, exemplary cases referred to successful Italian IDs in the last decades of the 20th century have highlighted the crucial role of a particular endowment of constructive attitudes encompassing the local actors in reducing transaction costs and externalities. It is a nexus that includes a shared bent towards trust in reciprocal exchanges, a diffuse attitude towards productive and innovative (vs. distributive or rent seeking) entrepreneurship and pro-activity of workers on the job, and a cognitive proximity or similarity of some basic knowhow (Becattini 1990). The frame of local markets at the core of the LPS division of labour, as combined with such a nexus, was termed a "communitarian market" (Dei Ottati 1994). We will come back later to its nature as a fundamental commons.

2.3 The need for goods with public-like features

Though fundamental, the pure combination of the constructive nexus with a dense frame of local markets is not enough for static and dynamic efficiency in LPS. Local product, service, and labour markets presuppose the effective provision or support of fine-tuned systemic conditions (Schmitz 1999). The need of such a provision/support corresponds to an explicit or implicit demand for goods with public-like features.

For example, within teams of firms tied by long term joint strategies, they are intangible goods, such as patented or private knowledge on innovative products and processes, private access to common financial or market channels, quality certification; or tangible goods, such as tools with high indivisible capacity.

At the local markets and LPS-wide industrial level, tangible infrastructures include focused vocational and professional schools, centres for collective market and technological services, specialized fairs, university-industry joint laboratories, etc. Intangible goods include agreements for orientating the definition or the adaptation of prices and contracts in crucial local transactions, technical standards and jargons, rules on socially acceptable imitation and bankruptcy, district trademarks of origin, fair labour and green performance labels, etc. The same pool of know-hows and R&D knowledge invested by the LPS firms is an intangible systemic condition, supporting learning and creative economies, insofar as it is the untraded stock from which productive knowledge circulation selectively spill overs within the LPS context[3].

[3]It may be seen as a case of "non-depletable multilateral externalities" (Mas-Colell et al. 1995, pp. 366–367), where the returns for each single agent in a set of n depend also on the access to a "good" that is not traded being the joint result of the n agents' investment or trade actions.

At the LPS-wide social and territorial level, various types of goods with public characters represent the ordinary target of urban planning. They are built and landscape heritage; green and other environmental resources; mobility and ICT infrastructure; logistic, industrial, and technological parks; collective water purifiers and other utilities, local social services, etc. (Venables 2018). Of course, this set could be seen as just related to the support to generic agglomeration economies of urbanization and/or to the reduction of territorial congestion costs. Nonetheless, its adherence to the need of the local division of labour may have a great relevance[4].

The continuous change in local and non-local contexts, under the influence of broad market, and technological, social and political tendencies, adds to the need for frequent adaptations to the structure of fine-tuned systemic conditions.

3 Public goods specific to CE in LPS

The following subsection proposes a matrix that lends a concise summary of the types of public goods introduced in Subsection 3.2, according concepts that the LPS literature has applied to understand their nature.

3.1 Types of goods exchanged in LPS

Elaborating on a matrix proposed by Elinor Ostrom allows to classify the different types of goods supporting CE in LPS (Table 1).

The matrix helps discuss in what sense the public-like goods in a LPS may be not just local as much as 'specific' to its differentiated features and related to a commons' nature.

3.2 Local collective competition goods

The concept of "local collective competition goods" (Crouch et al. 2004) directly expresses the relation between CE and classes of public-like goods[5].

What is the function or nature of the "local" qualification here? Some examples give a hint. First, "dress design firm located in a dynamic fashion district will benefit without cost from the tacit knowledge about new fashion concepts that circulate in the informal discourse of the district. A firm located remotely from any other firms in the sector will probably have to buy these ideas from consultants" (Crouch 2006, pp. 320–321). Second, "several decades of major military research contracts directed by the US Defense Department to southern California produced the rich scientific environment from which today's biopharmaceuticals and information technology industries grew" (ibid).

An "untraded" stock of knowledge (Table 1, I quarter) appears crucial, and more easily accessed and/or released and/or applied in a local context (Storper 2009). Similarly, the concept of "industrial commons" includes R&D know-how, development skills, manufacturing competencies and equipment, related to a specific technology and geographically rooted, especially in industries intensive in design or technological development (Pisano, Shih 2009). Development of technical and scientific knowledge needs face-to-face contacts and hopping of skilled and creative people, which for most workers is local (ibid). All this resounds the Marshall's "industrial atmosphere".

Other examples of local collective competition goods tell us about the application of specific institutional knowledge (Table 1, II quarter): "local government – and political parties – are nearly always involved in providing various resources [in industrial districts]:

[4] A well-known case concerns the constitution of a huge collective system of industrial water purification in the tanning district of Santa Croce sull'Arno, Tuscany, Italy (Amin 1994). A classic example at the beginning of the first industrial revolution was the central power facility supplying mechanical energy by a system of belts to a set of nearby manufacturing machines. In the contemporary ICT fields, it could be an extended digital facility, supplying enterprise resource planning, collaborative knowledge and innovation networks, branding methods, appropriate quality certification, integrated logistical solutions, trade channels and credit, etc. (Götz 2019).

[5] More precisely, "A competition good is a good, the acquisition of which assists a firm's competitiveness" ... "Collective competition goods are those competition goods that a firm does not have to buy in the market, but which it receives as club goods or as public goods" ... "Local collective competition goods identify those where the locality, rather than national, or sectoral, or some other level is involved in their provision" (Crouch 2006, pp. 320–321).

Table 1: Examples of types of products and services in LPS

		Subtractability of use	
		High	Low
Difficulty of excluding potential beneficiaries	High	**IV** *Common pool resources*: built and landscape heritage; green and other environmental resources; mobility and ICT infrastructure; local social and health services	**I** *Public goods*: cooperative nexuses; untraded stock of productive knowledge; rules on prices and contracts within local markets; technical and trade standards and rules; district trademarks of origin, fair labour and green performance labels; place or cluster certifications
	Low	**III** *Private goods*: specialized intermediate products and business services; professional labour and entrepreneurial services; financial services; technical capital goods; transport fleets; company patents and trademarks	**II** *Club or Toll goods*: restricted joint knowledge on innovations and financial or market channels; focused vocational and professional schools; specialized fairs; university-industry joint laboratories; industrial and technological parks; collective water purifiers and other utilities

Source: Elaboration by the author on Ostrom (2009, p. 413).

direct services (servizi reali), such as assistance with design techniques or marketing; or the establishment of the image and brand of the town as a famous centre for the product concerned" (Crouch 2006, pp. 320–321). The same concept of "cluster commons" is meant to identify meeting spaces at the core of cluster initiatives, favouring the collective use of untraded stocks of knowledge (Solvell 2015)[6].

Summing-up, it is not a generic 'urban' characteristic of public goods that supports CE in LPS, neither is just their use by localized 'sectoral' specializations[7]. It is their relation to a technical and social division of labour that has a specific territorial and sectoral composition in any LPS.

3.3 Specificity and public-like goods in LPS

The differentiation of benefits of a public good is a an accepted fact in textbooks and literature. Sometimes, differences distribute randomly among the population accessing the public good; in other cases, the population is segmented in sub-groups exhibiting different levels of benefits (e.g. Antonelli 2000).

The differences extend to the private costs of accessing benefits. We can distinguish the private costs of funding the public good and the spatial, technological, or organisational costs necessary to access it. The first ones take the form of taxes, tolls, fees, etc. The second ones depend on peculiarities and indivisibilities of the public good combining with differentiation of demand, which make easier the access to the good from certain places and/or for agents owning certain connecting qualities. Differently, the costs are higher.

Let us call the first one the (private) 'cost of funding', and the second one the (private) 'cost of accessing' the public good. The cases of public goods featuring a non-uniform distribution of (private) benefits after deducing the (private) costs of accessing (and before funding) sometimes relate to non-random factors (say nexuses) that tie the sub-groups of

[6]The concept of "servizi reali" was introduced by Sebastiano Brusco reflecting on experiences of deliberate collective support to contemporary Italian industrial districts (e.g. Brusco 1992). "Cluster" initiatives and organizations refer specifically to the Porterian tradition of studies on LPS started in the 1990s (Porter, Kramer 2011).

[7]This distinction could be related to urbanization vs. localization economies, as well as to Jacob's economies vs. MAR economies (Beaudry, Schiffauerova 2009). We do not deserve an explicit attention to such concepts here, since the approach followed in this paper is transversal to their fields. However, see Subsection 5.3 and the concluding Section 6.

agents with high net benefits (say B groups). These cases have suggested the concept of "specific" public goods (Bellandi 2006).

A nexus relates to various sources and qualities, which can be cultural (e.g. religious or racial minorities), political (e.g. a shared ideology with consequences on policies for social reform), local (the overlapping of daily life experiences), or professional (e.g. communities of interest) factors, separately or somehow combined. The nexus defines a B group and grants it a source of common interest (bridging), which is acknowledged within the group (bonding), and to which the provision of the public-like good is instrumental (Oliver, Marwell 1988, Putnam 2000).

Considering the classification of goods with public-like characteristics in Table 1, pure types (I quarter) are directly constituted by the actions (e.g. investments in R&D or human capital) of the agents of a LPS (or some sub-sets of them), such as in the case of localized industrial commons (Subsection 3.2). Otherwise, they incorporate features that fit specific needs, for example in the case of technical or trade standards. The efficient provision of common-pool resources is tied to some self-identified community (Ostrom 2009, p. 414), and this applies as well to LPS (IV quarter). Finally, a terminological distinction (Ostrom 2009, p. 413) recalls that toll goods need only paying the fee for becoming accessible, while club goods need also the "recommendation" of an incumbent, which is the sign of a nexus underlying the membership (II quarter). Some cases in Table 1 are necessarily club goods, like a private knowledge on innovative products shared within a business network. Others are local in access but may be either club or toll goods, like a collective water purifier whose services is or is not be calibrated to the needs of nearby companies (footnote 4).

An appropriate availability or provision of specific public-like goods may allow the firms of a LPS to obtain either the inputs of highly indivisible resources at relatively low prices or a higher productivity from the same inputs. Transaction costs could be reduced selectively and congestion/environmental costs as well. The exploitation of such potentialities depends on various factors, specifically on the presence of regulation mechanisms. The next section presents such mechanisms and how they relate to commons.

4 Chorality, provision by consent, governance, and commons

Consider the untraded stock of productive knowledge in Table 1 (I quarter), i.e. localized industrial commons (Subsection 3.2). The stock is constituted by the investments of the "setting"[8] of individual members who share its benefits (a B-group, according the definition in Subsection 3.3). In the other types presented in Table 1, the provision may be in principle independent (except for funding) from investments by individual members. Nonetheless, if a public-like good points to the needs and capabilities of a specific setting, the personal knowledge it embeds contributes to the constitutive and regulative processes of that good.

In this sense, specificity is also a 'commons' quality. The latter expresses the involvement of the members of a community (i.e. a setting sharing a nexus) in contributing to the provision, reproduction and/or regulation of common-pool resources and in general of public-like goods that they may access (Ostrom 2009). Concerning the last requirement, regulation by the community meets several difficulties, but it also enjoys inner advantages given by a direct awareness of specific needs and capabilities. The next points in this section expand on the commons' features of LPS specific public-like goods, following a classification of their regulative mechanisms.

4.1 Chorality, social customs, and the communitarian market

According to Becattini (2015), the persistent accumulation and the overlapping of experiences of work, consumption, dwelling, and local government create an evolving productive, socio-cultural and environmental heritage in a place. This heritage is shared by the resident population and perceived by visitors. Such a place has, in a way, a

[8]Here "setting" is used in the sense proposed by Neal, Neal (2013, p. 724), as "a set of people engaged in social interaction, which necessarily occurs in, and is likely affected by the features of, a place".

"conscience", a diffuse awareness of the common heritage, a related sense of belonging, and possibly a collective identity (Agnew 2011). The shared heritage and the conscience constitute, in other words, the bridging and bonding components of a place-based nexus (Subsection 3.2). It has public goods' characteristics, and it exists not only because of a previous accumulation of experiences in the place, but because the people working and dwelling in the place keep on sharing and acknowledging it. It is a fundamental commons. Even if its components may be the object of deliberate initiatives (Solvell 2015, Onesti 2017, Götz 2019), this place-based nexus is largely the outcome of evolutionary forces. Becattini (2015) calls it a "civil and productive chorality" when it assumes constructive and encompassing contents (Subsection 2.2).

Related to such nexus, sectoral immaterial public goods emerge with their regulation provided as 'social customs', i.e. informal norms enforcing conformism in individual preferences[9]. They concern, for example, accepted manners to signal an informal contractual agreement, or informally accepted technical standards. They extend the scope of communitarian markets. However, social customs are slow to adapt and coarse-grained. A complex and changing division of labour needs provision and regulation mechanisms that help a more agile and fine-tuned provision of many specific public-like goods recalled in Section 3. Building on previous analyses on collective and public action in LPS (e.g. Dei Ottati 1994, Schmitz 1999, Crouch et al. 2004), the next points recall further forms of provision and regulation, for and by the community.

4.2 Direct alignment

Social conventions express the selection of solutions allowing a direct alignment of individual and collective interests for the provision of a public good, out of a set of solutions where individual interests also diverge (North 1990).

Within a LPS, the agents of a (B-group) setting who behave regularly and respect a shared solution (e.g. sharing a non-depletable multilateral externality, see note 2) contribute not only to business exchanges and projects, but also to the confidence internal to the setting. Awards (e.g. social prestige), penalties (e.g. exclusion from all the settings of a LPS), and policing are rules that may support this quasi-automatic regulation[10].

The direct alignment is strengthened when the place-based nexus helps a positive inclusion of the utility of the other agents of the setting into the utility function of each one van Dijk, van Winden (1997), as when ideals of social-environmental sustainability, justice, and participation (Foster, Iaione 2019) join the goals of effectiveness and efficiency. The opposite case is interesting as well. A negative sign of social ties within the preferences would tend to generate depressed settings and work against the commons' features. A quite general implication would suggest that the place-based nexus may be more or less constructive and encompassing (qualities of chorality), thus associating to different proportions of cooperative and un-cooperative agents operating within the LPS. Together with the intervention by outside authorities (Ostrom 1995) and the flows of incoming external agents, this would help explain sharp differences in the support towards the provision of commons in the LPS (Schmitz 1999).

4.3 Provision by consent and joint private governance

When direct alignment is not possible, or not self-sufficient, mechanisms of deliberate collective action intervene (Schmitz 1999). First, considering joint private support, a point made by Oliver, Marwell (1988, pp. 6–7) suggests a relation with commons: "Collective action arises around those interests for which there is a group of especially interested and resourceful individuals who are socially connected to one another". Such support coalesces more easily when there is a nexus, the target thus being a public-like good specific to some B-group setting. When the individual incentives and the nexus work well,

[9] Marshall (1927, pp. 599–600) reflected deeply on social customs and industrial organization. More recently, a classical reference to consistent norms of behavior is North (1990). Examples are abundant in the contemporary literature on industrial districts.

[10] See Salais, Storper (1992) about rules and conventions in different types of LPS, and Brusco (1999) and Dei Ottati (1994) on industrial districts. More in general: Ostrom (2009, p. 420).

the good is provided and/or regulated by consent from within the setting[11]. Therefore, the goods are commons, for instance in the case of cluster commons promoted by cluster initiatives and organizations (Solvell 2015).

Popular examples concern collective contracts that define average fees, terms of payment, quality control methods, for an exchange of goods within the LPS. Individual entrepreneurs or business associations sponsor research of new technical standards. Local schools' programmes and university missions are discussed with business and social stakeholders helping the growth of basic competencies. Local bankers and industrial entrepreneurs find new financing schemes, adapted to the economic and technical peculiarities of the local investments (e.g. Amin 1994, Dei Ottati 1994).

4.4 Governance and public government

Initiatives and resources by local or localized public agencies (Subsection 3.2), even if non-necessary in principle, have a general role in regulating pure public goods (Table 1, I) within an extended network that incorporates important conflict of interests in spite of a common nexus (North 1990). "Innovation commons", where open knowledge is used to integrate environmental, social, and shared value innovations, may ask for the support of public agencies as well (Jeannerat et al. 2017, p. 17).

With regard to common-pool resources (Table 1, IV), exclusion is difficult, and congestion (and pollution) is often a negative feedback of economic growth led by the expansion of the local division of labour. In these fields, government initiatives (e.g. on norms of access) and public resources are sometimes mandatory and, even when not, they may be crucial due to difficulties in finding agreements on a pure private basis, especially in cases of large and differentiated networks of settings. For example, public incentives can support local agents avoiding private choices that exacerbate local congestion/pollution.

Similar considerations concern cases of specific "club" goods (Table 1, II), such as local public services or essential industrial facilities. With the first ones, public initiative is justified by a political acknowledgment of such services as related to rights of citizenship and/or universal access. They may be provided in ways contributing specifically to the needs of a community. An active involvement of the local users in the co-production of services and in some forms of local governance helps management of supply and provision (Alford 2014). To better understand essential industrial facilities, let's come back to complementary production phases at the core of an LPS, which need inputs from a facility with relevant indivisibility or relevant network economies (footnote 4). Consider a facility whose minimum optimal scale does not allow more than one supplier in correspondence to the local demand. If a private monopoly runs the essential facility, it could appropriate an excessive share of value, reducing both the economies enjoyed by independent local firms and CE. Private alternatives that restore efficiency are based on market contestability, direct alignment, or joint action. However, they may fail, for example when, given sunk costs and first-mover advantages, a private supplier carries out predatory strategies, breaking the place-based nexus directly or just selling the facility to some external player. Public support or direct initiative, possibly within a multi-scale frame of coordinated authorities (e.g. anti-trust), could tilt the balance towards solutions that preserve the appropriation of a fair value among the LPS agents.

To shape the solutions to the specific needs of the LPS, the actors of the public initiatives should be part of (or intersect in some sense) the network of involved settings (B-groups). The initiative is not taken by the government alone, being shared with at least some private leaders of the network. It is proper local "governance", as meant by Crouch (2006). Schmitz (1999, p. 476) refers to "joint action with government support" in LPSs, and Ostrom (2009) to "polycentric governance". This is again the field of regulation by the community, i.e. of commons features.

[11] "Selected incentives" may be implemented by "public good–making" entrepreneurs, as in the renowned case of the lighthouse services in U.K. discussed by Coase (1974).

5 Networked ecologies of commons

The previous section established the foundations of LPSs' CE in terms of its relationship with specific public-like goods that present commons features. This section proposes to subsume such relationship under the vision of a "networked ecology of commons"[12], which amplifies the evolutionary and multi-scalar correlates of the framework presented in the previous sections.

5.1 A networked ecology and the LPS as commons

Relevant literature on LPSs identifies the roots of their possible CE qualities in the strength of a constructive and encompassing place-based nexus, made of a shared cultural heritage and a conscience of place, which connects and bonds the people of the place (see Subsection 4.1). We have argued, first, that this is a fundamental commons shared at the LPS level and, second, that a structure of more operative commons may thrive upon this local "macrosystem" pattern (Neal, Neal 2013, p. 724), being related to public-like goods specific to CE, which an overlapping network of settings (B-groups) of the LPS agents support, provide, regulate and adapt (Subsections 4.2–4.4).

Even if each specific commons may refer to different local settings, sometimes even extending to non-local agents, sharing the place-based nexus gives the network of settings a focal point that helps identify the nature of joint needs and capabilities specific to each setting, as well as perceive some complementarity within the network. Conversely, the individual and collective experiences of constitution and use of specific commons, let's say "commoning" (Foster, Iaione 2019, p. 235), may be seen as the direct source of reproduction and variation of the same place-based nexus. This structure of co-evolving (B-groups) settings and commons is what we would call a 'networked ecology of commons'.

In ideal-typical conditions of the LPS 'as a commons'[13], such an ecology impregnates the place. It is the solid foundation of a CE that needs more than technical and transactional proficiency within a communitarian market. In real-world paths of local productive development, hampering factors can sometimes fragment the networked ecology and weaken its self-reproductive dynamics. They have an unavoidable but not always overwhelming impact on CE, being confronted by strengthening factors.

5.2 The interplay of strengthening and hampering factors

We present in this section just one class of strengthening and hampering factors, deferring more general considerations to Becattini (2015). We have suggested in Subsection 4.4 that an embedded local government plays important roles in the governance of specific public-like goods with commons' feature. It is part of a "place leadership", i.e. a set of key local actors able to express a crucial influence on the reproduction and variation of territorial development (Sotarauta et al. 2017), owning control or influence on important socio-economic resources, and possibly playing political and cultural mediation among the LPS settings on the features of public-like goods, on access to them, and on rules for negotiating conflicts on their provision and funding (Brusco 1999).

However, too much embeddedness of public actors has evil sides when it is conducive to either parochial approaches or protection of rent-seeking actors (Olson 1971). Large private resources sunk in traditional strategies may push a conservative coalition to obstruct the constitution of new commons that could help rerouting the LPS in face of disrupting challenges (Bellandi, Santini 2020). In the worse cases, the networked ecology deteriorates, and superior public authorities might subsume the provision of local public goods with a probable loss of specific features and CE (Beito 1993).

What type of balance prevails between progressive and conservative forces depends in part on the subjective characters of those who keep or aspire to place leadership, their political sub-cultures and styles towards local governance (Barca 2019), and their approaches towards policies of local development (Crouch et al. 2004). Other important

[12]The term comes from a variation on concepts of nested or networked ecological systems, as proposed in sociological and psychological studies (Neal, Neal 2013).

[13]This is a variation on the "city as a commons" in Foster, Iaione (2019).

factors include the property regimes and the local distribution of economic power (Ostrom 2009); the strategies of local investment taken by non-local actors (Trippl et al. 2017), in particular the relation with "shared value" strategies possibly played by local branches of large firms (Porter, Kramer 2011).

Finally, a polycentric governance of commons (Ostrom 2009) could support an active role of LPSs within the territorial relations of a large city-region and favour the combination of specialization economies at the sub-metropolitan level and diversification economies at the metropolitan level (Trullen-Thomas, Boix-Domenech 2017, Andersson et al. 2019)[14].

5.3 The networked ecology of commons within an enlarged frame

The remarks above contribute to understanding why paths of productive development do not distribute evenly across regions – the "world is not flat" (Pisano, Shih 2009) – as well as how their dynamics depend on the coupling with multi-scalar contexts. Indeed, the relationship between CE and networked ecologies of commons in LPSs contributes to some views on territorial development and multi-scalarity. Consider, as an exemplification, a possible set of stylized processes.

1. A population of economic, social, and institutional agents tied by a constructive and encompassing nexus is the social basis of a LPS. The nexus coagulates in a territory because of complex historical processes (Agnew 2011, Becattini 2015). A network of (B-group) settings pivots on the same nexus and associates to a structure of specific public-like goods with commons' features. It is an ecology whose low transferability explains a solid position of differential CE kept by the LPS with respect to competing organizations and territories. Related quasi-rents accrue to the settings of agents embedded in the context (Storper 2009).

2. Some sub-set of embedded agents enter cross-scale and specific sectoral markets, business and social networks, and institutional layers; some groups of migrants enter the LPS. They are gatekeepers of external knowledge and translational actors of local knowledge (Buciuni, Pisano 2018).

3. In time, thanks also to such cross-scale relations, specific public-like goods supporting the CE of an LPS become universal or less specific, and commons features tend to weaken (Storper 2009).

4. This means that some "local" sources of CE become, first, "mobile" (Robinson 1958), and then disappear as such. However new sources of CE regenerate ordinarily in lively LPS (Becattini, Rullani 1996), even if decline or mutation cannot be excluded[15].

5. Such evolving paths associate to different cases and forms of LPS, from classic industrial districts (Becattini 1990), to super-clusters (Feldman et al. 2019), or low-profile local systems in marginal areas (Ricci et al. 2019).

6 Concluding remarks

The paper started from a formulation of the basic tenet of a long stream of literature on local productive systems (LPSs) and related paths of territorial development, i.e. that the overall efficiency (statical and dynamical) of a LPS depends not only on what single business organizations do but also on a localized system-based support. The second component combines market and non-market mechanisms as well as production, socio-cultural, political, and territorial spheres featured by different structures of relations, cultural heritage, and senses of belonging. Performance based on the second component is collective efficiency (CE).

[14] Note that the configurations of the activities entering the productive specializations of a LPS often exceed the limits of statistical sectors.

[15] Feldman et al. (2019) have suggested recently that Marshallian external economies may combine with global monopolistic power and strategic barriers against external competition in some top-level LPS, e.g. Silicon Valley. A reading of such cases in terms of commons would be interesting.

In particular, the focus has concerned the foundation of that system-based support, which is the provision and regulation of a framework of specific public-like goods. After having argued that such goods have a more or less implicit nature as commons, it has been proposed to scrutinize this nature throughout a frame of interrelated and sometimes original concepts, such as the networked ecology of commons.

The frame could help future empirical research on LPS availing more extensively of the literature on commons, as well as suggest, on the other side, qualifications to the general "design principles" discussed by the literature on commons. The principles concern institutional regularities that feature "sustained regimes as contrasted to the cases of failure" (Ostrom 2009, p. 422). We have not referred explicitly to the original list proposed by the same Elinor Ostrom (ibid), nor to variations presented with innovation or urban commons (Allen, Potts 2016, Foster, Iaione 2019). A follow-up of this paper would further amplify the broad consistency of the conditions of provision and regulation of commons in LPS discussed in the previous sections with many such principles. It would add some variation as well. Indeed, ordinarily, the literature on commons applied to rural settings considers cases where the core social and productive resource is just a main single commons. Furthermore, in applications on (large) urban systems, which include many types of commons, the relations between such commons are not easily singled out, even though they are perceived (e.g. the "city as a commons" in Foster, Iaione 2019), because the territorial context is very complex or indefinite. The LPS are quite complex but well-defined territorial contexts where it is possible to conceive the presence of networked ecologies of commons or some proxies of them. Guidelines associated to industrial commons (Pisano, Shih 2009), cluster commons (Solvell 2015), and innovation commons (Jeannerat et al. 2017) could provide a starting point for both the extension of the design principles and the definition of non-traditional policy implications for territorial development.

Lastly, and also on the foundations of CE in LPS, it would be interesting to go deeper on their relationships with urban agglomeration economies and related basic principles, such as sharing, matching, and learning (Duranton, Puga 2004). The paper has briefly referred to combinations of such principles when discussing the fields of CE performances in Subsection 2.1. Furthermore, it has been suggested in Subsection 5.2 that concepts of commons in LPS could enter debates on specialization vs. diversification economies in regional studies (see footnote 7). However, the focus has not been the playing of general agglomerative and centrifugal forces as much as a class of endogenous economic, socio-cultural, and institutional factors that support or hamper development in different territories (Becattini 2015). A reappraisal of the above relationships in the light of this paper's concepts must be left to future theoretical and empirical research, starting from the territorial qualities of networked ecologies of commons and commoning processes. For example, the possibility of polycentric networks of communities is a bridge to be cultivated to understand fruitful combinations of specialized local paths and overlapping ecologies of commons within large diversified metropolitan areas or city-regions.

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