

A Place-Based Developmental Regional Industrial Strategy for Sustainable Capture of Co-created Value

David Bailey, Aston Business School, Aston University, Birmingham, UK.

D.bailey@aston.ac.uk

Christos Pitelis, Brunel University London and Queens' College, Cambridge, UK.

Christos.Pitelis@brunel.ac.uk

Philip Tomlinson, School of Management and Institute for Policy Research,

University of Bath, UK. P.R.Tomlinson@bath.ac.uk

Abstract

This paper critically assesses recent place-based approaches to industrial and regional policy epitomised in the EU's 2020 'smart specialisation' programme. It suggests that these are a move in the right direction in so far as they acknowledge 'place' as a key, constituent part of policy making. Drawing upon examples from across the world, we emphasise the importance of regions pursuing strategies that allow them to capture - in a sustainable way - a part of the value they help create and co-create with other entities, such as multinational firms and other organisations. This involves policymakers acting as public entrepreneurs, devising and implementing strategies, structures and policies to enable the regional eco-system and its constituent parts to capture value sustainably. In addition to the extant focus on linkages and embeddedness, a key aspect of this involves the adoption of regional value capture and positioning strategies.

Keywords: Place-based industrial strategy, ecosystems, smart specialisation, value creation and capture, sustainable regional advantage

JEL Codes: L52, O25, O30, R58

1. Introduction

Over the last decade or so, there has been a shift in European Union (EU) thinking on industrial and regional policy. In particular, there has been a move away from a conventional neoclassical (mostly spatially-blind) approach which regarded regions as homogenous entities and regional policy intervention as largely ineffective. In the new (place-based) approach there is a deliberate focus upon utilising policy to develop knowledge and innovation opportunities building upon a region's existing advantages and capabilities (Barca et al., 2012). Advocates of such a place-based strategy see opportunities for regions to evolve in a dynamic way (and in some cases re-invigorate themselves) and possibly move 'up the value chain' onto higher growth trajectories. This is epitomised in the 'smart specialisation' programme, which – in a short space of time - has become a major component in the EU's 2020 flagship 'Innovation Union' programme and wider EU 2014-2020 Cohesion policy - known as RIS3 (Research and Innovation Strategies for Smart Specialisation).

At the core of modern industrial and regional policy lies the concept of 'value creation'¹. In a recent article, Pitelis and Runde (2017) bring together key aspects of value creation derived from extant economic and management literature. These include human resources, innovation, increasing returns to scale and strategy and infra-structure. They claim that these are applicable to value creation by firms but also scalable to value creation by regions and nations. In the case of regions, for example, value can be created and co-created by leveraging these four variables as they exist and can be developed and leveraged within a particular region. As in other perspectives, a key structure instrument that can combine these four aspects is the regional cluster or ecosystem. But there are three key questions that arise from the above analysis. First, is the issue of value capture. Second is that of agency and particularly the role of public, private and 'third' (polity) sectors. The third question is the issue of sustainability of advantage.

Smart specialisation strategies (3S) are designed to support actors in new innovative value creating activities with commercial potential (Foray, 2015). The focus in 3S is the regional eco-system, since this is where new opportunities for growth and new specialisms are believed to be most likely to arise. Regional eco-systems comprise networked (and non-networked) actors, and smart specialisation strategies rely upon these actors co-working together to co-create value through innovation, which itself is believed to be largely dependent upon the successful generation, acquisition and exchange of new knowledge within regional technological domains. For policy to be effective it also needs to understand the types of network that exist and how to nurture and leverage linkages between them (Giuliani, 2007).

From business economics and strategic management perspectives, it has been argued that firms can achieve a sustained competitive advantage by creating value from innovation but also by capturing this value (i.e. profiting) in markets and to a greater extent than their rivals (Teece, 1986, Porter, 1985; Pitelis and Teece, 2009; Adner and Kapoor, 2010). While originally developed in the context of business strategy, the idea that nations and regions should also be interested in capturing - in a sustainable way - a part of the value they help create and co-create with other entities, is gaining recognition in the literature (Klein et al, 2013). This of course raises the

¹ The concept of value is wide-ranging, a useful definition is in terms of a good or service's '*perceived worthiness*' to an individual agent (Pitelis (2009, p.1118))

question of 'how?' Despite the extensive literature on value capture strategies in business strategy, there have been few attempts to discuss value capture at the national or regional levels. Advocates of the 3S approach advance discussion on regional policy by recognising the need for commercial potential hence the need not only to create and co-create value but also to capture it in the region (Clarysee et.al, 2014). Our aim is to add to the literature by critically assessing the 3S-based approach on this matter and then expanding it to propose ways through which regions can help co-create value and also capture a part of it sustainably.

The remainder of this paper is set out as follows. In Section 2, we briefly outline the traditional neoclassical 'spatially blind' and more recent 'place-based' approaches. Section 3 introduces smart specialisation, exploring the nature and dynamics of the regional eco-system and the role of different actors in knowledge and business networks in this context. Section 4 then proposes a theory-informed (and supported) novel approach to regional sustainable competitive advantage that builds upon and develops the 3S approach by focusing upon the sustainable capture of co-created value and on conditions, structures, vehicles and policies that help achieve this. Finally, Section 5 concludes and discusses opportunities for further research.

2. Spatially Blind Vs Place-Based Approaches to Developmental Regional Industrial Strategy

The traditional neo-classical approach to regional development is based on a view of the world as essentially 'flat', where convergence between regions occurs in the long run through a process of self-correcting market adjustment. This follows from the assumption of perfect competition and its associated premise of free resource mobility, implying that resources will tend to move wherever efficiency gains and gains from trade can be achieved, for example where the cost of resources is cheaper. In its extreme form, there is little role for interventionist measures by the government (public policy) to address regional performance including decline; flexible labour markets and wage adjustment are regarded as being sufficient in the long run to attract new capital and revitalize regional growth. In pictorial terms, this view of the world might be thought of as being akin to a smooth free-flowing river system (Hildreth and Bailey, 2013). It has become known as a 'spatially blind' or 'space-neutral' approach, since it pays little attention to a region's geography, history, culture and institutions. In contrast, a place-based approach emphasizes regional characteristics, viewing them as critical components in generating unpredictability, heterogeneity and uncertainty within regional eco-systems and hitherto, a region's long run trajectory. To return to our river analogy, it is more like a river system with large boulders and rapids that cause many disruptions to the natural flow of the market system (*ibid*).

The 'spatially blind' approach is not and has not been entirely public policy blind. Its advocates, such as the World Bank (2009), have placed an emphasis upon horizontal policy measures such as generic support for education and training, and tax credits to support entrepreneurship, investment and Research and Development (R&D), along with greater factor mobility and de-regulation (such

as liberalising planning regimes) to promote market-led growth (Warwick, 2013)². In a regional context, more efficient markets are seen to promote (regional) agglomeration within a New Economic Geography (NEG) framework (Leunig and Swaffield, 2008; Overman and Gibbons, 2011). The NEG framework is a variant of the neoclassical model, but adopts variations in basic assumptions that allow for spatially uneven development arising through the effect of localised increasing returns to scale and higher local productivity and by making particular regions increasingly more attractive to firms and workers. A consequence is that rather than predicting convergence, NEG models suggest that non-convergence can be endemic enough to make even the pursuit of more geographically-balanced development efforts and policies counterproductive (Gardiner et al., 2013). In this view, markets will adjust if the barriers preventing them from doing so are addressed. In terms of industrial and economic development, the view taken is it is better to allow the market to work by itself, rather than for the public sector to actively intervene (for example through an industrial policy). Indeed, a smaller public sector is seen as potentially creating more space for the private sector to grow (Faggio and Overman, 2012) and hence as beneficial. This approach is critical of anything more than a limited market-failure-based role for state intervention, seeing industrial and regional policies and their accompanying institutions as ineffective (Overman, 2012). It focuses upon the 'crowding out' effects of public investment to private ones and ignores any complementarities and 'crowding in' impacts of state intervention (on private investment) as recognized, for example, by among others Holland (2014) and Bailey et al (2015a).

The focus on upgrading skills and entrepreneurial capabilities and encouraging labour mobility has led some commentators to label the 'spatially blind' approach as being 'people based' (Barca, 2011). However, the distinction between spatially-blind and place-based approaches is not a dichotomous policy choice between investing in people or places - *both* approaches are actually concerned with *both* people and place. The key point in a place-based approach is '*the well-being of each person... also depends on the context in which he/she lives*' (Barca, 2011: 221). In this regard, a core argument around place-based approaches essentially boils down to the role of new knowledge in relation to developing place-specific specialisms and capabilities and which emerges from the impact of geography, history, culture and institutions (Barca (2011: 223). We return to these issues below.

In the UK context, the long term dominance of the spatially blind approach is widely apparent. Since the late 1970s, spatial imbalances between London and the South East and the rest of the country have been exacerbated (BIS, 2010, HMG, 2010). The recent Great Recession (2008-2013), appears to have extenuated the widening schism between a dynamic London and a sluggish periphery of (in particular) Northern and Midlands provincial UK cities (Hutton and Lee, 2012). Although widening regional disparities have raised significant economic and social concerns (Heseltine, 2012), key policy makers have suggested '*there may be substantial limits to how geographically balanced an economy may become*' (BIS, 2010, 26). This narrative supports the

² A critical view is these 'horizontal' measures still held an inherent 'vertical' element, albeit one specifically favouring larger (corporate) firms, who were in a stronger market position to appropriate much of the benefits from such initiatives (see also Christopherson and Clark, 2007).

idea that spatial disparities are driven by 'people' and not 'place' characteristics, and given it is hard to change 'area effects', the policy focus should be upon investment in people as opposed to place. This has gradually provided the rationale for prioritizing the growth of successful regions such as the South East, irrespective of the impact on uneven development elsewhere. The place-based view considers this approach as misguided.

3. Place-Based Industrial Strategies, Actors and the Regional Eco-system

3.1 Smart Specialisation and Regional Eco-Systems

As noted in the Introduction, over the last decade or so, EU industrial and regional policy has largely revolved around the concept of 'smart specialisation'. This is based upon the notion that economic sectors and specifically regions can build upon their own comparative and competitive advantages to generate new specialisms through the '*discovery of new domains of opportunity and local concentration and agglomeration of resources and competencies in these domains*' (Foray, 2015, p. 1). Such opportunities often emerge from existing place-based technologies, capabilities and specialisms. In this regard, private firms play a critical role since being market actors, they are often best placed to discover new entrepreneurial opportunities within these domains. Yet, in many cases, the private sector maybe unable to create and/or capture the full potential value of these opportunities due to market and systemic failures. This can lead to under-investment in such activities (Foray, 2013)³. In such cases the (regional) government may have a role to play that goes beyond horizontal measures; in particular, the state can aim to enable (regional) actors to identify, shape and/or create and co-create and take advantage of these hitherto (potential) opportunities (Foray, 2015). This, in turn can help regions to re-invigorate themselves, move onto a more dynamic growth trajectory and become relatively 'sticky places', that is places with activities which are more embedded and hence harder to shift out of the region (see Markusen, 1996).

Prioritising public resources for selected cases implies a more vertical and non-neutral policy perspective (Foray, 2013). Nevertheless, identifying suitable cases also requires strategic collaboration between both (regionally-based) private and public sector actors, involving the sharing of (often commercially sensitive) information around potential opportunities, critical evaluation (of projects) and policy learning in a process of 'embedded autonomy' (Bailey and Tomlinson, 2017)⁴. The diversity of players involved, helps render policy processes less amenable to 'regulatory capture' by particular firms or indeed sectors. Instead, a smart specialisation strategy focuses upon discovering and identifying specific 'activities' (within sectors, technological fields, or at the interstices of sectors) with the potential for innovation, technological development, knowledge spill-overs, scale and agglomeration economies and commercial opportunities that can potentially benefit a wide set of actors. In this sense, smart specialisation reflects contemporary thinking about modern industrial policy as a 'process of discovery' (Rodrik, 2004, 2008), whereby firms and the state can co-learn about underlying costs and opportunities and engage in strategic

³ Due to knowledge diffusion, there is typically weak appropriability of private returns from the entrepreneurial discovery process. In addition, there are also higher levels of uncertainty associated with the discovery process, and aligned to this, there is often weak access to finance and a higher cost of capital often assigned to such activities. These cause private firms to underinvest in such activities (Dasgupta, 1988; Hall and Lerner, 2010).

⁴ The evolution of (traditional) industrial districts offers an historical example of strategic collaboration and policy learning between (local) private and public sectors (see Konzelmann & Wilkinson, 2016).

coordination. It is also tailored towards building upon a region's existing industrial commons as opposed to the more standard 'one-size-fits all' (spatial-blind) policy solutions (see also Bailey et.al 2015b). In addition, the collaboration, consultation and 'brain storming' involved helps minimise the problem of government failure that had plagued earlier 'picking winners'-based approaches to industrial strategy, through mutual monitoring and checks and balances.

The crux for any modern place-based industrial policy (such as smart specialisation) is to appreciate the nature and dynamics of the regional eco-system, from which new opportunities and entrepreneurial discoveries can arise, and nurture and leverage these to the region's advantage. Importantly, appreciation entails the possibility to also shape and co-create the regional ecosystem that comprises a skilled labour pool, an agglomeration of firms, universities and public research organisations and related and supporting institutions and organisations. All these can help foster knowledge and engender spill-overs. While proximity within an eco-system matters to firms' competitive advantage, it is, the relational embeddedness of firms (and other actors) within (regional) networks that is crucial for creating and diffusing new knowledge and facilitating innovation (Maskell and Malmberg, 1999; Capello and Faggian, 2005)⁵, and co-creating value with an eye to capturing part of it (Pitelis, 2012).

3.2 Business and Knowledge Networks

Within the above context, and as regards in particular value creation and value capture, an important distinction can be made between knowledge and business networks (Giuliani, 2007). A typical knowledge network comprises a set of actors from the public and/or private sectors with heterogeneous knowledge bases, and differential levels of technical expertise and capabilities. It is a selective network, with actors collaborating and sharing knowledge with each other to deliver innovative solutions to complex technical problems (Giuliani, 2007). Firms with strong knowledge bases are most likely to be sought out by others for advice and technical expertise, and become technological leaders. They will be central to the knowledge network, and act as facilitators of innovation and technology transfer, especially to other technically advanced firms with the capacity to absorb and utilise such information (Giuliani, 2007; Boschma, 2005). Knowledge networks are essentially focused upon network-wide value creation (Clarysee et.al, 2014). In a regional eco-system, the knowledge network is geared towards knowledge generation, its subsequent development, and finally its diffusion among networked firms (Autio, 1998).

A business network is a group of firms and entrepreneurs, deliberately connected to explore, create and (jointly) pursue business opportunities (Österle, et.al, 2001), collaborating through vertical - and occasionally horizontal - relations to deliver a product/service to end-users. In business networks there is often a greater focus (than in knowledge networks) on innovative activity that not only seeks to create value for the network as a whole, but it also seeks to capture value by specifically addressing market and consumer demand side considerations (Wright, 2014) and putting in place requisite value capture strategies. This activity is often led by a large focal firm – possibly an Original Equipment Manufacturer (OEM) – which serve as 'orchestrators' of the value co-creation and capture process (Pitelis and Teece, 2018); in particular they co-ordinate activities, integrate technologies along the value chain and provide 'platform services' for the network (such

⁵ Whereas eco-systems and/or clusters represent a broad constellation of actors not necessarily linked in some way, networks are more structured, selective groups (of actors) purposefully formed to co-operate over shared objectives.

as services, use of equipment and technology), and in turn, facilitate the creation of new markets, business ecosystems and commercial opportunities. Within the business network, firms will share assets, including knowledge and information, although much of this will relate to the business application and exploitation of knowledge such as technical compatibility of inputs and ensuring appropriate interfaces between technical systems and subsystems within products as well as operational, managerial and marketing knowledge (Autio, 1998). While the geographical scope of business networks tends to be global, they usually arise in regional eco-systems, where market, social and institutional ties co-exist (Beccattini, 1990; Porter, 1998).

In policy circles, there has long been an assumption that by supporting the development of (regional) knowledge networks, a business network will naturally evolve and flourish, facilitating both value creation and value capture and hitherto regional growth (Clarysee et.al, 2014)⁶. In practice, however, this evolution is unlikely to occur since the dynamics and structure of each type of network are fundamentally different (Iansiti and Levien, 2004) and since successful value capture requires purposeful entrepreneurial actions, strategies and structures that help achieve this. Hence a key challenge for a successful place-based industrial policy is devise value capture strategies and structures, nurture links between both these types of networks with ideas and practices from both networks being transposed to the other (Clarysse et.al, 2014) and to help foster the sustainable evolution from the one to the other. Public policy can play an important developmental role in this process by facilitating network building and greater strategic co-ordination between key actors within the regional eco-system (Foray, 2015; Block, 2008), while simultaneously devising value capture strategies and seeking to ensure that value capture does not prejudice the continuation of the value creation and co-creation process. This is an important task and indeed balancing act on which we elaborate below.

3.3. The 'bridging' roles of Private and Public Anchor Tenants

A way to facilitate connections between different types of actors across both knowledge and business networks involves so called 'anchor tenants'. Anchor tenants are organisations heavily engaged in R&D with the absorptive capacity to apply new knowledge in a particular technological field to generate knowledge externalities within the region in which they are located (Agrawal and Cockburn 2003; Niosi and Zhegu, 2010). Public anchor tenants include regionally based universities and/or public research organisations (PROs) and are engaged in the regional knowledge network. They do not compete commercially but their public funding base allows them to engage in value creation activities through basic and applied research fulfilling a public role as knowledge generators and conduits for knowledge transfer (Agrawal and Cockburn, 2003). Private anchor tenants are typically multinational firms which operate within their own business network such as a global value chain (often while being also be part of a wider knowledge network external to the regional eco-system). Through their networks, private anchor tenants seek out new

⁶ The distinction between knowledge and business networks is not always clear cut and overlapping is inevitable in a similar way that the determinants of value creation and value capture can also overlap. Pitelis, (2009) for example, notes transaction cost reductions can create value and also help capture when for instance this motivates vertical integration, which in turn can function as a barrier to entry. That said the determinants of value creation and capture can also differ and there exist many cases where firms that have helped create and co-create value have failed to capture it because of a lack of complementary assets and capabilities, the requisite business model and/or the appropriate ordinary and dynamic capabilities (Pitelis and Teece, 2018). In a similar way retaining the distinction between knowledge and business networks can be useful.

'technological domains' for commercial exploitation and are thus involved in both value creation and capture.

Collaboration between private and public anchor tenants can help foster the regional eco-system, in which (local) public research is absorbed by firms, while stimulating local industrial R&D more widely. For instance, the utilisation of publicly developed technological platforms by private anchor tenants can facilitate the transition of technical knowledge from public funded research into commercialised output (Feldman, 2003). Yet, without a 'bridge' between both networks, knowledge derived from a knowledge network may have little 'value' that can be captured, hence constraining the development of the regional eco-system (Clarysse et al. 2014). This 'bridge' is essential to generate, create and capture value in regional economies. In the business literature, private anchor tenants are often viewed as the main bridge to align regional knowledge networks to their own business (value) network within the region and beyond, so as to create value for customers and to capture this value through developing commercial products and services (Guilani, 2007).

As vehicles of public policy, public anchors too, can have and continue to offer important 'bridging' functions in national and regional development. This has long been evident in Japan, where 182 *Kohsetsushi Centres* - which are run by regional prefectures - offer technical support to local small and medium sized firms (SMEs), especially in testing and adopting new technologies and providing opportunities to participate in joint applied research. Since 2009, the Innovation Network Corporation of Japan (INCJ) has sought encourage greater 'open innovation' in new technologies (particularly information technology, biotech, and green energy) through public-private partnerships (see Andreoni (2016)). Similarly, the German Fraunhofer institutes - as public anchors - have worked closely with the private sector, and (in the German Landers) led in specialising '*in joint pre-competitive research, prototyping and manufacturing scale-up, as well as product-ideas, commercialisation, bilateral applied research with individual firms, and technology transfer schemes*' (Andreoni, *ibid*, p.274; MIT 2015)⁷. Ó Riain (2011) also documents the critical role of (regional) public agencies (including university labs) during the 1990s/early 2000s in providing a range of supports to SMEs to stimulate collaborative innovation and commercialization in Ireland's emerging high tech industries.

Finally, and intriguingly, in the USA, Block (2008, 2011) outlines the often 'hidden' role of public R&D agencies and regionally based university centres that increasingly and purposely connect science (and knowledge and technological discoveries) with commercial opportunities⁸. These range from federal laboratories such as Laurence Berkley in California, the MIT Radiation laboratory in Boston and the National Institutes of Health to numerous smaller regional research institutes in defence and other sectors. Funding has largely come from the US Defence Advanced Research Projects Agency (DARPA), National Science Foundation (NSF) and the National Institutes for Health (NIH), alongside initiatives such as Small Business Investment Company (SBIC), Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programmes to support university/technology laboratory spin-offs and high tech small and

⁷ The Fraunhofers were the basis for the new UK catapult centres (<https://catapult.org.uk/>) that seek to better commercialise UK R&D (Bailey and Tomlinson, 2017).

⁸ Block (2008) describes their role in the US innovation system as 'hidden' from public view, largely because it did not fit with the political rhetoric of 'market fundamentalism'.

medium sized firms (see also Andreoni (2016)). More recently, the new US National Network for Manufacturing Innovation (NNMI) is a web of institutes that support the expansion and adoption of advanced manufacturing technologies and high tech initiatives (including robotics and materials genome). The NNMI is designed to build public and private partnerships - largely at the regional level – which involves innovative manufacturers, leading university scientists and engineers and state agencies combining their capabilities and (focused) expertise to address cross-cutting challenges in advanced manufacturing (Norman and Stiglitz, 2016). Indeed, without initiatives involving the state forging co-operation across a large number of industry and related networked actors, certain new enabling and platform and cutting edge technologies may not develop at all (Tassey, 2007)⁹.

In summary, both private and public anchor tenants can play an important role in the co-creation of regional ecosystems. A key challenge for regional public policy makers however is how to also help foster the sustainable capture of co-created value. This implicates more than public anchor tenants and indeed more than smart specialization-it involves smart sustainable capture of co-created value. Smart specialization is a key component but not enough.

4. Building on 3S - Leveraging value co-creation and value capture strategies for regional sustainable advantage

4.1 Building dynamic regional paths

It follows from the above that, in the 3S approach, value can be said to be created within knowledge networks, but to be largely captured in business networks (Thomas and Autio, 2015). While this is useful in acknowledging the importance of value capture that was previously assumed to be semi-automatic, the precise ways in which value can be captured in business networks cannot simply be assumed or taken for granted. The ‘how’ is also important. In addition, value captured in business networks can benefit disproportionately a few major players. Regions and regional policy makers therefore face two challenges. The first one is to ensure value is captured by regional players and that a fair part of it remains within/is captured by the region, not just some focal private players. But there is a second important one besides the fair distribution of the co-created value that is captured among the ecosystem participants (including the regional government). This is to ensure that a focus on value capture does not prejudice the value co-creation process and hence the sustainability of value capture. Identifying the right balance between value co-creation and value capture, helping private players to also pursue this, and fostering diversity and inclusiveness through sharing can be critical in ensuring that more regional actors have the resource to enhance their own capabilities, undertake new investment and if necessary, diversify into new and related

⁹ Our discussion here should not discount the possibility of network failures, which may arise due to opportunism (e.g. where one partner misappropriates the network’s collective ‘intellectual output’) or incompetence/ unreliability of actors within the network (Whitford and Schrank, 2011). Where these problems arise, the state might find it difficult to connect disparate groups such as technologists and private firms. Block (2008) suggests public anchors and agencies such as DARPA and NIH can militate against such problems through demonstrating competence, and actively engaging in strategic collaboration with the private sector by instilling confidence, and building trust and enduring social capital.

technologies. This, in turn, opens up (and shapes) opportunities for regional eco-systems to successfully evolve onto new innovative, industrial pathways (Bailey et.al, 2015b)¹⁰.

These are issues of both strategy and governance, and should be accounted for in regional industrial policy frameworks (Cowling and Tomlinson, 2011). Indeed, there is widespread recognition that multinational firms can benefit by leveraging publicly-funded knowledge networks, yet shift production to lower cost locations in their own wider business network. In doing so, they can capture a disproportionate share of the fruits of value co-creation (Christopherson and Clark, 2007).¹¹ This can be inimical to sustainability. If a region wants to benefit from the value creation in its knowledge network, it will need to attract and retain firms which capture value, while also identifying and leveraging ways in which it can also capture for itself a share of the co-created value additional to that arising from the employment and external economy benefits that arise from the very presence and operations of firms, substantial as these may well be. Sustainable regional growth requires enhancing embeddedness with strong linkages between the local production base and multinational firms, that render regions 'sticky' (Markusen, 1996) so as to foster co-created value, while also retaining/capturing a part of this co-created value. Below we focus on how can theory-informed and supported regional policy help foster both value creation and sustainable value capture.

A number of economics-based theories support the benefits from, and the way to achieve, regional 'stickiness'. For example, the NEG and agglomeration literature emphasises clustering, co-location and building regional ecosystems (Krugman, 1991). Porter (1990) also points to clustering but in the context of his diamond-based model emphasising the coexistence of demand, resource, strategy and structure alongside related and supporting industries in a region. The national and regional systems of innovation view (Lundvall, 1992; Freeman, 1995; Cooke et al, 1998) would point to the interaction of institutions in a region that can also form a cluster or ecosystem, which is more broadly defined than Porter to include the public and third sectors. However, despite, agreement on clusters and ecosystems these three perspectives rarely, if ever, try to delineate between what creates and co-creates value in a region and what helps to capture it and in a sustainable way. As Teece (1986) argued, value creation and value capture need not go together. Innovators and value creators more generally can help create and co-create value but sometimes fail - and often spectacularly so - to capture it. In addition, the way one captures value has important implications for the sustainability of the value creation process. For example, value capture that flows disproportionately to some ecosystem actors, can undermine sustainability of the value co-creation process (Mahoney et al, 2007). Hence, we need to focus on value creation and capture but also value distribution.

Many an economics-inspired theory cited above have done little to address the issue of value capture, in effect leaving this to the private sector and/or assuming that embeddedness and the success of a cluster or ecosystem somehow implies sustainable value capture. This is accurate by definition, but not too helpful an observation unless of course one accepts a variant of the market failure-based approach, with a non-interventionist local (or regional) government. If, however, one

¹⁰ A case in point is the historical success of the Italian industrial districts where in the 1970s and 1980s, an inclusive and co-operative approach to technological upgrading was adopted, facilitating a new dynamism enabling these districts to successfully compete in challenging global markets, and move onto a higher trajectory (for more details, see Piore and Sabel, 1984; Best, 1990).

¹¹ See Fitzgerald (2016) on examples in the solar industry.

accepts the view that more can be done by government agencies (the place-based view) then the question arises as to what and how local or regional agencies can do in order to help co-create value and to assist the private sector to capture it, while also retaining/capturing some of it for itself, not least so that it remains capable of supporting the regional private sector. As already noted by Klein et al (2013), Mazzucato (2013) and Bailey et al (2015a), in effect this requires public sector entrepreneurship that aims to co-create value, help business capture as much of it as possible, while also capturing part of it for the regional economy and the public sector too. That public agencies need to capture value helps incentivise them to co-create value that can be captured. This implies more than horizontal policy measures; in particular it involves paying attention to value capture as well as creation activities, and also the way value is captured and the division of captured value between the private and public sectors, so the process remains sustainable.

The literature on business strategy has identified four key value capture strategies by firms; these are barriers to entry (both structural and resource-capabilities-related), generic positioning strategies (cost leadership, differentiation and focus), integration and diversification strategies often informed by transaction costs, resource and power considerations, and organisation wide branding considerations (Pitelis, 2009). Interestingly these can be scalable to the regional level. Regions can have or develop a region-wide brand, they can aim to position themselves, they can raise barriers to entry to competitive regions, and can of course cooperate (ally) with other regions and in case diversify and even more rarely integrate with other regions-the EU is a case in point. On this basis, below we point to four key steps that local/regional government and agencies need to take in partnership with the private sector in order to help achieve their aforementioned objective. Noting the interrelationships and overlapping, the first two steps are designed mostly to help co-create value and the last two to mostly capture it. Following these we discuss conditions that foster sustainability (Section 4.2).

i). From Regional Comparative to Competitive Advantages and Place-Renewing Leadership

For regions to develop a value capture strategy, they first need to diagnose their extant and evolving comparative and competitive advantages. This involves deciding whether to 'compete' on their existing strengths or to develop new advantages in new specialisms, as advocated in the smart specialisation framework. Many of these new specialisms emerge through exploiting 'related variety', whereby a region is able to unlock its existing expertise, competencies and knowledge bases and fuse these with new, complementary ideas and technologies in adjacent (and related) sectors (see Frenken et al., 2007). In this way, structural change opens up the possibility of regions moving onto more dynamic trajectories especially once their traditional advantages become negligible (see also Swann et al., 1998; Menzel and Fornahl, 2010; Asheim et.al., 2011; Neffke et al., 2011) and which can be viewed as an element of 'place-renewing leadership' (Bailey et al, 2010). Regional governments and public agencies can play a key leadership role not least by helping align industrial policy with structural changes (Lee and Malerba, 2017) and develop the desired competitive advantages.

By way of an example, Andreoni et.al (2017) document the role of the Emilia Romagna regional government – alongside local public technology intermediaries – in providing an evolving range of direct and indirect supports to the Emilian Packaging Valley industry. Since the early 1970s,

the industry has undergone an industrial transformation where the integration of new electronics, information and communication technologies with traditional mechanical systems has opened up new opportunities in higher-value product segments (such as in pharmaceutical machine packaging), and this in turn has precipitated an organisational reconfiguration within the local production system. By liaising closely with the business community and ensuring co-ordination and flexibility in policy at different stages of this cycle, regional policy-makers have played a key role in enabling firms to take advantage of these changes and ensure Emilia Romagna retains its international competitive advantage in machine packaging (Andreoni et.al (2017)). Place-renewing leadership may also be supported through structures, such as industry bodies, as in the UK's North Staffordshire ceramics industry, where Lucideon and its Applied Materials Research, Innovation and Commercialisation Company, have led the industry's evolution into fields of material science, enabling the cluster to develop a new competitive advantage in transforming materials (including ceramics, metals and polymers), processes and technologies into new types of products and solutions to improve industrial efficiency and for commercial use (see Tomlinson and Branston, 2014, 2017).

ii). 'Vehicles' for fostering regional growth

Guiding and enhancing regional dynamics involves identifying and supporting key 'vehicles' through which supply side structural international competitiveness can be fostered. In the regional context, these 'vehicles' can include inward Foreign Direct Investment (FDI), and multinational firms acting as 'anchor tenants' (see Section 3) and the agglomeration of firms and universities/research institutes within a regional eco-system. When jointly pursued, these 'vehicles' can foster regional value co-creation. The existence of related and supporting institutions and organisations can foster embeddedness and stickiness. There is also a plethora of usually third sector or private-public collaborations such as chambers of commerce, joint infrastructural projects, venture capital firms, incubators, catapults and in cases free enterprise zones. All these have advantages and disadvantages and they are not always suitable in all cases. Cost-benefit considerations are implicated in all cases. Critically, however, none of these involve a passive regional government and many are horizontal interventions within the regional context as they foster the entrepreneurial activity of all players in the ecosystem.

Massachusetts is a good illustrative example in this respect. It is a knowledge intensive, innovation economy that boasts a strong manufacturing presence, which is based upon small-batch, high value niche production. It has achieved and maintained this position largely through its world class university sector and public-private research institutes (such as the Raytheon-UMass Lowell Research Institute), which have close long standing links with OEMs and have developed reputation for fostering innovative start-ups. Such 'vehicles' have enhanced the state's entrepreneurial and innovation eco-system, not least by also attracting inward FDI. They continue to play a critical role in the development of advanced manufacturing. That said, while knowledge flows between the state's universities and OEMs are strong, those between OEMs and SME have become relatively unidirectional and have weakened SMEs' ability to shape innovation. In response, the state has begun to explore how policy might foster better collaboration with OEMs to upgrade SME capabilities, especially in the supply chain and in the early-stage of SME 'scale up' to ensure the long term vitality of the state's eco-system (see MIT, 2015).

iii). Regional 'Place Positioning'/Branding

Third, regions can do more to capture value by adopting 'positioning' and branding strategies. Such positioning strategies are well established in business strategy but largely ignored in industrial strategy. However, the concept of positioning is readily scalable to regions. It involves identifying and seeking to be placed in a position that differentiates in a positive way an entity from its peers/competitors; in essence, developing a 'place brand' (see also Konzelmann et.al, 2017). This can be achieved through cost leadership, differentiation and/or focus/niche strategies, whereby the first two can also operate in the context of the third (niche/focus). In terms of regional strategy that would involve a region aiming to position itself as a niche/focus player differentiated from other niche players in terms of the cost and quality of its offerings as compared to other regions. In this context the ideal position involves being in a position of low relative cost/high relative differentiation, which normally arises in highly innovative regions. This allows regions to simultaneously reduce unit costs (through organisational and institutional innovation) and produce high quality products and services, while acquiring a reputation/brand as being a technological leader¹². In contrast, regions with high relative costs and low differentiation are technological laggards and struggle to compete in international markets. High relative costs are a reflection of low innovative capability, weak infrastructure, a lack of increasing returns, and/or weak organisational and institutional configuration (Bailey et al, 2015a). Most of Eastern Europe struggles in these respects ((EC, 2017).

In the UK, 'place' positioning strategies have been successfully adopted in several diverse clusters. These range from mature industrial districts, such as the Northamptonshire footwear industry where recent investments in traditional skills have successfully been combined with firms developing (international) premium market niches, to Motor Sport Valley, which has established a global reputation for continual product and process innovation in Formula One, and to emerging clusters such as English Sparkling Wines in Sussex and Kent, where the focus is upon low volume/high quality wineries that have won international awards. Firms in these clusters develop high value products and offer bespoke services that are largely invariant to price competition, allowing them space for organic and sustainable growth. In each case, these clusters have also benefitted from strategic leadership from industry trade associations, that have facilitated training and skills development, cluster innovation and enforced quality standards (and approved accreditations), as well as actively – and crucially - promoting these British brands in international markets (see Konzelmann et.al (2017)).

iv). 'Bottleneck' assets

Another way to foster capture of value co-creation involves regions (and their constituent firms) placing barriers to competition by other regions, much like firms. In the private sector such barriers relate to returns to scale, differentiation, excess capacity and differential resources and capabilities (Porter, 1980, Teece, 1986). Seen as overall packages such barriers take the form of so called 'bottleneck assets and capabilities'. In the context of regions this can involve aiming to specialise within global value chains and/or creating (segments of) their own locally based ones to the extent possible, but in a way that places them in the position of 'bottleneck' players/assets. These are

¹² Cambridge and London in the UK, Stuttgart and Karlsruhe in Germany, Stockholm in Sweden and the Hovedstaden region of Denmark are noteworthy cases in point (EC, 2017).

players/assets whose contribution to the final product is most critical (and difficult to dislodge), and thus enables them to capture a significant proportion of globally co-created value. There is a host of such firms in the German Mittelstand (its highly specialised advanced manufacturing SMEs), and more recently the British Midlands - aptly named 'Midlandstand' - that adopt multi-niche strategies focusing on products and activities of low interest to multinational giants yet hard to imitate and also critical for the production of the final product (bottlenecks). Regional policy should aim to help firms identify and be able and willing to support these.

New regional industrial policy requires a focus upon reindustrialisation and locally-based manufacturing (Chang and Andreoni, 2014). This is in part because bottlenecks are harder to create in services that normally exhibit lower barriers to entry. Innovation takes place in R&D laboratories, but also and significantly in production circles. The loss of production capabilities – through off-shoring - eventually, can also mean loss of innovation capabilities (Pisano and Shih, 2009). Local SMEs can, in this context, be encouraged to specialise in “bottleneck” parts, which are outside the radar or interest of the “giants”, but of importance to their own objectives. Such moves often require re-industrialisation, public-private collaboration, hence regional industrial policy, at the very least through the provision of intelligence and advice by state agencies. This approach has long been a feature of German industrial policy, where SME participation in applied research programmes – such as the Leading Cluster Initiative – is mandatory, which strengthens SME unique technical capabilities, while allowing them to participate with research consortia partners (that include universities, research institutes, OEMs, consultancies and intermediaries) in collaborative projects. These projects maybe experimental and aimed at developing novel products and/or focused upon developing existing value-chain innovation, and are often led by the Fraunhofer institutes and/or universities. Critically, they target specific growth areas and are focused upon utilising a region’s distinctive capabilities such as medical devices in Nuremberg, and e-mobility in Stuttgart (see MIT, 2015, Andreoni, 2016).

Increasingly, the UK is adopting similar policy measures, with *The Economist* (21st September 2013) citing the case of the “High-Value Manufacturing Catapult” outside Coventry as a case of public-private-polity (University, in this case) collaboration, alongside a series of other interventionist measures; see also Foresight (2013). Such policies enhance a region’s ‘stickiness’ and ability to create and capture value. Another example can be seen in the ‘Niche Vehicle Network’ developed in the UK Midlands region based on open innovation principles so as to facilitate a shift into low carbon technologies, supported by the former Regional Development Agency, Innovate UK and the Advanced Propulsion Centre, which has been viewed as assisting the emergence of a ‘phoenix industry’ (Amison and Bailey, 2014).

4.2 Fostering Regional Sustainability

The four steps discussed above can be usefully employed to help regions to identify ways to enhance their competitiveness by reducing unit costs, improving differentiation and strengthening their innovative capabilities. For instance, smart specialisation strategies can include policies geared towards enhancing skills and capabilities within existing regionally embedded industries, while simultaneously fostering a regional diversification strategy within specialised technological domains so as to encourage synergies in related technologies, from which new innovative and commercial opportunities may arise (McCann and Ortega-Argilés, 2015) while serving as ‘bottlenecks’. This is an integrative approach that should enable regions – particularly lagging

regions – to upskill, enhance productivity and move onto a lower unit cost/higher differentiation trajectory.

More generally, with regional adaptation, a region's competitive advantages and positioning should be reviewed regularly to ensure consistency with evolving circumstances and stages of development. For example, in order to attract and embed high knowledge-intensive FDI, it may be useful to discourage some FDI, e.g. by rendering such FDI expensive to firms, through a high-wage policy – as pursued by Singapore over time (Lall, 2000). In this regard, care should be taken to achieve a coincidence between what multinationals require in their quest to leverage locational advantages, and what regions consider consistent with their advantages/positioning strategy, in line with the coupling, recoupling and decoupling processes that take place between regions and Global Production Networks that goes beyond strategic coupling per se (MacKinnon, 2012)¹³. Such regular reviewing to ensure consistency is especially important in an era of “fragmentation” (Venables, 1999), where multinationals can slice the value-chain, exercise ‘divide and rule’ strategies and choose ‘optimal’ locations for each part of their production process (Coffey and Tomlinson, 2006).

For sustainable regional development, these elements should be considered simultaneously. Competitive advantages can be linked to positioning, regional eco-systems diagnosed and upgraded, and appropriate FDI attracted in a way that is inclusive and in line with these advantages and supports the pursued positioning. Bottleneck assets and capabilities should be identified and leveraged in the context of specialisation within advantages-compatible segments of global value chains.¹⁴ What is advantages-compatible is often beyond the capabilities and resources, even the radar, of many firms, especially SMEs. The public sector can therefore be critical in funding the requisite research and disseminating the information, knowledge and training to whoever can benefit from it, acting as a ‘public entrepreneur’ (Klein et al., 2010, 2013). An SME focus can help foster diversity and pluralism and a fairer distribution of value captured, which is critical for sustainable development (Bailey et.al, 2015b). It also strengthens the hand of the local players allowing policy space to the region to adopt regulatory policies that foster a fairer distribution of the gains.

It is also important to note the approach advocated escapes the trap of viewing public policy in terms of being ‘market guided’ or ‘guiding the market’, as it is often presented in industrial policy debates (Bailey et al, 2015). Instead what is involved here is ‘market-guided market guidance’. The state (national and/or regional) identifies, listens to and is guided by the market signals as well as the interests and concerns of its participants. At the same time and precisely because it does so, such inclusivity also identifies the limitations, possible failures and needs for gap filling and support required to guide the market. Hence, the approach is ‘market guided market guidance’. An example is provided in a recent study by Georgiadis and Pitelis (2015), who find in the context of a natural experiment that UK government support in terms of workers’ training allocated to SMEs

¹³ Strategic coupling is seen as the “*dynamic processes through which actors in cities and/or regions coordinate, mediate, and arbitrage strategic interests between local actors and their counterparts in the global economy*” (Yeung, 2009; 213).

¹⁴The requisite conditions for achieving these are not easy, and are arguably becoming more stringent in developing countries, (Boltho and Allsopp 1987; Stiglitz, 2001; Fagerberg and Verspagen, 2002). At the same time, specialisation in segments of global value chains can provide some scope for smart, agile and effective industrial policy (UNCTAD, 2012).

had a very significant and positive effect on the recipient firms' productivity and performance. That support was offered because of earlier findings that SMEs can lack resources to invest in training. Hence the policy was 'market guided'. It was followed however by 'market guidance' and support that also demonstrated that public sector support properly implemented can be an important contributor to the regional commons.

The scale and speed of the challenge posed by what has been termed the 'Fourth Industrial Revolution' (De Propriis/WEF, 2016) also brings into sharp relief the need for new policy approaches to capture value at a regional and national level. Policy will have to nurture and engage with ecosystems of open, interconnected networks of stakeholders, cooperating to a much greater extent through strategic partnerships (Bachtler et al, 2017). Such ecosystems will be more dependent on their business environments to source knowledge regionally and internationally (Roland Berger 2015). A number of factors are relevant here for value creation and capture in ecosystems. Firstly, the pace of technological and other changes poses considerable uncertainty and risks for firms and governments (Andreoni and Chang, 2016). Managing this calls for a pooling of resources and risk-sharing and requires the use of joint infrastructures and support services. Bachtler et al (2017) highlight, for example, 'living-labs' where multinational companies and start-ups can interact and benefit from each other's competencies. Such ecosystem support need to be regionally provided (European Commission, 2017) but positioned within a multi-level governance framework, and be able to integrate with innovation systems internationally. Moreover, in line with Section 4 above, these need regular reviewing to ensure consistency with regional needs.

Secondly, innovation – notably disruptive innovation often requires inter-disciplinary approaches and 'open' models of collaboration (Chesbrough 2003). As the OECD (2016) has noted, "*pieces of knowledge required come from various actors and activities are rarely available inside a single organisation... it is important therefore to support the generation, diffusion and use of many sorts of knowledge and types of collaboration*" (OECD, 2016; 68). In addition, for 'mixing' to occur, an open and collaborative environment is needed, built on established relationships and trust. This in turn highlights the need for well-developed institutions capable of nurturing collaboration and networks both regionally and internationally (Amison and Bailey 2014) and in industrial policy terms in bringing actors together in the knowledge discovery process. Thirdly, as Bachtler et al (2017) stress, proximity to holistic support environments matters. Proximity, especially to the urban centres, matters for economic growth (OECD 2014). Proximity to large urban centres appears to allow rural regions to 'appropriate' agglomeration effects as long as a required level of connectivity and linkage is met (Veneri and Ruiz 2013).

As discussed in Section (3.3), the role of private anchor tenants may be critical since they provide access to these markets through their wider business network, such as their global value chains and wider marketing activities. A more diffuse, inclusive global strategy is to consider the possibility of nurturing and development of multinational webs of small firms through which international (small firm) cooperative networks of innovation and production might emerge. Unlike the current global transnational production networks where control of such lies among a few leading players, these webs would be organised in a way that fosters wider opportunities for

small firm participation in international cooperative activities and technological development (again with supporting institutional arrangements; see Cowling and Sugden, 1999). Since many small firms and regions across the globe face similar challenges, such a process may facilitate a wider cross-fertilisation of ideas (and creativity) and generate joint solutions to the problems they face. Policy should therefore facilitate partnering with different regions (Bachtler et al, 2017).

5. Concluding Remarks

Recent developments in place-based strategy represent moves in the right direction since they recognise both value creation and value capture, but unfortunately largely ignore the strategies for value capture as well as the distribution of value capture and hence the sustainability of the value creation process. This paper attempts to fill this ‘missing link’ in research on regional industrial policy by advocating place based strategies that cross fertilise industrial with business strategy, proposing positioning and value capture through building bottleneck assets with the aim of fostering sustainable value creation and the capturing of co-created value. Indeed, co-creating value, and capturing such co-created value in a sustainable way, through the co-creation of sustainable regional ecosystems, and the adoption of requisite positioning and specialisation in global and local value chains strategies, can be seen as the new rationale for a regional place-based industrial policy. In this context, regions could aim to position themselves as niche players, being characterised by “value for money” products and services (“relatively high quality” – “relatively low costs”) that specialise in bottleneck assets, such as advanced manufacturing products and hard-to-imitate services, based on regional histories and legacies. This involves active public sector engagement. In contrast to this being guiding the market or being guided by the market, such policy involves ‘market guided market guidance’, with simultaneous learning and support. In this context, modern industrial and regional policy is not about ‘picking winners’, but about co-creating the conditions that facilitate the emergence of winners (and also their supporters and challengers).

In summary, we argue that regional industrial policy requires an integrative approach, with a mix of appropriate inclusive policies across a range of policy domains reflecting the desired and aimed for competitive advantage of regions (Crescenzi et.al, 2016). Indeed, the OECD has recently pointed to the need for policy support for ecosystems to be provided at different levels (local, regional and national) and be tailored for specific places (OECD 2017). Such a place-based approach is refreshing, but still requires more by way of the means to capture value and the conditions for sustainability of the value creation process-that is the focus of our paper. We have identified four key steps that local/regional government and agencies need to take in partnership with the private sector. First, regions need to diagnose their extant and evolving competitive advantages. This involves deciding whether to ‘compete’ on their existing strengths or to develop new advantages in new specialisms, as advocated in the smart specialisation framework. Secondly, enhancing regional dynamics also involves identifying the key ‘vehicles’ through which supply side structural international competitiveness can be improved. In the regional context, these ‘vehicles’ maybe inward Foreign Direct Investment (FDI) and multinational firms acting as ‘anchor tenants’ to link knowledge and business networks (and the agglomeration of firms) within a regional eco-system. When jointly pursued, these ‘vehicles’ can foster regional sustained competitive advantage. To foster both value co-creation and capture the region has to select how to ‘position’ itself vis a vis other regions. This would involve a region aiming to position itself as a niche/focus player differentiated from other niche players in terms of the cost and quality of its offerings as compared to other regions. Fourthly, regions need to specialise within global value

chains and/or create (segments of) their own locally based ones to the extent possible, in a way that places them in the position of 'bottleneck' players/assets, whose contribution to the final product is most critical (and difficult to dislodge), and thus enables them to capture a significant proportion of globally co-created value.

Sustainability is fostered through strong local SMEs and (the often related) policy measures that foster a level playing field and a fairer distribution of the value captured. Clearly research on the issue of industrial and regional policy for sustainable competitiveness will continue. We hope that by critically assessing and extending the 3S and place-based approaches to account for issues of positioning and sustainability of value capture, we have taken the debate a step further and will motivate others to build upon and develop further our contribution and also to engage with policy makers in constructively critical ways.

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