REGIONAL STUDIES
2023, VOL. 57, NO. 6, 998–1010
https://doi.org/10.1080/00343404.2021.2016680

Routledge Taylor & Francis Group
RSA Regional Studies Association

Towards a problem-oriented regional industrial policy: possibilities for public intervention in framing, valuation and market formation

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ABSTRACT

Thinking about regional industrial policies remains focused on the supply of new knowledge, and recently also on grand challenges and missions, but takes problems, demand and market formation largely for granted. In this paper we build on policy sciences, sociology of markets and valuation approaches to explore the place-based roles of agency, institutions, networks and values in discursive processes of problem-framing and market creation. We identify a number of choices and trade-offs in the processes, practices and constitutive elements of market creation that in turn suggest new possibilities for more societal problem-oriented regional industrial policies.

KEYWORDS

industrial policy; place-based policy; innovation policy; demand; missions; societal challenges

JEL O25, O38

HISTORY Received 7 November 2020; in revised form 18 November 2021

INTRODUCTION

The need to identify new sources of regional industrial growth is a pressing policy issue. The last decade has witnessed renewed interest in the potential of industrial policy to advance agendas of regional economic development and innovation. Place-based industrial policies, such as the European Union (EU) Smart Specialisation approach, aim to help regions identify sectors and niches with growth potential. The premise of these new place-based policies is that regions should draw on their own resources, place-specific assets and innovative capacities to develop new specializations (McCann & Ortega-Argilés, 2015). Building on new industrial policy thinking (Rodrik, 2004), the aim is to stimulate transformation bottom-up through 'entrepreneurial discovery' of new market opportunities (Foray, 2014). In this view, the role of policy is to actively support the place-specific exploitation of emerging technological fields and industrial activities.

However, much of this thinking focuses on regional technological capabilities, overlooking other avenues for diversification on the demand side. Also, place-based industrial policies tend to neglect the possibility of path creation from unrelated diversification or 'path importation' from elsewhere (Hassink & Gong, 2019; MacKinnon et al., 2019; Martin et al., 2019). Further, by focusing on the rate rather than the direction of transformation, it neglects sustainability and societal goals, and tends to ignore the relative significance of more mundane economic activities to many regional economies.

The Covid pandemic and climate emergency have brought the need for a more holistic, place-based approach to societal challenges into sharper relief (Martin, 2021). McCann and Soete (2020) argue that the European Green Deal and Smart Specialisation strategies represent a reordering of the priorities and logic of regional development in Europe. To be meaningful, such a shift must acknowledge that there is a geography of problems distinct from the geography of innovation (or solutions), and that challenges 'faced by different contexts differ and therefore actions need to be tailored to the local context' (p. 17).

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As we will argue, to avoid repeating past mistakes, place-based industrial policy requires a deeper appreciation not just of the productive structure but also of the problems, values, social assets and cultures of places. This includes recognizing that 'real' local problems, values and assets are not just market failures to resolve but also potential opportunities for innovation and economic development (Coenen & Morgan, 2020). While the need to create and capture regional value has been discussed in the literature (Bailey et al., 2018), scholars have paid less attention to the practices involved in the process of defining that value and how value relates to societal *values* and concerns (Martin, 2021; Uyarra et al., 2019). Important questions thus emerge for regional industrial policy around how societal issues are framed, selected and justified as priorities (or not), and how local societal needs and problems can be turned into new solutions and market opportunities (Huguenin & Jeannerat, 2017). Our aim is to demonstrate that market outcomes are not given, but rather the result of decisions and actions that set the boundaries of what is important and what counts, and that influence incentives, for instance through often unglamorous or mundane government decisions around regulation, taxation or public procurement (Chang et al., 2013, p. 76; Miller & Lehoux, 2020).

Moving away from narrowly supply and technology-oriented interpretations of regional industrial policy can open up new possibilities for policy intervention. Thinking more carefully about local problems, demand and markets can shed new light on the potential uses of regional policy instruments around cluster or system-building, networking or experimentation, and demand-side tools such as public procurement. In this paper we build on policy sciences, sociology of markets and valuation approaches to explore the roles of place, agency, networks and institutions in processes of problem-framing, valuation and market creation. We identify trade-offs and scale/spatial issues in the processes, practices and constitutive elements of demand formation and market creation that in turn suggest new possibilities for innovation and industrial policy interventions in regions.

The paper is structured as follows. After a short introduction and review of recent industrial policy agendas, in the third section we examine the idea of 'problems' as policy rationale. We then discuss how problems are framed and given value, namely how they become 'matters of concern' and 'matters of worth' in the fourth section. The fifth section addresses the place and scale implications of problem-framing, valuation and market formation, before we finally consider key policy interventions and trade-offs of a problem-oriented approach in the sixth section. The seventh section concludes with a discussion of the promise and potential challenges of a more problem-oriented regional industrial policy.

RECENT REGIONAL INDUSTRIAL POLICY THINKING – AND ITS SHORTCOMINGS

Over the last decade there has been growing support for more 'place-based' and more selective innovation and industrial policy approaches. This partly reflects dissatisfaction with more generic approaches to regional policy based on systemic failure rationales. No policy can be entirely sector (or place) neutral in practice, particularly as generic policies tend to further reinforce relationships between strong incumbents in existing supply chains, at the risk of reducing variety and generating systemic lock-in (Herstad et al., 2010; Narula, 2002). Both Martin (2015) and Brown and Mawson (2019) note how 'innovation systems' rationales lack substance and coherence in policy terms. Meanwhile, the underwhelming impact of innovation systems policies in driving economic transformation and addressing 'wicked' social problems (Frenken, 2017) has driven renewed interest in industrial policy and in mission-orientation.

A central aspiration of new industrial policy thinking is to achieve more spatially sensitive, participatory and democratic policies (Bailey et al., 2019; Iammarino et al., 2019) without 'picking winners' (Mazzucato, 2018). Perhaps the most prominent example of a place-based industrial policy is the Research and Innovation Strategies for Smart Specialisation (RIS3) of the EU. This aims to help regions discover place-relevant opportunities, to generate or maintain competitive advantages, and to create capabilities for developing new growth trajectories in a limited set of strategic key areas (Foray, 2014). However, the impact and transformational potential of such approaches has been questioned (e.g., Hassink & Gong, 2019). First, the focus is overwhelmingly on technology generation rather than diffusion or market formation. This implicit science and technology (S&T) push approach may be appropriate for regions with more 'advanced' entrepreneurial ecosystems, but is likely less so for weaker ones (Isaksen, 2015). The latter might also be more susceptible to 'policy capture' by powerful local actors such as universities or large firms (Brown, 2021; Kempton, 2015). A narrow view of Smart Specialisation is thus unlikely to be transformative in all but the most propitious institutional and economic contexts. At best, it is about 'discovering' opportunities rather than creating new ones in 'market landscapes that simply did not exist in the past' (Mazzucato, 2016, p. 150).

Second, the societal dimension is often absent in regional innovation and industrial policy thinking (Coenen et al., 2015; Uyarra et al., 2019). The dominant policy discourse adopts a structural view of place-based characteristics and assets and at best remains agnostic about innovation directions and societal relevance (Grillitsch & Hansen, 2019). In reaction to this, critics have called for regional industrial policies that incorporate both the realities and societal goals of local economies and also acknowledge that innovation has negative as well as positive impacts. These impacts may be distributed unevenly spatially, socially and temporally. Instead, it is argued, we need a broader view of innovation that also encompasses the emergence of new processes and practices in more application, service- or user-oriented sectors. So-called 'foundational economy' sectors (Coenen & Morgan, 2020) such as health and care, food and retail, providing

goods and services essential for the well-being of citizens, play proportionately more critical roles in less-favoured regions (Froud et al., 2018). However, theoretical and policy debates about place-based industrial policy neglect these sectors (Hansen, 2021). These debates also tend to ignore the social and economic importance of mundane but essential 'maintenance' (vis-à-vis 'innovation') (Vinsel & Russell, 2020), and the 'darker side' of innovation is rarely acknowledged (e.g., Biggi & Giuliani, 2021).

In our view, societal problems, as much as sectors, are foundational and place based. Problems create opportunities for innovation, requiring input from 'foundational' and other sectors. Coenen and Morgan (2020) argue for attention to problems as a means to prioritization in place-based policies. Prioritization, they argue, should not be based on entrepreneurial opportunity alone but should also focus on 'specific, tangible local problems highlighted by the foundational economy, such as drought, ageing societies or economic hardship due to the disappearance of local industries and involvement of "ordinary people" affected by these problems as well as problem-solvers' (Coenen & Morgan, 2020, p. 21). But how are new needs or problems recognized, and then articulated into demand, shaping markets that provide both economic and social value? And what can we learn from this for regional industrial policies?

PROBLEMS AS POLICY RATIONALE FOR A PLACE-BASED INDUSTRIAL POLICY

Hoornbeek and Peters (2017) define problems as 'a disconnection between a desired state and the current state of affairs' (p. 369). Policy problems are socially constructed, influenced by how and by whom this disconnect between 'is' and 'ought' is defined (Hoppe, 2011). The role of policy in resolving problems is framed within society and the political system. Recommendations for policy design, instruments and implementation are thus inherently political and tied to underlying problem definitions (Hoornbeek & Peters, 2017).

In the innovation policy discourse, the problems targeted for policy intervention are innovation system deficiencies, deficits in the innovation performance of territories, or general market failures (e.g., Tödtling & Trippl, 2005). Similar thinking underlies 'systemic industrial policy' approaches (Aiginger, 2007), advocating different policy strategies and forms of coordination between firms, institutions and government to promote industrial development. Even whilst accepting that 'industrial policy has to be driven by societal goals' (Aiginger & Rodrik, 2020, p. 202), these approaches typically ignore the societal dimension in *activating* the dynamic and transformative potential of industrial policy in different places (Bailey et al., 2019).

Meanwhile, the notion that innovation is key to solving societal challenges is central to a 'new generation' of mission-orientated (Mazzucato, 2018) and transformative innovation policy approaches (Schot & Steinmueller, 2018). Here, societal problems related to climate change, migration, food or energy security are – or should be – key targets for policy intervention. Yet these streams largely take for granted the understanding of a problem, the means of addressing it, and the legitimacy or impact of those means. As Pfotenhauer et al. (2019, p. 896) note, 'innovation has become a framing device – a kind of diagnostic lens – through which we tend to frame policy problems as problems of innovation', narrowing policy options and marginalizing 'rationales, values, and social functions' (p.895). The actual formation and selection of the goals and values behind these challenge- or problem-oriented policies – who decides, and how? – is rarely questioned (Huguenin & Jeannerat, 2017; Schlaile et al., 2017; Uyarra et al., 2019). Thus there seems to be a 'solutionist' bias to mission-oriented innovation policy thinking. S&T-based solutions appear at the centre of innovation missions or strategies, with an emphasis on tackling complex societal challenges (e.g., around public health or the decarbonization of our economies) with technology rather than with broader changes in economic, social or political structures (Montero, 2020; Morozov, 2014).

Solutionism places an emphasis on promising solutions at the expense of more deeply understanding the problem, its causes and consequences. Yet innovation *is* fundamentally a problem-solving activity: according to Metcalfe et al. (2005), knowledge of problems and solutions grows in an 'experimental and autocatalytic fashion, as one problem leads to another in the minds of the different individuals who compose the invention and innovation system' (p. 1284). Undoubtedly, problems will differ in the extent to which they are structured and well definable (Head, 2019; Hoppe, 2011; Turnbull & Hoppe, 2019). And societal issues are typically more contested, complex and uncertain than technical challenges or performance goals (Wanzenböck et al., 2020). Thus, the more unstructured and messy the policy terrain, the more ambiguous the problem diagnoses of different stakeholders, and the more likely that policy runs the risk of prematurely coupling problems to a specific solution, reducing the search space for innovation.

Moreover, what a stronger orientation towards societal challenges and problems means for place-based policies remains unclear. Most current approaches share an implicit assumption that societal challenges are global, neglecting context and place sensitivity, and the multi-scalar embedding of societal problems (Wanzenböck & Frenken, 2020). However, the spatial dimension is intrinsic to 'wicked' policy goals, posing key challenges around problem definition and identification. For instance, challenges around climate extremes, plastic pollution, or income inequality typically differ in their scale and scalability. Understandings of problems and potential solutions are influenced by the level of exposure and perceptions about the nature and urgency of the problem, with consequences not only for policy-making but also the level of disaggregation and scalability of the envisioned solution.

Frenken (2017, p. 44) argues that mission-oriented policies should be 'local' in the sense of emanating from

'those parts of society where the challenge is actually present and partial knowledge about it is available'. Similarly, Brown (2021, p. 3), in his critique of mission-oriented policies in Scotland, argues that effective innovation policies must be 'deeply rooted in a close understanding of the specific localized context in which they are introduced'. This involves recognizing the crucial role played by implementers 'on the ground', who will possess practical knowledge of the problem and the context in which it must be tackled (Ansell et al., 2017). Wanzenböck and Frenken (2020) invoke the principle of subsidiarity to suggest that societal challenges should be addressed by those more likely to be affected by them. These affected actors and communities may help construct temporary innovation systems that can advance societal objectives and structures that eventually become diffused across territories and sectors (Frenken, 2017).

The literature on place-based industrial policies has started to look more closely at place-specific conditions, assets and capabilities (Bailey et al., 2019; Fothergill et al., 2019), but still focuses on the geography of (potential) solutions more than that of (potential) problems. It rarely asks how societal needs or problems are defined, demands articulated and markets formed. Market creation is implied to be an *apolitical* and *aspatial* process that can somehow be guided by policy action. However, these processes can be highly contested. Industrial policy thinking needs to consider how problems, needs and societal values are defined, framed and turned into market opportunities; that is, how 'matters of fact' become, first, 'matters of concern' and then 'matters of worth' (Doganova & Karnøe, 2015; Latour, 2014; Stark, 2017).

FROM MATTERS OF FACT TO MATTERS OF WORTH

The policy analysis and framing literatures (Bacchi, 2009; Hajer, 1995; Peters, 2005) have long considered the social construction of problems, and the politics and processes involved in how they become policy targets. Problems become collective concerns because (at least some) people (partly) agree about them. They are shaped through societal discourse, political debate, and influenced by the efforts of actors to impose interpretations upon them (Hajer & Laws, 2006; Van Hulst & Yanow, 2016). Contestation and framing can lead issues that were previously unnoticed, or seen as fixed or stable, to become 'matters of concern' – issues for discussion and debate (e.g., policy debates around water, energy or food) (Schaeffer & Smits, 2015; Schwanen, 2018).[1]

More broadly, frames can be conceptualized as 'schemata *of interpretation*' (Goffman, 1974), guiding how we assess new circumstances and situations. Frames allow actors to 'signify and condense the "world out there" by selectively punctuating and encoding objects, situations, events, experiences, and sequences of action in one's present or past environment' (Snow & Benford, 1992, p. 137). Moreover, framing is a *process*. For instance, the social movement literature sees framing as a discursive (narrative based), strategic (goal oriented) and contested (between proponents and opponents) endeavour on the part of actors to strengthen, challenge and transform dominant frames (Benford & Snow, 2000). Framing can also be a process of negotiating and drawing boundaries around a societal or political issue, to define what is important, what counts and what does not, and to justify who will be included and who excluded in relevant actions (Van Hulst & Yanow, 2016).

When a frame becomes a guide to action (or inaction) it becomes substantive, acquiring high practical relevance. For Rein and Schön (1977, p. 236), problem frames influence 'the questions we ask' and 'shape the answers we get' in public policy. Head (2019) uses the example of poverty, which can be framed either as a problem of individuals lacking sufficient skills or personal motivation, or as one caused by economic and social structures. In the first case, proposed solutions might focus on individuals, for instance, involving training and personal skill development. By contrast, in the second case, proposed solutions might focus more on new employment or basic income schemes.

Thus, problem frames, and the policy designs building on them, are performative in the sense that they can influence the course of innovation and transformative change in regions. To take the example of the increasing incidence of dementia, framings focused on cures or therapies will favour S&T-based solutions and sectors, likely organized in global knowledge networks and value chains. However, framings emphasizing adaptation of care systems and integration of sufferers into society – whilst addressing the same broad societal challenge – might lead to very different outcomes due to the social and localized nature of the solution search process. There is also a temporal dimension to framing: for instance, a public health emergency, such as a new disease outbreak, might temporarily trigger a shift in the time horizon of policy from long-term planning to rapid response mode (Ansell & Torfing, 2015). Actors may make very different resource and investment decisions depending on whether external events and future perspectives are perceived as threats or opportunities (Dutton & Jackson, 1987; George et al., 2006), though both may be considered urgent. More broadly, visions and expectations about the future can help align actor networks and institutions, reduce uncertainties and mobilize resources (Berkhout, 2006).

So far, we have discussed how problems depend on the questions we ask, and how they become 'matters of concern'. But how do they become 'matters of worth' demanded in markets? Since 'problems are not the same as markets' (Conway et al., 2017), some processes must translate a real social or environmental problem into actual market demand (Doganova & Karnøe, 2015). The innovation studies literature has paid some attention to the formation of markets for societal needs, for instance to favour the emergence of greener technologies. Mazzucato (2016) advocates a shift away from thinking about 'failures' (whether market or system) preventing the creation of these public goods, towards a more transformative,

market-creating role for the state. Technology innovation system (TIS) approaches (Bergek, 2019) identify 'market formation' as a key process and suggest policy interventions for the articulation of demand and preferences, standard-setting or product positioning (including pricing and segmentation), that nurture and legitimise new technologies. Articulating demand – actively bringing together producers and potential users (Boon et al., 2011) – helps coordinate fragmented or unmet user need and build markets whilst helping to develop or adapt knowledge and production around solutions (Uyarra et al., 2020). Despite these acknowledgements of market formation, TIS approaches, and the innovation literature in general, lack a detailed account of *how* this happens (Bergek, 2019; Boon et al., 2020).

Social studies of markets emphasize that markets are constructed, practically organized social or socio-technical mechanisms (see Fligstein & Dauter, 2007, for a review). The focus is on the networks, institutions, and calculative processes through which markets are *performed*. Actors, networks and institutions are considered constitutive elements in reducing uncertainty and resolving coordination problems to make market exchange possible (Beckert, 2009; Möllering, 2009). For instance, social network structures will influence the likelihood of cooperation and the development of trust between market actors. As arenas of social interaction, markets are made possible by shared values, expectations, and understanding. Formal and informal institutions are also important in reducing uncertainty. Legal frameworks, regulations, *de jure* or *de facto* standards, etc. serve to organize competition in the market, reflecting societal demands and political cultures. Crucially, this involves practices of valuation that render the characteristics of products comparable and understood. Valuation involves: selecting a quality of worth as salient, excluding others; metrics or scales that allow commensuration (i.e., comparison) and that make visible new product qualities; and claims about what type of evidence or proof counts (Barman, 2016; Kornberger et al., 2015).

Such 'calculative' market devices (Callon & Muniesa, 2005) shape how market actors make decisions about products and technologies. This is particularly important for products claiming novel qualities, such as environmental friendliness, or for efforts to make markets more just (Reijonen & Tryggestad, 2012). For instance, Doganova and Karnøe (2015) describe how use of a 'preferred technologies list' helped normalize novel product qualities to build a market for environmental technologies in Denmark (see also Iuel-Stissing et al., 2020). The introduction of qualities that reflect new (local) values and priorities thus requires proactive efforts in order to make them visible and actionable, and is often subject to intense political controversy over time, as shown by Mortensen (2018) in the case of the evolution of wind energy in Denmark. In this sense, markets are 'as much political arenas as they are economic realms' (Beckert, 2009, p. 259). The work of intermediaries and 'value entrepreneurs' involved in coordination, qualification and legitimation practices for market construction is often key (Barman, 2016; Bessy & Chauvin, 2013), particularly in situations characterized by 'uncertainty, openness with regard to technological design and activities of pioneering entrepreneurs' (Dewald & Truffer, 2012, p. 405). Such actors are not just passive translators of framed problems, values, needs and demands, but disseminate and provide legitimacy to particular conventions or standards (e.g., of product or service quality) (Miller & Lehoux, 2020).

The social value underpinning the need for 'public goods' should therefore not be taken as read (Geiger et al., 2014), but rather should be considered the result of the ordinary functioning of markets that from time to time 'triggers the emergence of matters of concern' (Callon, 2007, p. 139). 'Concerned markets' (Geiger et al., 2014; Reijonen & Tryggestad, 2012; Roscoe & Townley, 2016) emerge as market actors produce social value through often mundane valuation practices that seek to achieve both economic gains and a more just and sustainable society.

A corollary of the discussion so far is that market processes are ongoing, because the constitutive elements of the market are constantly being reproduced through processes of innovation, network formation, institutionalization, commodification, communication and competition (Möllering, 2009). These processes progressively reduce uncertainty by reconciling opposing forces or tensions, for instance trade-offs such as: commodification versus customization; transparency in communication versus information asymmetry; too much competition versus too little competition; and predictability versus applicability of institutions (Binz & Truffer, 2017; Möllering, 2009). Uncertainty is key to the dynamics of markets, and it is both a challenge to be resolved (or minimized) but also a critical factor in innovation, opening up opportunities for entrepreneurs and innovators (Beckert, 2009; Metcalfe, 2008).

PLACE AND SCALE IMPLICATIONS OF PROBLEM FRAMING, VALUATION AND MARKET FORMATION

The dynamics of problem-framing, valuation and market formation described above have spatial and scale implications. Not only problem discourses but also the actors, networks, and institutional contexts and practices that markets depend on are geographically diverse and multi-level (Dewald & Truffer, 2012). In this section we discuss the spatial aspects of how 'matters of fact' become 'matters of concern' and 'matters of worth'. These dynamics involve tensions and trade-offs that policy makers would need to consider in supporting demand and market creation. In the sixth section, we will further explore these tensions and trade-offs related to problem-framing, network-building and institutional change practices in order to pull out implications and potential areas for industrial policy intervention.

Places are endowed with assets and challenges that may become matters of concern but also of legitimation and positioning. Schaeffer and Smits (2015) show for instance

how energy controversies turned villages and areas in Chile and Thailand into 'places of concern', as social movements transformed these places into 'exceptional' ones 'worth defending and caring for' (p.148), eventually influencing national energy policy discussions. Similarly, Seyfang and Smith (2007) argue that environmental solutions often evolve from place-based experimentation with new social practices and technological innovations, and discuss how networks of activists and organizations generate bottom-up solutions in response to local problems and local values (see also Bours et al., 2021). This suggests that alternative visions need to be grounded first in particular actor networks and specific places in order to gain legitimacy and ultimately be realized, as described by Eames et al. (2006) in the context of the implementation of technology visions and imaginaries for a 'hydrogen economy' in London. There is therefore a geography of legitimacy-building for problems and solutions which has an inward but also an outward dimension, involving efforts to position a place as distinctive from others to foster value creation and capture (Bailey et al., 2018; Heiberg et al., 2020; Uyarra & Flanagan, 2021).

Different place-based problem discourses are likely to lead to different policy outcomes and implementation. For instance, Lowe and Feldman (2008) show how biosafety regulations were framed and implemented differently in two US regions (Cambridge, MA, and Berkeley, CA), only in the former case contributing positively to biotechnical entrepreneurship and regional development. In Cambridge the implementation process was described as 'a shared conversational space' which facilitated consensus, community-building and legitimacy, and strengthened open citizen involvement and entrepreneurial capacity. Establishing such local 'conversations', that is, interactive processes drawing in people with different backgrounds, perspectives and values, demonstrates the need for local network-building to address local problems and activate economic renewal (Lester & Piore, 2004; Pihlajamaa & Merisalo, 2021; Rutten, 2017; Uyarra et al., 2017; Van Winden & Carvalho, 2019). Such conversational spaces also raise questions about inclusion and the degree of participation, involving decisions around who defines (and owns) a problem, how it should be framed and who can benefit from a solution. Here, the number and heterogeneity of participants matters, and may help mobilize additional support, expertise and legitimacy. Pihlajamaa and Merisalo (2021), for instance, found that the involvement of city representatives in innovation contests in Tampere increased ownership of problems and aided the subsequent adoption and adaptation of solutions to local needs, while active engagement of private firms in problem-framing increased the likelihood of innovation but also increased the risk of solutionism. Increasing the diversity of viewpoints, interests and values can indeed reduce the risk that specific actors might capture framing processes but can also make building trust and productive deliberation more difficult (Ansell & Torfing, 2015).

As we have argued, framings broaden (or limit) the range of actors, networks and regional assets to be mobilized to create new opportunities and to meet future societal needs (Ansell & Torfing, 2015). They also broaden (or limit) the spectrum of search paths or future imaginaries (Jasanoff & Kim, 2015) by assigning value to certain innovations or solutions over others. In terms of market formation, there may be a trade-off between narrower, more place-specific framings and broader ones that leave more space to innovate and to shape markets, but which may disempower some local actors and views (Ansell & Torfing, 2015; Pihlajamaa & Merisalo, 2021). Broadening the geographical scale of the problem, for instance, by mobilizing translocal networks such as global city networks (Fastenrath & Coenen, 2021), may help 'bridge scales', widen the scope of a market (Dewald & Truffer, 2012) and upscale potential solutions to new places or fields of application (Uyarra et al., 2017). However, rescaling of problem-framings may also affect local institutions, network configurations and power relations, privileging certain interests (e.g., of large multinationals) while disempowering others, as shown for the case of the governance of municipal waste in the UK by Davoudi (2009).

Valuation practices are also spatially and temporally localized (Antal et al., 2015) and subject to tensions and trade-offs. Binz and Truffer (2017) suggest a stylized dichotomy of standardized (for mass markets) and customized (to specific local contexts or needs) valuation. In the former, legitimation is eased by the relative clarity and uniformity of demand, standardized distribution channels and investment procedures. In the latter, customized valuation helps develop market niches for products that align to place-specific needs and the symbolic meanings of particular user groups or places (Binz & Truffer, 2017). Also here, actors may engage in framing practices such as bridging (connecting several related frames), over-amplification (strengthening of existing but latent values), extension (to new issues and values), and frame transformation (altering or generating new meanings to align with new situations) (Benford & Snow, 2000). Hence, both framing and valuation processes involve considerable place-sensitive institutional work performed by, for example, civic, community or public leaders and other actors shaping the multiple discourses and practices (Schaeffer & Smits, 2015).

Placing agency, institutions and networks at the core of framing and valuation processes is consistent with the recent interest in agency in regional change. An example is the 'trinity of change agency' approach of Grillitsch and Sotarauta (2020), which emphasizes the roles of innovative entrepreneurship, institutional entrepreneurship and place-based leadership. Institutional entrepreneurs (Battilana et al., 2009) will attempt to challenge existing frames, create new interpretations and a 'new system of meaning' around institutional arrangements (Garud et al., 2002). They will try to influence the societal discourse, to make visible and articulate demands, values, concerns or new orders of worth (Boltanski & Thévenot, 2006) and use new frames to mobilize resources, people or ideas in an attempt to increase the legitimacy of their

own interests. Thus, active engagement in problem (re-) framing by challengers of established social and institutional structures can create opportunities for new ways of doing things (Battilana et al., 2009; Shaw & Carter, 2007; Lowe & Feldman, 2018).

Place-based leaders (Grillitsch & Sotarauta, 2020) also play a key role in constructing local imaginaries and managing conflicting discourses about, or visions or framings of, the future of the region. Similarly, the place-based aspect of coordination and network-building are emphasized in the emerging literature on systemic intermediaries in sustainability transitions (Kivimaa et al., 2019; Van Lente et al., 2003). Intermediaries can make use of multi-scalar network spaces to govern, mediate and coordinate actions between different localities, or to translate regional strategies into local practices (e.g., Medd & Marvin, 2008). As mentioned earlier, the 'value entrepreneurship' role of such place-based intermediaries can be key to market construction. Importantly, these types of agency (or problem and value entrepreneurship) are not solely the province of traditionally conceived leaders, business entrepreneurs or 'autonomous' intermediaries; they are also present in the important, yet often invisible activities of implementers, officials or procurers in framing and legitimizing problems. These actors develop criteria and make choices that link problems to places and place-based discourses, but that also shape ideas about appropriate solutions and help build markets to deliver them.

TOWARDS PROBLEM-BASED INNOVATION AND INDUSTRIAL POLICIES

Viewing markets as the product of place-based framing (discourse) shaped by actors, their interactions (networks) and institutions, allowed us to uncover the importance of shared values, meanings, visions and expectations that underly the functioning of markets. As we will argue now, it may also offer new opportunities for public action. The figure below summarizes key trade-offs and choices involved in market formation to reveal potential points of public intervention related to problem-framing and legitimacy-building, agency and network-building, and support for institutional change. Many of these trade-offs represent choices that are being made every day in mundane processes of public administration, and in public-private and private-private interactions. Thus our aim is not to suggest an entirely new set of policy instruments but rather to argue that more attention to these choices in established policy implementation practices and instruments can illuminate opportunities for targeted policy action to align problem-based visions, expectations and innovation efforts for regional industrial development (Figure 1).

First, tensions can emerge from specific *problem-framings* – how certain issues become 'matters of concern' and thus performative in influencing the course of innovation or transformation in regions. Shared framings facilitate interaction and cooperation among actors to mobilize resources, to articulate demand, to transform or to create new markets. Legitimation can be built either by focusing on a narrow problem-framing, implying highly specific solutions and a local search, or by broadening out the problem and linking it with other problems (frame extension or bridging). If problems are articulated in generic, more universal or place-independent terms, the problem can be 'scaled up' to facilitate the embedding of local actors, networks and solutions into global market structures. These choices influence not only the definition of the problem but also the likely solution space, future resource and investment decisions, and the direction of innovation.

Following the idea of place-specific problems, assets and values, there has been much practitioner and scholarly interest in the use of participatory prioritization, and of design and experimentation mechanisms such as foresight, innovation contests, living labs and hackathons. Such policy mechanisms could be a platform for facilitating local 'conversations' to deal with societal problems, particularly when they are fraught with ambiguity and contestation and require the consideration of different social conventions and values (Van Winden & Carvalho, 2019; Pihlajamaa & Merisalo, 2021). These instruments could potentially influence problem-framing and network-building in market formation *if* they can be genuinely problem-driven in terms of ambition and participation.

Participatory methods have also been suggested as platforms for the co-discovery and co-production of priorities for industrial policy (Bailey et al., 2018), with equally prominent roles for local or regional government bodies, local businesses and universities and citizens. Even more traditional industrial policy instruments focused on cluster, platform and ecosystem-building (Janssen & Frenken, 2019) could be relevant if value creation and demand are not treated as exogenous or given. A risk for industrial policy, when implemented top down, is that such approaches tend to be focused on optimizing and tailoring existing or imminent technological solutions to specific users and problems. Instead, an emphasis can be placed on mobilizing a diversity of initiatives, technological and societal, formed in places bottom-up, to stimulate learning and buy-in across promising 'small wins' around a place-specific problem (Bours et al., 2021).

A second point of attention is thus the form of *agency and network-building*. Actors might, however, disagree about how extensive and open to entry networks should be: for instance, potential innovators on the solution side may want to maximize the number of customers whilst minimizing the competition, whilst potential users on the demand side may prefer to see more, and more diverse, suppliers. Smaller and more homogenous networks (in terms of values, knowledge or proximity) may build trust more easily, whilst in larger, more diverse networks, building trust may require greater effort and more time. However, there is the risk of creating cosy and potentially corrupt local relations, particularly if networks are too closed. Moreover, solving societal problems are likely to require the bridging and combination of previously unconnected actors and industries, which may lead to the

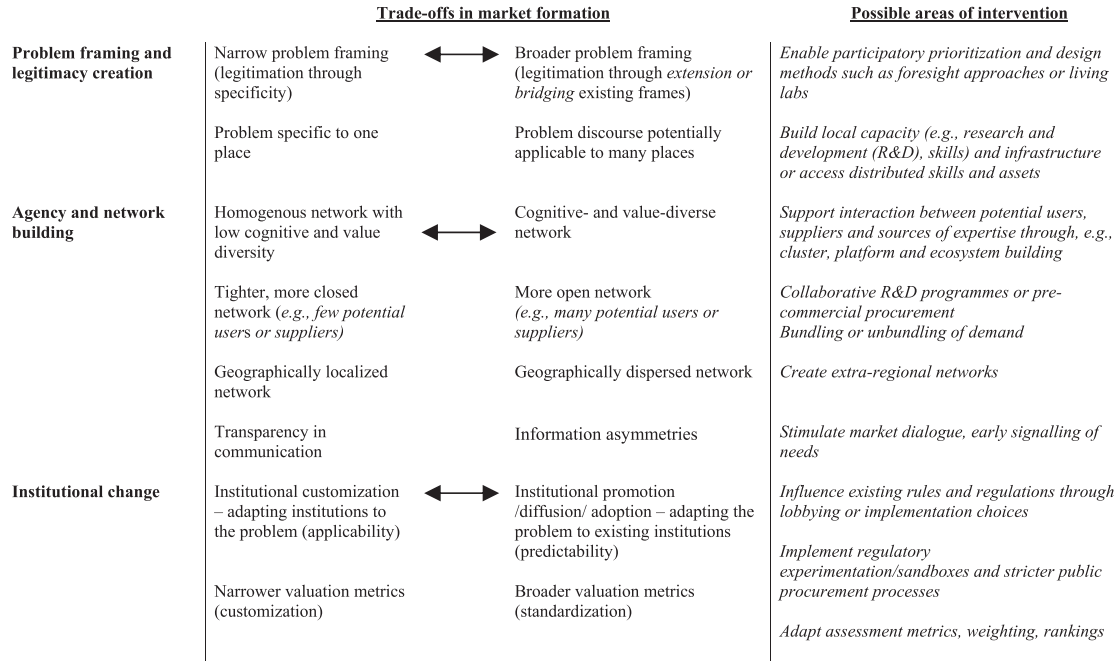

Figure 1. Trade-offs in market formation and possibilities for public intervention.
Sources: Authors' own elaboration inspired by Möllering (2009) and Ansell and Torfing (2015).

emergence of new unrelated industries (Janssen & Frenken, 2019).

Hence, the number and heterogeneity of participants matters, and may help mobilize additional support, expertise and legitimacy. Encouraging consortia of firms and other actors (such as universities and technology centres), and partnerships between local small and medium-sized enterprises and large firms through, for example, public procurement, cluster and platform policies, has been proposed both as a means of addressing societal challenges and of upgrading and diversifying regional business ecosystems (Bailey et al., 2018; Clarysse et al., 2014; Uyarra & Flanagan, 2021). Moreover, going beyond user-producer interactions and including other actors with relevant expertise or resources in the implementation of these policies can also shape the sophistication of potential solutions. This could mean investment in knowledge creation and skills development within the region and/or going beyond the region through extra-regional efforts to attract and anchor in the region external knowledge and capabilities, for instance through collaborative research and development programmes or the pre-commercial procurement of promising solutions (Uyarra & Flanagan, 2021).

The way in which needs are signalled and communicated, and to whom, is also important in terms of openness and transparency of networks, influencing which actors participate and perform in markets. For instance, awareness raising among a broader spectrum of actors through public procurement processes, such as advance notice of future public tenders or market consultation exercises, could lead to greater market entry and competition (Georghiou et al., 2014).

Finally, *institutions*, formal and informal, will shape framing and market formation processes, and thus provide relevant starting points for policy to influence the creation and functioning of markets. Informal institutions and practices, in the form of routines, conventions and cultures, typically increase trust and reduce uncertainty in the search for solution. Formal institutions, and how they are enacted, can affect the ways in which users and producers interact, determine market entry conditions, or influence competition in other ways. Applying widely understood norms around, for instance, standards, regulations, public procurement or the protection of intellectual property rights, can help reduce uncertainty by promising economies of scale and more stable and predictable market conditions. Conversely, tailoring institutions through regulatory innovation and experimentation, for instance through regulatory sandboxes and demonstration projects, may help enact desired local values (Huguenin & Jeannerat, 2017).

The same applies to valuation processes that shape markets around products and technologies and direct actors' decisions towards these desired values and needs (Binz & Truffer, 2017). Where solutions need to be tailored to new needs, a new or more customized valuation infrastructure may be required that better reflects those values and needs. This could involve, for instance, the inclusion of stricter or more specific quality and performance requirements in public procurement (e.g., in relation to social and environmental sustainability). Stricter public procurement processes can attract or incentivize more innovative solutions, but equally the knowledge may not exist to respond to these requirements. Further, too much novelty in terms of the solution may reduce the potential for applicability and implementation. Conversely, the combination of stricter criteria and enlarged demand (through, e.g., articulating user needs) may

encourage the formation of new partnerships or consortia between suppliers and experts with different but complementary knowledge to address these needs (Uyarra et al., 2020).

Institutional capacity and available resources are often weaker in regional and local governments, constraining the potential for more inclusive and experimental policy processes (Morgan & Marques, 2019). Nonetheless all places have some institutional capacity in relation to core aspects of public administration. The often-mundane matters of rules, regulations, technical and calculative devices can be key to market formation. Moreover, in many regions the regulatory framework will be outside their direct control. Even so, regional policy actors will have influence through lobbying efforts or through mobilizing actors to influence regulatory change at other scales (e.g., through demonstration effects). Moreover, they potentially exert influence through their role as implementors of regulation on a day-to-day basis at the local level, given that institutions are interpreted and reinterpreted by the actors that respond to them (Lawson, 2003).

CONCLUSIONS

The need to identify new sources of industrial growth for regions is a pressing one, not least in the context of the need to respond to the climate emergency and debates about a new green industrial agenda. However, so-called new generation directional policy thinking (Foray, 2018) treats needs and problems unproblematically. Too little attention is paid to the emergence and dynamics of what is perceived as a problem or challenge, and what becomes a matter of collective concern and thus a target for policy and innovation. In this paper we have unpacked problem-framing, valuation and market shaping processes to shed light on a broader range of ways in which regions might detect and create new market opportunities within and across territories, based on their individual context, territorial assets and needs.

The challenges or problems targeted by policy will always be shaped by place-specific structures and actors, influenced by values, and subject to change over time. A socially concerned industrial policy would therefore have to engage more widely with society to understand the variety of societal problems, to engage in a process of problem definition, and to recognize the variety of responses to these problems potentially arising in different places. In a few cases place-specific responses to societal issues may revolve solely around the development of new technologies within specialized industrial clusters. More often local problem-solving strategies will involve searching for *new ways of applying and embedding* existing technologies, in line with local conditions and institutions – perhaps especially so for lagging regions.

The notion that potential users, potential producers, technical experts or regulators should be brought together in collaborative fora to co-produce industrial policy priorities is not new but has tended to remain biased towards the supply of solutions (or the search for problems to which solutions can be applied), and the knowledge and capabilities ascribed to the supply side. Meanwhile those calling for directional and mission- or challenge-oriented policies have tended to take for granted *which* problems get selected as priorities, *by whom* and *how*. We suggest a middle way between calls for space-blind mission-orientation towards broad and global 'grand challenges', and unrealistic expectations that regions can act like mini nation-states in terms of industrial policy.

Our purpose is not to identify optimal strategies for regional actors from this synthesized understanding of problem-framing and valuation in market formation, or make a naïve call for greater coordination. Rather, we argue from the position that innovation systems are, fundamentally, problem-oriented, directed towards specific problem-framings. Hence, problems are eventually turned into potential market demand, through agency, networks, discursive processes and through institutional change and interpretation. Treating innovation systems, problems, and markets as constructed, organized socio-technical mechanisms, we propose a different and complementary starting point for thinking about industrial policy; one that potentially helps address the difficulty conventional approaches face in effectively bridging different kinds of ecosystems (notably the knowledge and business ecosystems) within regions (Clarysse et al., 2014).

We are not proposing a raft of new policy instruments – rather we argue that policy should consider all the roles of the state (purchaser, regulator, convener of conversations) (Borrás & Edler, 2020). This implies a broader range of potential interventions on both the supply and demand sides, around problem-framing and legitimacy creation, agency (including in relation to problem and value entrepreneurship) and network-building, and the practices of institutional change, along with all those mundane processes which can help to shape and manage markets. Policy should similarly consider a broader range of potential regional assets as a basis for diversification, not just knowledge assets, but also local values and problems.

There are risks involved in a policy agenda build around network formation, framing and the development of shared visions and values. Outside authoritarian regimes, shared visions can rarely be built through top-down coordination. Coordination must always remain a moving target, but the kinds of processes we discuss above can support mutual adaptive coordination (Flanagan & Uyarra, 2016). Public administrations in less-favoured regions may lack some of the institutional capacities necessary to do place-based policy. However, they will have institutional capacity in relation to statutory duties and 'foundational' activities and these can be the starting point for further development through institutional work, as documented in the case of Galicia by Uyarra et al. (2020).

It is also the case that deliberate attempts to influence framing and valuation might be captured by actors with vested interests, or dominated by cosy or corrupt local political and business relationships. Public procurement, in particular, is felt to be at risk of corruption, and hence is

subject to special regulation and accountability measures. However, regulatory changes and new institutional practices in public procurement could make it more open, inclusive and transparent. Problem- and value-driven approaches to industrial policy would certainly need to institutionalize practices of openness and transparency to citizens and their representatives to minimize any corruption risks arising from attempts to build tighter local networks of users and suppliers with strongly aligned interests. We would also note that traditional supply-side policy-making and Smart Specialisation style prioritization approaches are just as likely to reflect cosy and closed networks, and to be dominated by the 'usual suspects'. Moreover, we would stress that processes and practices shaping problem-framing and market creation go on in any case. The often hidden and unglamorous choices made by public policy makers and implementers already affect the outcomes of these processes almost on a daily basis. We therefore believe that incorporating these processes, practices and choices into regional industrial policy thinking can provide a distinctive and useful complementary starting point for attempts to promote economic development and address societal problems.

Finally, our analysis also has implications for scholarly research. Ideally we need more cases of regional industrial policy initiatives that attempt to leverage non knowledge base assets, or that attempt to mobilize a wider range of roles for the state. More broadly we need research that helps us understand more clearly how state actors contribute to problem and value entrepreneurship, and that sheds light on – sometimes mundane – processes and practices of framing, valuation and market shaping. Insights from such research would help inform the approach to regional industrial policy thinking we have proposed in this paper.

ACKNOWLEDGEMENTS

The authors thank the special issue editors and two anonymous referees for their truly helpful suggestions. Authors names are listed alphabetically. All authors have contributed equally to this paper.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

FUNDING

Elvira Uyarra acknowledges support from the Regional Studies Association Fellowship Grants [grant number FeRSA Grant R124830] and the Productivity Institute, funded by the UK Economic and Social Research Council [grant number ES/V002740/1]. The work of Iris Wanzenböck was supported by the Research Council of Norway (Project INTRANSIT) [grant number 295021].

NOTE

1. Problems can serve as 'boundary objects', with sufficient interpretative flexibility (Ferraro et al., 2015) to enable actors from different social worlds to come together to recognize a need to act whilst maintaining their distinctive practices, ideas, values or identities (Fastenrath & Coenen, 2021; Franco-Torres et al., 2020; Star & Griesemer, 1989).

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