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# **Towards a problem-oriented regional industrial policy: Possibilities for public intervention in framing, valuation and market creation**

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# **Towards a problem-oriented regional industrial policy: Possibilities for public intervention in framing, valuation and market creation**

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## **Abstract:**

Recent thinking about regional industrial and innovation policies remains focused on the supply of new knowledge, and on grand challenges and missions, but continues to take problems and demand for granted. In this paper we build on political science, sociology of markets and valuation approaches to explore the roles of agency, institutions, networks and values in discursive processes of problem framing and market creation. We identify a number of 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.

Keywords: industrial policy, place-based policy, innovation policy, demand, missions, challenges

## ***1 Introduction***

The need to identify new sources of industrial growth is a pressing policy issue, particularly so for less developed regions. The last decade has witnessed renewed interest in the potential of industrial policy to advance regional agendas of economic development and innovation. Place-based industrial policies, such as EU smart specialisation strategies, aim to help regions identify niches and sectors with growth potential. However, key questions arise about their ability to enable structural change in less developed regions (see e.g. Hassink and Gong, 2019). Recent policy thinking has focused mainly on regional technological capabilities, overlooking other avenues for diversification on the demand side and the possibility of path creation from unrelated diversification and ‘path importation’ from extra-regional sources (Hassink and Gong, 2019; MacKinnon et al., 2019; Martin et al., 2019). Place based industrial strategies have also devoted little attention to the outcomes sought by innovation policy in terms of addressing sustainability and social goals, and neglected ‘foundational’ sectors, which are often a major activity in lagging regions (Coenen and Morgan, 2020). The dominant supply side approach to innovation and industrial policy is thus insufficient to inform a regional development agenda aiming at environmental or societal problems and place-based needs, and likely to, directly or indirectly, reduce opportunities for lagging places. Innovation studies have acknowledged the importance of *demand* and the knowledge and preferences of users in shaping innovation, but recent literature

still tends to treat demand as a somehow exogenous input for innovation that can be mobilized (Carvalho and Winden, 2018) to shape new products and new market niches/segments. It does not consider how new needs or challenges can be mobilised (articulated into demand) to shape markets that provide both economic and social value.

The need for a holistic, place based approach to solving societal challenges has been brought into sharp relief by the Covid epidemic and the climate emergency. McCann and Soete (2020) argue that the European Green Deal and the new smart specialisation strategies for sustainable and inclusive growth (S4+) represent a re-arranging of the priorities and the logic of regional development strategies in Europe. To be meaningful, such a shift needs to recognise that there is a geography of problems that is different to 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” (McCann and Soete, 2020, p.17).

This rethink requires a deep appreciation not just of the productive structure but also of the problems, values, social assets and civic culture of places, acknowledging that ‘real’ local values, assets and problems constitute not just a market failure to resolve but a potential source of entrepreneurial opportunity and innovation (Coenen and Morgan, 2020). Regional policy scholars have extensively discussed the need for regional value creation and value capture but have paid less attention to the practices involved in the process of defining that value and how they relate to societal *values* and concerns (Uyarra et al., 2019).

Important questions thus emerge around how to frame, select and justify the societal issues to be prioritized (or neglected) as well as how local societal needs and problems can be turned into market opportunities (Huguenin and Jeannerat, 2017). Market outcomes are not ‘natural’ but the result of decisions that set the boundaries of what is important and what counts, and that influence incentives through often unglamorous or mundane government decisions around regulation, taxation or public procurement (Chang et al., 2013; Miller and Lehoux, 2020).

In this paper we build on political/policy science approaches and sociology of markets and valuation approaches to explore the roles of agency, institutions, networks and values in discursive processes of problem framing and market creation. This allows us to identify trade-offs and scale/spatial issues in the processes, practices and constitutive elements of demand formation and market creation that in turn can suggest new possibilities for innovation and industrial policy interventions.

## ***2 Recent regional industrial policy thinking - and its shortcomings***

One of the attractions to policy-makers of ‘systems’ rationales over recent decades has surely been the intellectual cover it helped provide for a shift away from more interventionist technology and industrial policies towards generic innovation, competitiveness and enterprise support policies under what some have called neoliberalisation (Peck and Tickell, 1994). However, no policy can be sector (or place) neutral in practice, and generic innovation policies are likely 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). The apparent lack of success of such generic policies in their own terms, let alone in

driving economic transformation and renewal or in addressing ‘wicked’ social problems (Frenken, 2017), has led to a renewed interest in more directional and selective policies, whether still framed as innovation policy (e.g. ‘mission-oriented’ innovation policies), or a return to older framings of technology policy and industrial policy.

Inspired by new industrial policy thinking (Rodrik, 2004), ‘smart specialisation’ approaches aim to help regions to discover their individual opportunities, to generate or maintain competitive advantages, and to create capabilities to specialize in a limited set of strategic key areas (Foray, 2018). However, the transformational potential of smart specialization approaches has been questioned (see e.g. Hassink and Gong, 2019). First, by focusing on technological capabilities, less developed regions may be disadvantaged vis a vis those endowed with a plethora of diverse knowledge assets and sectors (Bailey et al., 2019; Capello and Kroll, 2016; Isaksen, 2015). Secondly, the societal dimension is mostly absent (Coenen et al., 2015; Uyarra et al., 2019). There are concerns that regional innovation policies fail to respond to the needs of ‘left behind places’, and that the narrow view of innovation in smart specialisation is unlikely to be transformative in all but the most propitious institutional and economic contexts, thus contributing to raising rather than ameliorating regional disparities (Hassink and Gong, 2019).

This implicitly linear science and technology-based approach to innovation may be more appropriate in regions with “advanced” entrepreneurial ecosystems, but less suited to weaker regions, which may at the same time be more susceptible to “policy capture” by powerful incumbent actors such as universities or large firms (Brown, 2020; Kempton, 2015). Further, this policy discourse mostly adopts a structural view on place-based characteristics and innovation assets and is at best agnostic about the direction and societal relevance of innovation (Grillitsch and Hansen, 2019). This has led to calls for greater directionality for regional innovation policy in order to solve societal goals, as well as for a broader understanding of innovation, including social innovation and the foundational economy (Coenen and Morgan, 2020). ‘Foundational economy’ sectors provide goods and services that are essential for the wellbeing of citizens, including care, food and retail (Froud et al., 2018). The notion of the foundational economy carries with it an implicit dismissal of innovation policy thinking (Morgan, 2019). Clearly theoretical and policy debates have neglected these sectors - and indeed of maintenance and care more generally (Vinsel and Russell, 2020). However it could be argued that it is *problems* rather than sectors that are foundational and place-based, and that problems constitute a source of innovation requiring input from both foundational and other industries, moving us away from a misleading dichotomy of innovative versus non-innovative activities.

The notion that innovation should be harnessed towards solving societal challenges is the common denominator of the ‘new generation’ mission-orientated (Mazzucato, 2018a) and transformative innovation policy approaches (Schot and Steinmueller, 2018). Problems related to climate change, migration, or food and energy security are or should be key motivations for intervention, to be addressed through more targeted and transformative system changes. However, what this means for place-based policies is unclear (Brown, 2020).

These approaches share an implicit assumption that societal challenges are global and thus best dealt with at the national or supranational level, neglecting the contextuality and place sensitivity of societal needs, and the multi-scalar embedding of societal problems (Wanzenböck and

Frenken, 2020). Different places have different exposures to environmental and societal challenges. These are ‘wicked problems’ characterised by uncertainty and ambiguity about the nature of the problem and the means to solve them, and this has a spatial dimension. They are framed differently according to different perceptions about the nature and urgency of the problem, and thus present key policy – and political - challenges around problem definition and identification. However, the literature rarely questions the formation and selection of the goals and values behind challenge oriented policies—who decides and how? (Huguenin and Jeannerat, 2017; Schlaile et al., 2017; Uyarra et al., 2019).

Further, recommendations about challenge orientation tend to be provided in an institutional and governance vacuum, with at best vague allusions to the need for “regional, local and national” coordination (Mazzucato, 2018b)<sup>1</sup>. For instance, Brown (2020, p. 3) casts doubt on the successful implementation of mission-oriented policies in Scotland, arguing that effective innovation policies need “to be deeply rooted in a close understanding of the specific localised context in which they are introduced”. This requires recognising the crucial role played by front-line implementers ‘on the ground’, which possess key skills and resources as well as practical knowledge of the problem and the context for its solution (Ansell et al., 2017). However, policy implementation is often reduced to a technical-design problem “de-linked from any contextual and political economy considerations” (Andreoni and Chang, 2019, p. 141). Institutional capacity for implementation will more important the more sophisticated the policy is and the more complex and contested the problem or context is.

In addition, mission-oriented approaches tend to adopt a supply-side bias, focusing on scale, concentration and state-led R&D rather than on the *diffusion* or *uptake* of novel solutions (Boon and Edler, 2018; Weber and Truffer, 2017). Generally, innovation policy thinking has overwhelmingly focused on the generation of technology rather than on diffusion or market formation (Dewald and Truffer, 2012), despite early discussions of user-producer interaction (Lundvall, 1993) that stressed the importance of demand in setting the long-term direction of technical change<sup>2</sup>. Knowledge is embedded in people and organizations and distributed among many actors including *users on the demand side* (Wanzenböck and Frenken, 2020). Thus, the know-how required for solving societal challenges is partly tacit and situated, and investments “require discovering the tacit elements of technology and adapting them to the local environment” (Hausmann and Rodrik, 2003, p. 624). A supply-oriented approach “misses half the story” because innovation is as much about “new perceptions of market opportunity” from the demand side (Dodgson et al., 2011, p. 1154) as new technology.

### ***3 Taking problems seriously***

According to Metcalfe et al (2005), innovation systems are best seen as problem-oriented and thus as transient or temporary. Knowledge of problems and solutions grows in an “experimental

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<sup>1</sup> See also Flanagan and Uyarra (2016) for a critique of the handwaving tendency of innovation policy studies to call for ‘more co-ordination’.

<sup>2</sup> And reflecting the still earlier acknowledgement of the role of users in early innovation studies (e.g. [Langrish et al., 1972](#)) and foundational debates about ‘demand pull’ versus ‘technology push’ explanations of the innovation process (Mowery and Rosenberg, 1979).

and autocatalytic fashion, as one problem leads to another in the minds of the different individuals who compose the invention and innovation system.” (Metcalf et al., 2005, p. 1284). Temporary innovation systems may be oriented towards the solution of technical problems (and this kind of technical puzzle-solving has been the focus of thinking about technological trajectories and paradigms) but also societal problems (Hekkert et al., 2020). “Wicked” societal problems are more ambiguous and therefore more contested (Wanzenböck et al., 2020). Neither the understanding of a problem or of the means of addressing it, nor the legitimacy or impact of those means, can be taken for granted.

For problem-oriented innovation policies, policy targets, means and outcomes are shaped by how divergent knowledge, interest and belief systems are expressed, mobilized or combined (Head, 2019). Frenken (2017, p. 44) argues that mission-oriented innovation 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”. Wanzenböck and Frenken (2020) invoke the principle of subsidiarity to suggest that such problems should be addressed by those more likely to be affected by them. Similarly, Coenen and Morgan (2020) argue for attention to problems as a means to prioritisation in place-based policies. They argue that prioritisation for development should not be based on entrepreneurial opportunity alone but rather should 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 and Morgan (Coenen and Morgan, 2020, p. 21). Such demands can lead to new market opportunities, mobilising new innovation system and market configurations.

The geography of (potential) problems is therefore as relevant for innovation policy thinking as is the geography of (potential) solutions. Actors in disadvantaged regions and communities may help construct temporary innovation systems that can advance societal objectives and structures to “diffuse contextualized solutions across territories and sectors” (Frenken, 2017, p.45). Place-specific challenges help legitimize change and give direction to public investment in the development or adoption of new solutions (Boschma, 2017). While recent literature acknowledges the importance of local needs and demand in path creation (Martin et al., 2019), it doesn’t explore the processes by which these needs are defined, demands articulated and markets formed. Demand-orientation is implied to be a largely *apolitical* process that is somehow ‘guided’ by policy action around new regulations or support instruments. In reality responding to societal needs and articulating demand can be a highly contested endeavour. Any conceptualisation of demand articulation and market formation must therefore consider the processes and practices through which contested needs, problems and values are turned into markets in order to be useful to innovation and industrial policy thinking.

### *3.1 Where do problems come from?*

Mission-orientation and smart specialisation thinking tends to take for granted the regional needs and problems, as well as the processes by which they are identified and become matters of collective concern. This stands in contrast to policy studies and framing literatures (Hajer, 1995; Peters, 2005), where the social construction of problems, and the politics and framing processes involved in defining them as policy targets is a key concern. Problems become collective

concerns because (at least some) people (partly) agree about them. They are socially constructed, shaped through societal discourse, political debate, and influenced by the efforts of actors to impose interpretations upon them (Hajer and Laws, 2006; Van Hulst and Yanow, 2016).

The role of frames and framing practices has also been a concern in the social sciences beyond policy studies. Frames have been conceptualized as “*schemata of interpretation*” (Goffman, 1974), guiding how we assess new circumstances and situations. They 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 and Benford, 1992, p. 137). Moreover, framing is more and more seen as a *process*. For instance, the social movement literature considers framing to be a discursive (narrative-based), strategic (goal-oriented) and contested (involving proponents and opponents) endeavour of actors to either strengthen or to challenge and transform the dominant collective frames (Benford and Snow, 2000). It is also seen as 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 and Yanow 2016).

Following this view, framing involves *agency* in the sense that certain actors will try to purposefully influence the societal discourse, to make visible and articulate demands, values or concerns—or *orders of worth* (Boltanski and Thévenot, 2006). Framing practices can range from bridging (connecting related but unconnected frames), over amplification (strengthening of existing but latent values) or extension (to new issues and beyond primary values), to frame transformation (altering or generating new meanings to align with new situations) (Benford and Snow, 2000). Framing and frame transformation are crucial in institutional entrepreneurship (Battilana et al., 2009), where actors aim to challenge existing frames and to create new interpretations and a ‘new system of meaning’ around institutional arrangements (Garud et al., 2002). Based on new frames and visions, entrepreneurs can mobilize resources, people or ideas, in the attempt to increase the legitimacy of their own interests or views of the world.

When a frame becomes a guide to action or inaction, for individuals, organizations or policy, it becomes substantive, with high practical relevance. Problem framings help to reduce problem complexity, draw boundaries, and build expectations about what a legitimate solution could or should look like. For Schön and Rein, problem frames influence ‘the questions we ask’, and ‘shape the answers we get’ in public policy (Rein and Schön, 1977, p. 236). For instance, Head (2019) refers to the example of poverty which can be framed either as a problem of individuals, caused by a lack of skills or personal motivation, or as a structural problem, mainly caused by the economic and societal system. In the first case, the proposed solutions will be largely individual centred, for instance oriented towards training and personal skill development. In the second case, in contrast, proposed solutions will more likely be around new employment or basic income schemes.

Problem frames have a strong performative role in influencing the course of transformation and institutional change (George et al. 2006). For instance, studies in the organization sciences have shown that firms react differently to external events or environmental developments, depending on whether they are perceived as a threat or opportunity (Dutton and Jackson, 1987; George et al., 2006). Both framings can imply a sense of urgency and evoke some form of action.

However, the course of action is likely to differ depending on the context and the dominant problem frames. Similar observations were made by Lowe and Feldman (2008) who showed that different responses to local regulatory changes influenced biotechnical entrepreneurship and the course of industrial development in regions.

Drawing on all the above, we argue that specific problem frames are likely to influence the nature and values associated with new solutions and market opportunities. The reason is that problem frames define the selection environment and who is considered as innovator, entrepreneur or value creator. Indeed, specific frames can help narrow down (or ‘tame’) problem complexity, helping mobilize resources, align actors and reduce demand uncertainties for specific innovations. The more defined the problem and envisioned solution, the more likely it is that knowledge accumulates within networks and builds on established routines along a specific search path. However, narrow policy agendas may impede plurality and the emergence of alternatives, and with that progress in addressing societal issues (Wallace and Ràfols, 2018). Active engagement in problem re-framing, by ‘entrepreneurs’ or challengers of established social and institutional structures, can create opportunities for new ways of doing things (Battilana et al. 2009; Shaw and Carter 2009; Lowe and Feldman 2017).

### *3.2 Problems, demand and market creation for innovation*

So far we have discussed how problems become ‘matters of concern’, but how do they become ‘matters of worth’ (Doganova and Karnøe, 2015) that are demanded in markets?. The innovation studies literature paid some attention to the formation of markets for societal needs, for instance to favour the emergence of greener technologies. Markets for certain technologies may not exist due to uncertainties around customer needs, poor articulation of demand, lack of standards or uncertainty about costs and benefits (Bergek et al., 2008). Technology Innovation System (TIS) approaches (Bergek et al, 2008) identify ‘market formation’ processes such as articulation of demand and preferences, standard-setting or product positioning (including pricing and segmentation), that nurture and legitimise new technologies. Demand articulation - 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).

However the TIS literature has not really provided a detailed understanding of the market formation process (Bergek, 2019). It has also rarely explored how market formation takes place *spatially*. An exception is the Dewald and Truffer (2012) study of solar photovoltaics in Germany, where they show market segments develop at local, regional and national levels, and how market segments differ significantly in different geographical contexts<sup>3</sup>. As Boon et al. (2020, p. 346) argue, market formation has been mainly studied in terms of “which user groups to target and how to improve innovation adoption”, paying less attention to “legitimized perceptions of market boundaries, the roles of actors, the interplay between markets, and the process character of market formation.”

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<sup>3</sup> See also Binz and Truffer (2017) for an analysis of the multi-scalar dynamics of system formation, including market valuation processes.

Contrary to conventional economic views of markets as ‘just there’, social studies of markets see them as constructed, practically organized social or socio-technical mechanisms (Kjellberg and Helgesson, 2006). Drawing their inspiration from actor network theory, pragmatist approaches such as economics of conventions and valuation approaches, and political economy approaches, work within the sociology of markets (for a review see Filgstein and Dauter (2007)) treats markets as networks, institutions, or calculative processes, through which markets are *performed* (Aspers, 2007; Beckert, 2009; Callon and Muniesa, 2005; Fligstein, 2002). All of these elements (actors, networks, institutions) can be seen as essential constitutive elements in reducing uncertainty and resolving the coordination problems—in terms of how to determine value, cooperation and competition—that make market exchange possible (Beckert, 2009; Möllering, 2009). For instance, social network structures will influence the likelihood of cooperation and 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 organise competition in the market, reflecting societal demands and political cultures. In this sense markets are “as much political arenas as they are economic realms” (Beckert, 2009; p.259).

Market constitution requires that the worth of an exchange is established<sup>4</sup>. When a market is being constructed a new “valuation machinery” is required, in order for the characteristics of products to be comparable and understood. Valuation involves: selecting a quality of worth as salient, excluding others; a metric or scale that allows commensuration (comparison of different objects) and making visible new product qualities; and a claim about what type of evidence or proof counts (Barman, 2016; Kornberger et al., 2015). Such ‘calculative’ market devices (Callon and Muniesa, 2005) shape what counts, and in doing so change the ways in which market actors make decisions in relation to products and technologies. This is particularly important for products claiming novel qualities such as environmental friendliness, and for efforts to make markets better or more just (Reijonen and Tryggstad, 2012). For instance Doganova and Karnoe (2015) described how the introduction of a ‘preferred technologies list’ helped build a market for technologies that reduced ammonia emissions in Denmark by describing and normalising novel product qualities.

Market processes are ongoing, and the constitutive elements of the market are constantly being reproduced through processes of innovation, network formation, institutionalisation, commodification, communication and competition (Möllering, 2009). These processes progressively reducing 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 the predictability versus applicability of institutions (Binz and Truffer, 2017; Möllering, 2009; Storper, 1997). Uncertainty is key to the dynamics of markets in that it is both a challenge to be resolved or minimised but also a key factor in innovation, opening up opportunities for entrepreneurs and innovators (Beckert, 2009; Metcalfe, 2008; Stark, 2011).

Markets are therefore not static but always in the making. This has implications for notions of market failure – markets will ‘fail’ all the time, since they are in a process of continual

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<sup>4</sup> Described by Beckert (2009) as the ‘problem of value’.

reconfiguration (Callon et al., 2002). In the traditional conceptualisation of public goods, markets will tend to fail to deliver them in a socially optimal manner. The social value underpinning the need for such goods is taken as read and recasts social problems as market failures requiring policy interventions (Geiger et al, 2014). However, the production of ‘matters of concern’ is, according to Callon (2007), an ordinary consequence of the functioning of markets. This means that value should be defined by decisions about what counts and what is important, doing away with the artificial distinction between value and values rooted in contemporary economics literature. ‘Orders of worth’ are not values counterpoised to value but are themselves constitutive of value (Stark, 2000). Recent interest in ‘concerned markets’ (Geiger et al., 2014; Reijonen and Tryggstad, 2012; Roscoe and Townley, 2016) places the focus on how market actors can produce social value through their practices as a means to both economic gain and to produce a more just and sustainable society. Geiger et al. (2014) argue that most markets are concerned markets in that they are affected by or cause, ethical, moral or environmental concerns.

A focus on framing and valuation means that *agency* is paramount. Markets are organised collective endeavours - or *agencements* (Callon and Muniesa, 2005) – where agency is “dynamic, heterogeneous, distributed and composite” (Reijonen and Tryggstad, 2012, p. 215). As Geiger et al (2014, p. 15) note, there is no “inevitability in the way markets ‘happen’ ...each individual actor has a means of shaping the market by making their own concerns matter”. Markets can be actively constructed, for instance by intermediaries involved in coordination, qualification and legitimation practices (Bessy and Chauvin, 2013). Actors intermediating between users and producers will not be passive translators of unproblematically framed problems, values, needs and demands but will have their own agency in situations where judgements of value are required (Miller and Lehoux, 2020). This is particularly important in technology markets with high levels of uncertainty, related to the lack of knowledge about the innovation as well as unclear or poorly articulated markets and user groups (Bessy and Chauvin, 2013).

### *3.3 Scale, scope and geography in market creation*

The approaches discussed above offer insights into market formation but largely do not deal with how this takes place spatially. A few studies have considered regional innovation from a valuation perspective, seeking to understand how and where producers and consumers interact to co-define and ascribe value to new products and services (Jeannerat and Crevoisier, 2016; Jeannerat and Kebir, 2016). These studies show that consumers derive value not only from the technical characteristics of products but also from intangible aspects such as experiential and other symbolic or identity values and meanings, which can be a key source of product and service innovation (Asheim et al., 2007; Carvalho and Winden, 2018; Manniche and Testa, 2010). Consumers can also be knowledgeable actors involved in co-production processes (Jeannerat and Kebir, 2016; Martin et al., 2019), leading to new industry formation. While these approaches acknowledge the importance of demand and the knowledge and preferences of users in shaping innovation, they mostly treat demand as a somehow exogenous input for innovation that can be accessed and mobilized (Carvalho and Winden, 2018) to shape new products and new market niches/segments. They do not consider how new needs or challenges can be mobilised (articulated into demand) to shape markets that provide both economic and social value.

Yet there is a clear spatial dimension to how problems are defined and markets are constituted. Different places are endowed with different assets and challenges that may become matters of concern. Valuation practices are spatially and temporarily localised, shaped by path dependent institutional trajectories and repertoires as well as being sector and product specific (Hutter and Stark, 2015; Miller and Lehoux, 2020). As Dewald and Truffer (2012) argue, the actors, networks, and institutional contexts that market formation depends on are geographically diverse and multi-level. Proximity may help establish trust-based relationships that influence the emergence of markets. Conversely, collaboration among spatially distributed actors helps comparability and commodification of products, and can therefore bridge scales and widen the geographical scope of a market (Dewald and Truffer, 2012, p. 404). As mentioned above, there is an important ‘discursive’ or ‘interpretative’ dimension in shaping markets, for instance how specific problem definitions may broaden (narrow down) the spectrum of search paths or imaginaries (Jasanoff and Kim, 2015) for future development. Problem framings assign value to certain innovations or solution over others, or widen (limit) the variety of actors, networks and regional assets to be mobilized to create new opportunities and to meet future societal needs (Ansell and Torfing, 2015). van Winden and Carvalho (2019) and Uyarra et al. (2017) similarly employ the idea of ‘conversations’ between various social worlds and innovation frames in order to articulate demand and ‘upscale’ innovations to new places or application fields. These are particularly important when dealing with challenges that are “fraught with ambiguity and may rely on different social conventions and values” (Van Winden and Carvalho, 2019, p. 3).

#### **4 Towards problem-based innovation and industrial policies**

So-called new generation directional policy thinking (Foray, 2018) treat needs and problems unproblematically. Little attention is paid to the emergence or dynamics of what is perceived as problem or challenge, and what becomes a matter of collective concern and thus a target for policy and innovation. Above we have shown how (some) problems get turned into market demand. This involves actors in diverse processes of bargaining and struggle over the trade-offs and tensions involved in the creation of a market order. We have also shown that the spatial dimensions of this are neglected, although problems and actors both belong to places. We now want to argue that there are potential points of influence for public policy action in these dynamics of demand articulation that can present new entry points to regional innovation and industrial policy thinking, opening up the possibility of a wider range of starting points for policy intervention and new combinations of supply and demand-oriented efforts. The dynamics of market formation have space and scale implications, and involve tensions and trade-offs that policy makers need to consider. In this section we explore these tensions in order to discuss possible implications for policy intervention.

Viewing markets as the product of agency, interactions (networks), institutions and framing (discourse), allows us to uncover the importance of shared values, meanings, visions and expectations that underly functioning markets and offer opportunities for public action. Shared framings facilitate interaction and co-operation among actors to articulate demand, to transform or to create new markets. They tame problem complexity by reducing uncertainty about future demand and market opportunities, mobilize actors to contribute to the search for new solutions, and provide valuation criteria that constitute a map of the terrain on which that search can take place and shape the selection environment for solutions. In reducing uncertainty and mobilising

actors to align their views, these processes build legitimacy for the problem/solution framing and therefore also legitimate the search for potential solutions.

Legitimation can be built by focusing on a narrow problem framing, implying highly specific solutions and a local search, or by broadening out the framing of the problem through frame extension or by linking it with other problems (bridging to other frames). The scale/size, scope, and homogeneity of networks mobilised in problem framing, valuation and search can be broadened, involving more cognitively- or value- diverse actors, or actors that span a greater geography or greater time span. 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, or to create new export opportunities or tap global demand for local solutions. Conversely, networks may be scaled down. These choices influence the definition of the problem and of the likely solution space. They may also affect how easily a market is formed, given that uncertainties need to be tamed and trust built in order for co-operation to occur between actors. Smaller and more homogenous networks (in terms of values, knowledge or proximity) may build trust more easily, whilst in larger more diverse networks trust may require greater work and more time.

Participatory prioritisation and design methods such as foresight approaches or living labs have been proposed as platforms for the co-discovery and co-production of priorities for industrial policy but, when implemented, such approaches often seem to be supply-dominated and largely focused on matching and fine-tuning existing or shortly forthcoming technological solutions to specific users and problems. However, in principle these methods are highly relevant means of shaping problem-framing and network-building in market formation - if they can be genuinely problem-driven in terms of ambition and participation. Similarly cluster, platform and ecosystem building policies (Janssen and Frenken, 2019) could also be appropriate here, if value creation and demand is not treated exogenous but integrated.

In terms of network membership, actors will disagree about how extensive and open to entry to these networks should be: potential suppliers on the solution side may want to maximise the number of users whilst minimising the competition, whilst potential users on the demand side may prefer to see more and more diverse suppliers. Meanwhile users may see benefit in aligning their needs with those of other users so as to create a larger, more homogenous demand (through aggregating or bundling of needs) if this creates a more attractive market for solutions - potentially more sophisticated or innovative solutions, or at least cheaper ones - than otherwise would be the case. Public procurement may be used to articulate demand and structure user-producer interaction. However, scaled-down networks may lead to more focused framings and richer interactions between knowledgeable users and potential suppliers, favouring the creation of protected niche or proto markets around specific user needs (Dewald and Truffer, 2012) which could be the focus of scaling-up efforts at a later stage. At the same time there is the risk of creating cosy and potentially corrupt local relations if networks are too closed. Going beyond user-producer interactions, the inclusion of other actors with relevant expertise or resources 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, through for instance collaborative R&D programmes or the pre-commercial procurement of potential solutions. This requires signalling and communication across geographies.

The way in which needs are signalled and communicated is also important in terms of openness and transparency, influencing which actors participate and perform in markets. Awareness raising among a broader spectrum of actors may lead to greater market entry and competition, as opposed to the use of limited communication channels. Greater transparency and openness may in turn generate trust among potential exchange partners, although some may prefer to maintain information asymmetries in order to restrict competition. The timing of communication between actors may also influence the engagement and commitment to the development of solutions. Again different mechanisms may be used to structure such communication, such as prior notice of public tenders, market consultation exercises, etc.

Institutions, and how they are implemented through often neglected mundane practices of public administration, shape the functioning of markets, for instance by influencing the ways in which users and producers interact (e.g. EU, national and local procurement norms and rules), market entry conditions (e.g. thresholds on public procurement contract size and quotas for small firm participation), as well as other measures influencing competition (contractual conditions and bureaucratic requirements) and valuation devices such as metrics, rankings, weighting systems, etc.

Choosing to conform to widely understood norms around e.g. standards, regulations and protection of intellectual property rights could help reduce uncertainty by promising economies of scale and more stable and predictable market conditions. Conversely, tailoring institutions through regulatory innovation and experimentation (e.g. through regulatory sandboxes and demonstration projects) may be necessary in order to enact the desired values (Huguenin and Jeannerat, 2017). Some regions may be able to set local regulations but in many cases the regulatory framework will be outside of their direct control. Even so regional policy actors will have influence, through lobbying efforts or mobilising actors to influence regulatory change at other scales (e.g. through demonstration effects). Moreover, they potentially exert influence through their more mundane 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).

Similarly, establishing value may be uncontroversial and involve existing valuation procedures. Where solutions need to be tailored to new needs, a new or more customised valuation infrastructure may be required that better reflects those values and needs. This could involve, for instance, the inclusion of specific or more strict quality and performance requirements in public procurement (e.g. in relation to social and environmental sustainability). This may 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 potential for applicability and implementation. Conversely, the combination of more strict criteria and a larger 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).

## **5 Discussion and Conclusions**

The figure below summarises the trade-offs and choices in market formation, and potential points of influence for public intervention, identified above. These are trade-offs and tensions

that play out over time – markets are continually enacted through mutually constitutive processes and practices that give rise to these trade-offs. 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 with potential to be aligned to problem-based visions and expectations for regional industrial development.

**<figure 1 goes here>**

Our aim here has been to conceptually unpack demand and market shaping processes with a view to opening up new ways of thinking about industrial policy. In doing so, we attempt to uncover a greater breath of opportunities for regions to detect and create new market opportunities within and across territories, based on the individual context, and the territorial assets and needs. The notion that potential users, potential producers, technical experts, regulators, etc should be brought together in collaborative fora to co-produce industrial policy priorities is not new but have tended to remain biased towards the supply of solutions (or the search for problems to which solutions can be applied), or towards 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 offer a middle way between calls for space-blind mission-orientation towards high level 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 synthesised understanding of problem framing and valuation in market formation, or make a naïve call for better co-ordination through networking. 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. Seeing problems, markets, and demand not as ‘just there’ could help especially less-favoured regions to break out of the conceptual trap that encourages them to diversify based on technological capacities they do not have and struggle to build with supply-side interventions alone.

We argue that policy should consider all the roles of the state (purchaser, regulator, convener of conversations) (Borrás and Edler, 2020), and a broader range of potential interventions on both the supply and demand sides along with all those taken for granted or mundane processes and practices which help to shape and manage markets. It should also acknowledge a broader range of assets for diversification beyond knowledge assets, including local values and problems. Less-favoured regions often lack the institutional capacities which are crucial for the implementation of place-based policy approaches (Morgan and Marques, 2019). There are risks involved in a policy agenda build around network formation, framing and the development of shared visions and values. Processes might be captured by actors with vested interests and corrupt local political and business relationships. Public procurement, in particular, has often been felt to be at risk of corruption, and hence is subject to special regulation and governance oversight beyond normal market transactions. Much work has already been done to redraw these

trade-offs in the light of interest in using public procurement to drive innovation and other social goals. Moreover, supply-side approaches are just as likely to start with the ‘usual suspects’ whereas stricter regulation and new institutional practices in public procurement can make it more open, inclusive and transparent. Problem- and value-driven approaches to industrial policy will need to institutionalise practices of openness and transparency to citizens and their representatives to minimise any corruption risks from attempts to build tight local networks of users and suppliers with strongly aligned interests. But it is important to emphasise that the processes and practices that shape problem framing and market creation go on in any case, and 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 believe that incorporating these processes, practices and choices into regional innovation and industrial policy thinking can provide a distinctive and useful complementary starting point for attempts to promote economic development and address societal problems.

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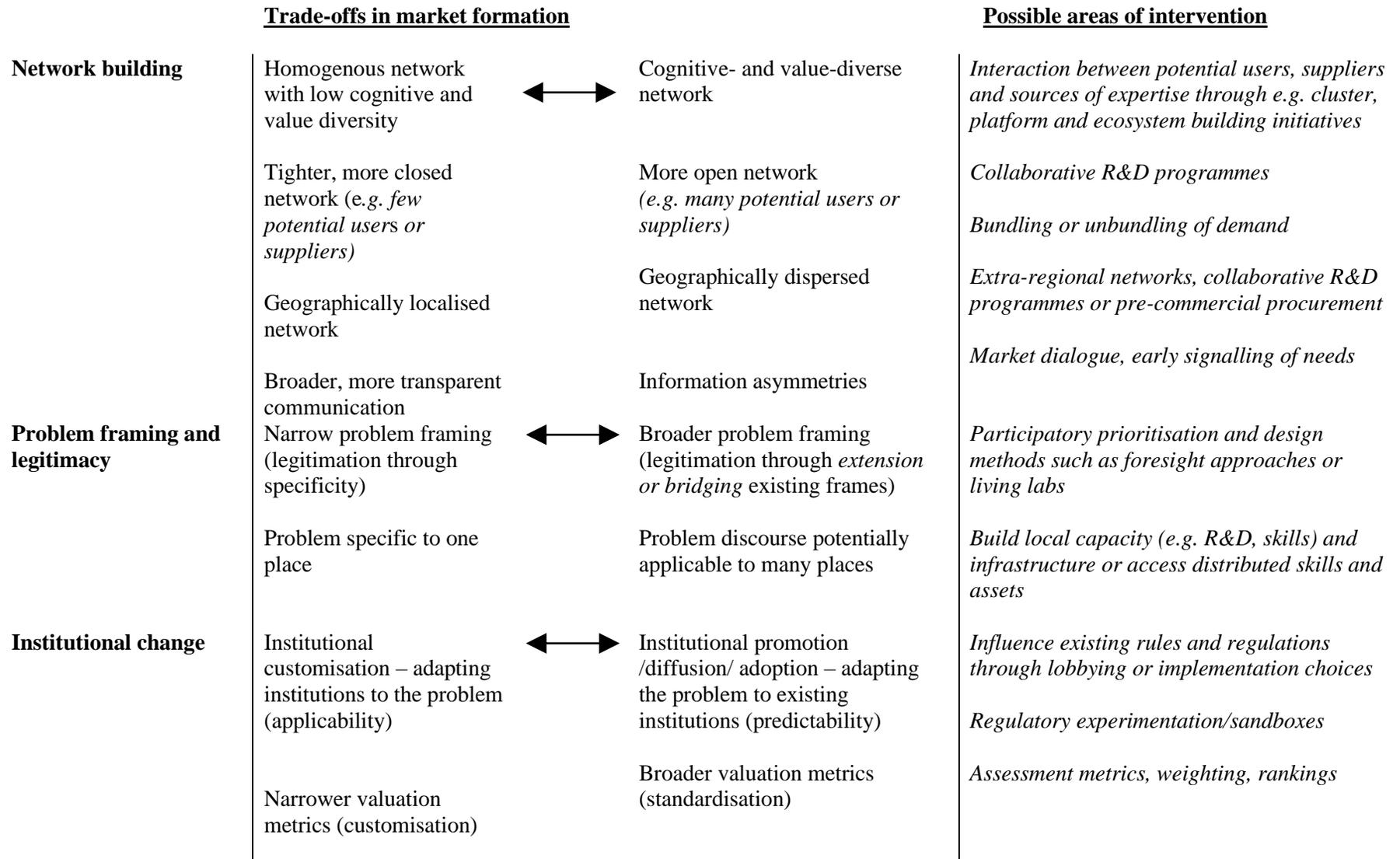
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**Figure 1: Trade-offs in market formation and possibilities for public intervention.**  
 Authors' own elaboration inspired by Möllering (2009) and Ansell and Torfing (2015)