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systemic policy:
Four approaches***

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Developing service-inclusive systemic policy: Four approaches

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ABSTRACT

Although policy makers dealing with innovation are increasingly interested in services, the debate on how to formulate policy for spurring service innovation is still fairly nascent. To a large extent, existing misunderstandings and overly narrow perspectives are due to a lack of insight in the various roles services can play in innovation systems.

This paper offers an analytical structure for incorporating service innovation support in a systemic policy mix. First, we describe the three phases in the evolution of service innovation thinking, and extend them with an additional point of view. Each viewpoint relates to a different potential for economic transformation in and through services. By establishing a link with the functional perspective on innovation systems, we show how the four approaches imply preferences for particular instruments in the spectrum of specific and generic policy. Specifically, we argue that each approach corresponds to a specific configuration of measures that jointly can ensure the strength of various system functions. Using the evidence from a comparative case study of two similar regions, we illustrate how the alternative approaches can be used for classification and comparison of service innovation policy options. We conclude by discussing possibilities for further research and policy formulation.

Keywords: Innovation policy, service innovation, innovation systems

1. Introduction

For several reasons, attention for service innovation is on the rise. It is becoming widely acknowledged that service providers do innovate, rather than just being adopters (Djellal and Gallouj, 2001; Gallouj and Djellal, 2010). Service businesses, especially knowledge-intensive ones (KIBS), are also seen as important drivers of innovation by other actors in the innovation system (Den Hertog, 2000; Muller and Zenker, 2001). Some of these actors have in fact started to switch to service-oriented business models themselves: for manufacturing industries facing the commodity trap, service-dominant logic is a key to innovative and high value-added solutions (Vargo and Lusch, 2004).

Having observed how a better service-orientation can improve the competitiveness of firms, and innovation systems as a whole, policy makers increasingly try to overcome the manufacturing-bias that characterizes many R&D policies (Miles, 2007). In pursuit of economic progress, innovation policy is being turned from 'service-friendly' and 'service-inclusive', to service-focused (Gallouj et al., 2014). Especially the past decade has witnessed a surge of reports and policies on service innovation, popping up at regional, national and supranational levels (Den Hertog et al., 2010). For instance, the European Commission has launched several initiatives for helping regions to modernize their economic structures by 'unlocking the transformative power of services' (e.g. EPISIS, 2011; European Commission, 2012; ESIC, 2013), and also the OECD has actively been tracing and spurring policy developments on this topic (OECD, 2005a).

Policies addressing the issue of service innovation still tend to be of an experimental nature. Despite widespread interest from academics and policy makers alike, it remains unclear how service-sensitive innovation policy can best be developed in accordance with socio-political goals like economic growth in general or solutions to specific societal challenges. This struggle is partially due to the fact that the topic 'service innovation' stretches over a broad range of essentially different phenomena (Sakata et al., 2013). Whereas some policy interventions are positioned as service innovation policy when supporting particular service industries (e.g. tourism, financial services), other measures carry this label when, for example, promoting the knowledge-brokering activities of KIBS, the development of new software applications, or the creation of new solutions in domains like health and sustainability (Den Hertog et al., 2010). Most likely, the fuzzy nature of service innovation (Gallouj and Savona, 2009) also explains why some policy makers are reluctant to overcome manufacturing-bias and stick to supporting novelty creation in the form of goods (Rubalcaba et al., 2012). Finally, as a consequence of the various ways one can look at the position of service innovation within the economy, also the place of services in ongoing discussions regarding specific and generic innovation policy is rather unclear (Rubalcaba, 2006; Rubalcaba et al., 2010). As innovation policy is often rooted in industrial policy, policy makers tend to associate services only with specific service industries or to contrast it with manufacturing (e.g. as in Kim, 2011). Clearly,

such narrow or even dualistic perspectives are not consistent with the observation that services are of great importance for economic transformation in other industries as well.

The current paper takes up the challenge of clarifying how different types of service innovation policy measures fit in the specific context and path-dependent policy mix of a region or state. Existing scholarly attention for service innovation policy has mainly focused on economic rationales for policy intervention: this debate identified market and system failures, urging for a specific form of service innovation support (Rubalcaba, 2006; Rubalcaba et al., 2010). However, insight into why intervention is needed does not immediately inform policy makers about how this can be done.

To meet our research objective, we introduce a framework for classifying the service-inclusiveness of innovation policy. This framework refers in the first place to the variety of roles services can play within innovation systems. Not only can services themselves be a (often neglected) form of novelty; service providers are also of major importance when it comes to diffusing knowledge and yielding innovation in other system actors. In order to distinguish these roles, we describe and extend the widely adopted set of service innovation ‘schools of thought’, consisting primarily of assimilation, demarcation and synthesis (Coombs and Miles, 2000; Gallouj, 1994). Each viewpoint relates to a different potential for economic transformation in and through services. Therefore, only by recognizing the different ways to think of service innovation, do policy makers have a basis for determining how services can contribute to achieving policy priorities.

The second theoretical pillar of our framework is the perspective of innovation systems. The view on innovation policy we take here is one that accounts for how a multitude of actors and policy interventions within such a system interact with each other. In recent literature on innovation systems and the choice of policy instruments, policy makers are advised to avoid focusing on individual measures only (Flanagan et al., 2011; Edquist, 2014). For policy instruments to be systemic, they need to be “combined into mixes that address the complex and often multi-dimensioned nature of innovation” (Borrás and Edquist, 2013, p. 1522). According to the functional perspective on innovation systems, public and private parties should perform activities aimed at functions like developing, diffusing and applying knowledge (Edquist, 2005). Whenever an innovation system fails to fulfil all functions, policy intervention is needed (Hekkert et al., 2007; Borrás and Edquist, 2013). Identifying and solving weaknesses in the innovation system thus lie at the heart of developing balanced policy mixes (Bleda and Del Río, 2013). Surprisingly, this view has hardly been used for formulating service innovation policy (Rubalcaba et al., 2010). Our main contribution here is to analyze the service-inclusiveness of systemic policy mixes in the light of the different perspectives on service innovation.

In the following sections, we discuss the various meanings that go under the label of service innovation (so-called ‘service innovation approaches’), present a framework for assessing the service-inclusiveness of individual policy measures, and show what type of policy mix corresponds with each

of the approaches to service innovation. Rather than just urging for more service innovation policy, we plea for a better understanding of the various ways in which (explicit or implicit) attention to services can help to achieve policy priorities and how this translates into systemic instruments (see Van Mierlo et al., 2010) that complement existing policies.

2. Viewpoints on the nature of service innovation

2.1 *The three traditional approaches*

In order to support service-inclusive policy formulation, we first clarify the positions one can take regarding the nature of service innovation. With positions, approaches, schools of thought, or points of view, we refer to how scholars look at the unicity of service innovation features. Whether or not service innovation is believed to be a phenomenon that differs fundamentally from other forms of innovation has far-reaching implications for considerations on how to support it (Rubalcaba, 2006).

Scientific inquiries into service innovation have traditionally been grouped into three main lines of thinking (Gallouj, 1994; Coombs and Miles, 2000). Together, these conceptions are believed to represent the evolution that service innovation research has undergone (Gallouj and Savona, 2009; Carlborg et al., 2014). However, new theoretical perspectives have formed supplements to the discourse rather than entirely replacing the older ones (Chang et al., 2012).

The categorization of approaches lends itself for various purposes. In research, for instance, the respective conceptions form a lens for determining what aspects of service innovation to investigate. In this study the approaches will be applied to the task of policy formulation. The tendency to apply the categorization in different contexts has led to some variety in what scholars see as the key properties of each approach. Here, we concentrate on the most consistent and discriminative properties.

The *assimilation* approach is built on the assumption that ‘most economic attributes of services are fundamentally similar to those of manufacturing sectors’ (Miles, 2007, p. 262). All dissimilarities between the two domains can be thought of as matters of degree, rather than fundamental differences. Typical for this approach are the attempts to adapt existing frameworks to the specific features of services, like for instance the taxonomy Miozzo and Soete proposed in 2001

(see also Castaldi, 2009; Chang et al., 2012). However, by starting from the same concepts and methods used for analyzing manufacturing, e.g. for measuring R&D, this ‘technologists’ approach is generally found to be poor in its ability to shed light on what is special about services (Miles, 2005).

The *demarcation* or *differentiation* approach is a response to much of the critique concerning the assimilation approach. Rather than treating all forms of economic and especially innovative activity as similar, this approach focuses on identifying peculiarities of services. Particularly popular are domains like financial services, tourism, retail, or logistics. By studying innovation in such different service sectors, scholars concentrate on finding specificities that are not present in the domain of manufacturing and goods. Due to its focus on idiosyncrasies, the demarcation approach is accused of resulting in ‘local theories’ rather than contributing to a better understanding of innovation in general (Gallouj and Savona, 2009).

The *synthesis* approach, finally, is commonly regarded as the most promising research avenue (Miles, 2007; Consoli, 2007). Rather than seeing service innovation as fundamentally equal or different from goods-oriented innovation, it integrates the characteristics of both into overarching theories and frameworks. An important reason to take this perspective is that the borders between manufacturing and service activities are becoming hazy (Bryson and Taylor, 2010). Seeing the domain of goods- and service-based innovation as strongly intermingled, the synthesis approach urges not to view service innovation in isolation. Instead, services should be considered an inherent part of change processes in individual products as well as in the transformation of entire sectors, value chains or clusters. Despite the fact that the synthesis is widely advocated, the risk that lures when adopting all-encompassing views is that the acclaimed peculiarities of service innovation dynamics are not adequately taken into account after all (Gallouj and Savona, 2009).

2.2 From three to four schools of thought

Although the aforementioned approaches arguably cover diversity or even evolution in service innovation thinking, it is at least remarkable how none of the individual viewpoints appears to adequately match the label of ‘service innovation’. To assimilationists, this notion would seem meaningless because they see no point in pitting innovation in services against innovation in

manufacturing. Reversely, the label is overly broad for the demarcation approach, which mainly looks at the peculiarities of certain service sectors (e.g. retail or financial services) without stressing the relevance for other service sectors. For the most common understanding of the synthesis approach, finally, service innovation is a hollow term as long as the phenomenon is simply regarded as an intrinsic and inextricable characteristic of innovation in general (Toivonen and Tuominen, 2009). This apparent contradiction, one could argue, undermines the need for any policy explicitly devoted to service innovation: if none of the viewpoints acknowledges the existence of peculiarities at the level of service innovation (covering heterogeneous service context and sectors), why would policy makers be concerned with it?

In our view, the literature currently lacks a satisfactory label for contributions on commonalities between instances of service innovation (i.e. service innovation *an sich*) and the relationship between service innovation and other forms of innovation in general. The extensive body of literature with such a scope now falls exactly on the (arguably overly large) border between demarcation and complete synthesis. The reason these two should be distinguished more clearly is as follows.

Over the past decade, it has increasingly been acknowledged that the real opportunities for innovation research explicitly focused on services lie in using the insights they generate for understanding and informing also innovation efforts by non-service firms (Drejer, 2004). Provided that some aspects of innovation are more pronounced in services, studying the latter might increase the overall scope of research on innovation dynamics. As Miles puts it in his discussion on developments in innovation thinking: “One value of a focus on services is that it can bring to the fore neglected features of economic activity that may be becoming more prevalent and widely distributed across the economy” (2007, p. 263). This is particularly the case for intangible forms of innovation. Although complete synthesis might for many be the final goal of service innovation studies, it takes profound and well-embedded insights on the dynamics of service activities to actually develop the desired integrated theories and frameworks. In fact, many of the calls to move towards integrative theory actually plea for better views on service innovation reality, rather than immediately jumping to all-encompassing perspectives (Rubalcaba et al., 2012). Therefore, while debates on the life cycle of

service innovation thinking tend to state that the integrative scope of the synthesis approach is preceded by sector-based studies of the demarcation approach (Carlborg et al., 2014), we regard it useful to discriminate an intermediate stage.

Based on these considerations, we propose the idea of separating the synthesis approach into a ‘pre-synthesis’ and a ‘post-synthesis’ line. While our interpretation of post-synthesis refers directly to the notion of full synthesis as discussed above – in which services are an integrated and therefore relatively un-emphasized issue — the pre-synthesis approach can be considered fairly new. We understand it as the line of thought aiming to incorporate service-specific insights into a larger body of service innovation knowledge. It includes efforts to overcome the apparent heterogeneity between service sectors by developing theories, frameworks or practices that are valid (and applicable) in a wide variety of contexts where service innovation is the common denominator.¹ Therefore, this approach qualifies best for being regarded as a genuine ‘service innovation’ perspective.

Figure 1, below, provides an illustration of how the additional approach (or actually separation) can be positioned within the existing lines of thought. Following the pioneering work by Gallouj and Weinstein (1997), we use a simplified version of the characteristics-based approach to visualize the respective assumptions on how goods- and service-based innovation relate to each other. For each approach, the perceived attributes of innovation in a domain are depicted as vectors of characteristics (Y_1, Y_2, \dots).

According to the assimilation approach, goods- and service based innovation essentially share the same characteristics. The similarity of the two vectors in Figure 1 reflects that service innovation topics like R&D, productivity measurement, innovation management, etc. are not fundamentally different from goods-based innovation. The demarcation or differentiation approach mainly looks at the idiosyncrasies of particular services. In our visualization, these are reflected by the unique

¹ Apart from merely conciliating insights from various *empirical* services contexts, we present pre-synthesis as the approach in which these insights are also *theoretically* unified. The production, improvement, renewal and branding of services were traditionally studied by diverse fields like marketing, business operation, organizational theory and new product development, all adhering to their own perspectives. In order to build on this vast body of valuable research, it is essential to interpret their contributions on the basis of a coherent and consistent theory. Evolutionary theory seems to be a very suitable candidate when aiming to understand and better position the emergence of novel services (see Consoli, 2007). If the focus was only on collecting service innovation characteristics that are different from innovation in manufacturing (see the ‘United Service Theory’ by Sampson & Froehle, 2006), the label ‘post-demarcation’ would be more appropriate. ‘Pre-synthesis’ is the preferred option, as the approach aims to form the step *towards* fully integrated frameworks and concepts.

characteristics for different specific services contexts, which are typically contrary to properties of technological innovation as a whole (hence still depicted as a single vector). The fact that demarcation is largely oriented towards emphasizing the distinctiveness of services is marked by the ‘goods versus service’ arrows. Finally, the full or post-synthesis approach considers that innovation in goods and services are inherently interwoven. This view acknowledges that many products rely on a combination of hardware and services. Our visualization illustrates this by placing the characteristics of goods- and service-based innovation in one single vector. The integrative perspective thereby covers service innovation peculiarities (as opposed to assimilation approach), but does not stress why exactly these peculiarities should receive special attention.

The differences in the visualizations for the various approaches show exactly where the pre-synthesis approach enters the picture. Taking the middle way between demarcation and full synthesis, it focuses explicitly on the *similarities across multiple service innovation activities and how they relate to other innovation dynamics*. Because of these properties, the pre-synthesis approach can lead scholars to contemplate the role of services (as products) or service providers (the firms who deliver service products) within socio-economic systems, for instance to shed light on the interdependencies and synergies between manufacturing and services (e.g. Consoli, 2005; Castellacci, 2008; Cusumano et al., 2014). Moreover, seeing service innovation features in relation to goods-based innovation also provides the much-needed basis for determining which characteristics of service innovation are relevant for integration in broader accounts of innovation (Miles, 2007; Drejer, 2004).

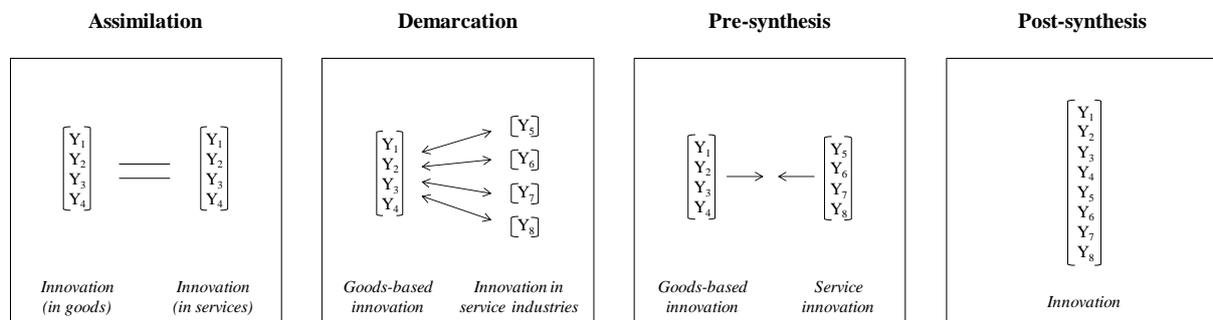


Figure 1: An extended classification of views on the nature of goods-based and service-based innovation. Inspired by a characteristics-based approach (Gallouj and Weinstein, 1997). A larger picture can be found in Appendix A.

In sum, each of the approaches offers its own perspective on the nature and distinctive features of service innovation. A point of view which focuses on the similarities between various occurrences of service innovation activity, however, has not been introduced so far. As we will see now, this additional conception of service innovation has implications for policy formulation.

3. Towards service-inclusive systemic policy mixes

3.1 The service-inclusiveness of individual policy measures

Recognizing the distinct ways to think of service innovation might help policy makers to understand the various opportunities for benefitting from it (Rubalcaba, 2006). Thereby, the approaches form a starting point for developing a structured approach regarding the formulation of systemic innovation policy in which the potential of services is carefully considered and embedded in the structure of other policy instruments, institutions and actors that characterize an innovation system.

So far, local policy experimentation has yielded a wide variety of instruments with relevance for service innovation (Den Hertog et al., 2010). This relevance can be present in an explicit way, like in funding schemes devoted to service innovation, but also implicitly. If a measure supports R&D in a domain such as ICT, some of the innovation it generates will have a high service-component (e.g. software solutions or high-tech services like imaging and data storage, security and analysis). However, innovation support stretches further than R&D policy, and especially in these other forms we can expect to encounter the participation of service firms and the creation of service solutions (Den Hertog et al., 2010). Thus, even if policy mixes do not contain measures dedicated to service innovation, it does not imply that service innovation is unsupported.

A comprehensive overview of options for service innovation support demands examining the variety of possibly relevant policy measures. In order to express how important a certain policy measure is for service innovation, we map its ‘service-inclusiveness’ along two main dimensions.

The horizontal axis in Figure 2 indicates to what extent a particular measure is aimed at either goods or services, which is the distinction we are examining. As noted above, apart from being supported by measures explicitly devoted to service or even manufacturing industries, support for services can also be embedded in schemes with a wider scope. Such policy interventions are to be located at the middle of the goods-services continuum, but can still vary in their degree of specificity. To be precise, the vertical axis of the framework conveys a distinction between measures that are not aimed at any concrete policy theme at all (‘Generic’), or measures based on a single thematic program (‘Specific’). In this latter category, encompassing goods-based as well as service-based activities (and industries), we find policies that focus on, for instance, a certain problem, technology, or societal

issue. Note that the resulting framework is not a two-by-two matrix, but rather a constellation of two independent axes. As both axes relate to merely gradual distinctions, policy instruments can be plotted anywhere on this conceptual ‘map’.

The advantage of this simple map is that it allows for objective comparisons of the service-inclusiveness of policy measures. It thereby facilitates the kind of policy learning that is required for drawing lessons from ongoing experiments with different forms of service innovation policy (Miles, 2007; Rubalcaba et al., 2010). The framework will also allow us to clarify how services fit in the discussion on generic and specific innovation instruments (Rubalcaba, 2006; Rubalcaba et al., 2010).

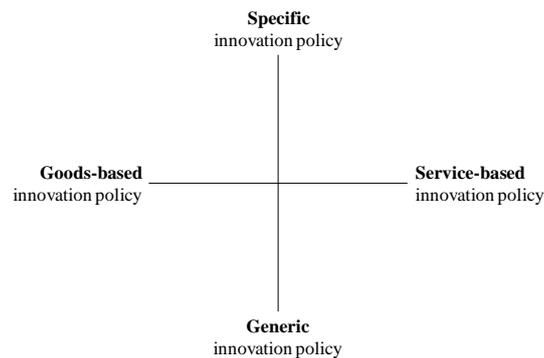


Figure 2: Framework for plotting the sectoral orientation of innovation policy measures.

3.2 Four approaches for developing systemic policy

Understanding the different approaches to service innovation does not yet answer the question of how they can guide the development of systemic policy mixes. In literature on innovation systems, policy mixes are regarded as systemic when they ensure the fulfillment of various basic functions (Edquist, 2005; Borrás and Edquist, 2013). Several authors have proposed classifications describing a select number of those basic functions. For instance, Hekkert et al. (2007), Hekkert and Negro (2009), and Bergek et al. (2008) study niche creation and transitions in technological innovation systems by focusing on seven functions: entrepreneurial activities, knowledge development, knowledge diffusion, guidance of the search, market formation, mobilization of resources, and creation of legitimacy. Looking at innovation efforts in general, scholars have stressed the importance of collaboration and networking, as well as innovation-oriented competence building, incubation activities and knowledge-spreading consultancy (Edquist, 2005). The innovation system’s functions and constituting activities (two terms often used interchangeably) can be executed by private as well as public parties. In cases where a function is weakly developed, policy makers might consider implementing additional support (Bleda and Del Río, 2013; Ács et al., 2014).

According to current holistic innovation policy thinking, policy instruments do not have to be ‘systemic’ themselves (see Smits and Kuhlmann, 2004): they can be complementary when strengthening distinct system functions (Hekkert et al., 2007; Borrás and Edquist, 2013). By

combining this interpretation of the functional perspective with our reflection on service innovation approaches, we propose four ways to develop a systemic innovation policy mix. Earlier work has equaled systemic policy to the synthesis view (e.g. Rubalcaba, 2006; Den Hertog et al., 2010). We provide an alternative view by taking the functional perspective on innovation systems as a starting point. Specifically, we argue that each of the service innovation approaches can form a basis for shaping policy mixes in which all the functions of the innovation system receive appropriate support.

In Figure 3, below, we use the framework from section 3.1 to present how the viewpoints on service innovation can all form a basis for strengthening the functions within an innovation system. For understanding the difference between the approaches, it is irrelevant which specific set of system functions or activities is observed; the only thing that matters is that every approach has its own unique way of addressing system functions. We will now discuss the resulting four policy approaches by providing examples of concrete policy measures corresponding to each of them.

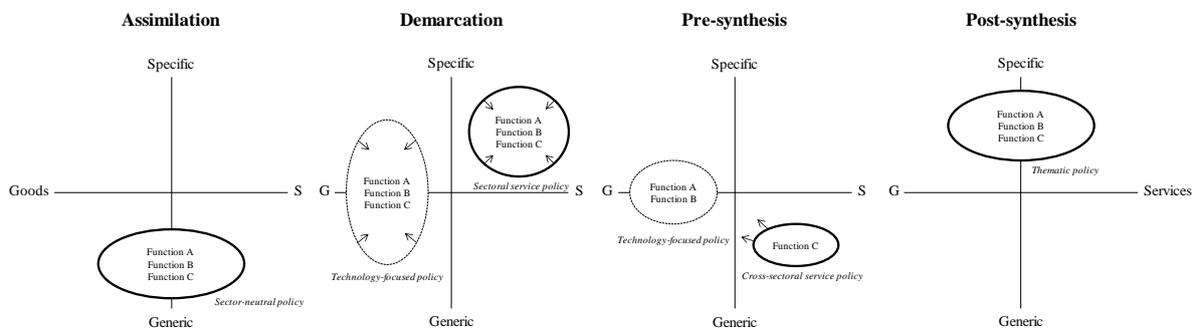


Figure 3: Translation of service innovation viewpoints to four systemic approaches. Each approach corresponds to a different configuration of functions (and constituting activities) that determine novelty creation within an innovation system (Edquist, 2005; Borrás and Edquist, 2013; Hekkert et al., 2007). A larger picture can be found in Appendix A.

Systemic policy according to an assimilation approach

If assimilation at the level of individual policies refers to *broadened* measures, then the assimilation approach for developing systemic policy is to use sector-neutral measures for supporting all system functions. Almost by definition, this implies the use of generic innovation policy.

Our view on what these measures could look like is consistent with earlier work on assimilative policy (Den Hertog et al., 2010). The core of this approach is to create instruments that are neutral with respect to supporting either goods or services. One way to create such measures is by adapting the criteria of formerly goods-focused innovation policies. Illustrative are funding policies aimed at mobilization of resources (Hekkert et al., 2007), and in particular, access to finance. Whereas such measures used to focus on technological R&D, they are increasingly made eligible to intangible innovations (Miles, 2007). Likewise, tax schemes allowing firms to deduct innovation expenditures have long since been broadened up to service renewal (OECD, 2000; Van Ark et al., 2003). Following the broadening strategy, collaboration and networking within an innovation system can be improved by extending labor mobility schemes to the domain of services (Expert Group on Innovation in Services, 2007).

A second type of generic measures that fits with the assimilation approach is the type of policy that is inherently generic. Here, one can think of measures that strengthen the system function of knowledge development by supporting PROs and universities' research activities. Apart from policy for science and education, also measures that facilitate entrepreneurship are rarely specific for the domains of either goods or services. An exception is perhaps the kind of instrument that aims to address knowledge application by providing training on firm-level innovation capabilities and innovation culture; it has been argued that these can often be improved by taking services better into account (Van Ark et al., 2003; Abreu et al., 2010). Also in the context of education, scholars pointed at the need to better embed knowledge on services in curricula (Rubalcaba et al., 2010), for instance in business administration, marketing, or software studies.

Systemic policy according to a demarcation approach

Following the demarcation or differentiation approach, a systemic innovation policy mix can be achieved by implementing various measures that meet the needs of specific manufacturing and services industries. Therefore, in the debate on generic versus specific policy measures (Rubalcaba, 2006), the demarcation approach often favors the latter style.

Again, existing literature provides useful examples of how to address the peculiarities of service industries. Some are in reports like 'Enhancing the performance of the services sector' (OECD, 2005a), where the focus lies on reforming service sector policies. The proposed interventions typically focus on improving the financial market for services and adapting the public-science outcomes to services' commercial needs (Rubalcaba et al., 2010). Respectively, these suggestions are relevant for system functions like financing innovation and growth, and knowledge development and transfer. Green et al. (2001) stress how informal networks can be reoriented towards the requirements of service industries. Their suggestion to support internationalization and remove trade barriers for services is particularly relevant for an innovation system's activities related to entrepreneurship. When it comes to generating innovation, many reports highlight the importance of having appropriate and accessible ICT-infrastructure in place (OECD, 2005a; Evangelista and Savona, 2003).

Characteristic for policy mixes fitting this approach is that there is a certain amount of *duplication* in instruments addressing a particular system function. Sometimes this is limited to one instrument for the technology domain, and one for the services domain. However, as many acknowledge that the service sector is highly heterogeneous (Pilat, 2001), most demarcation instruments only meet the needs of a particular service industry. For instance, parallel with funding measures for technological R&D, systemic policy mixes following this approach include vertical measures aimed at providing financial support to either logistics, or trade, or tourism, etc. (Den Hertog et al., 2010). Similarly, with respect to functions like knowledge development and application, duplication results from respecting arguments for developing service-specific IPR instruments in addition to legislation typically focused on technology. Such service-specific IPR is particularly

encouraged in service industries dealing with franchises, software, or consultancy methods (OECD, 2005a). Other examples of instruments for particular service industries can easily be found.

Systemic policy according to a pre-synthesis approach

Rather than addressing each single system function by implementing distinct measures for the goods and services domains, the pre-synthesis approach suggests benefiting from each domain's contributions to the overall functioning of the innovation system. Corresponding measures see service innovation in relation to other industries. By regarding 'service innovation' as a non-sector-specific concept, the cross-sector orientation of this policy approach is mostly on the side of generic measures. However, because service innovation policy is still more specific than fully neutral innovation policy, it is not as generic as the assimilation approach.

In the existing classification of service innovation approaches, measures focused on service innovation as such appear in both the sector-focused demarcation approach as well as in the fully integrative synthesis approach (Den Hertog et al., 2010). Indeed, service innovation role-models and courses might be thought of as restricted when focused exclusively on service industries. However, when designed to inform also other industries about how to engage in service innovation, this measure fits better with our idea of pre-synthesis. Yet, measures aimed at increasing the role of KIBS and creative industries in innovation systems are not as integrative as the programs where the opportunities for goods and services are unified. In our perspective, the 'outward-looking' measures for role-models, KIBS and creative industries are neither demarcation nor complete synthesis, but fit in a pre-synthesis approach focusing on how particular service firms can contribute to the functioning of other actors in the innovation system. These other actors can be manufacturing, service, or hybrid organizations; what matters is that they can benefit from support in developing new (service-based) business models (Wood, 2005).

From a systemic perspective, policies corresponding with this approach focus on system functions where services can contribute the most: of key importance are the ideas of *complementarities* between goods and services (Rubalcaba et al., 2010) and innovation *through* services (Den Hertog, 2000). Particularly promising opportunities occur in the context of knowledge development and transfer. With respect to knowledge development, Probert et al. (2013) argue that R&D services can be seen as the engine of the high-tech economy. Such a perspective departs radically from considering R&D only within the domain of services (European Commission, 2006). Second, KIBS might be supported on the basis of their potential to spread knowledge throughout the innovation system (Den Hertog, 2000; Toivonen, 2007). It is widely acclaimed that such specialist services like KIBS contribute significantly to the economic and innovative performance of other industries (Simmie and Strambach, 2006; Shearmur and Doloreux, 2013). Mas-Verdú et al. (2010), when discussing the role of services in regional development and innovation, stress that policy makers can benefit from the distributive function of services either by supporting private KIBS or by

developing public forms of transfer and connection services. By acting as cross-fertilizers, service businesses also play an important role in generating new business models in other industries. Notably creative industries like design firms and marketing agencies are known for their ability to provide input that might help client firms to turn inventions into successfully commercialized innovations (Lehrer et al., 2012; Mangematin et al., 2014). The various roles services can play in the growth and evolution of industries (Cusumano et al., 2014) suggest that there is a clear case for policy interventions aimed at spreading service-based business models throughout industries predominantly geared to manufacturing.

Systemic policy according to a post-synthesis approach

Systemic policy mixes based on the post-synthesis approach contain interventions where support for goods- and service-based innovation is entirely *integrated* in individual instruments or programs. Measures corresponding to this approach acknowledge that both domains have their own dynamics, but also that the two types of innovation often need to build upon each other. Just like individual firms might benefit from delivering hybrid product-service systems, also large scale economic change often requires the interplay of novelty in the spheres of physical products and services (Gallouj et al., 2014; Consoli, 2007). This is convincingly demonstrated in Windrum and Garcio-Goñi (2008) for innovation in health systems. Taking into account the distinct but intermingled nature of goods- and service innovation, the post-synthesis approach is particularly applied in policy strategies with a focus on *specific societal or technological themes*. This topical scope distinguishes it from the assimilation approach, which is all-encompassing only because it does not have a sectoral focus.

Policy interventions that see goods- and services innovation in relation to a specific topic can be found for practically every function in an innovation system. Cluster policy is a strong example of such policies. According to Porter (1998), clusters are geographic concentrations of companies, specialized suppliers, public or private service providers, and associated institutions (including academia) connected to each other through their highly similar fields. Due to agglomeration and network effects along the value chain, these fields are typically broader than a single manufacturing or service industry: more common is that the cluster concentrates on a specific technology (e.g. biotechnology) or a domain like health, sustainability, or energy. By supporting interactions between the various co-located actors, cluster policy can affect system functions like knowledge development (in universities) or collaboration and networking. Often, clusters or campus management organizations provide facilities for start-ups, such as advisory services and incubation funds. These policies concern system functions like entrepreneurial activities as well as mobilizing resources for innovation (Hekkert et al., 2007).

Another example of integrated policy aimed at specific themes is public procurement of innovation (PPI). Addressing system functions like competence building and financing innovation

(Edquist, 2005), policy makers can invite and support market parties in the (phased) development of solutions for specific issues. Thereby, PPI also forms a powerful tool for addressing societal challenges (Borrás and Edquist, 2013). Like most demand-side policy instruments, participation in PPI schemes is often open to firms from any sector. In fact, one of the main features is that creative input can be brought forward by firms other than the ‘usual suspects’ in manufacturing.

4. A comparative case study

In the previous section we outlined four different approaches for achieving systemic policy mixes, based on a comprehensive account of the potential of service innovation. The purpose of this empirical section is to demonstrate how classifying policy instruments according to these approaches can assess the service-inclusiveness of policy mixes. We also show how our analytical structure provides opportunities for identifying where extra support might be needed. Comparing the policy mixes of different regions can offer fruitful inspiration for solving functional weaknesses.

This section builds on two of the case studies conducted by the European Service Innovation Centre (ESIC), an initiative of the European Commission’s DG Enterprise. ESIC’s objective was to shed light on the transformative power of service innovation. One part of the research project consisted of case studies in regions coping with the challenge of revitalizing their economy.

Despite having a similar economic structure, the regions Upper Austria (Austria) and Limburg (the Netherlands) differ in their strategy for including services in their innovation policy mix. As both case studies have been conducted by the European Service Innovation Centre, they rely on exactly the same methodology. The practices for information sourcing follow most of the suggestions by Borrás and Edquist (2013). First, information on the region’s economic performance and policy mix was retrieved through extensive desk research. Part of this phase was a benchmark exercise using indicators from the European Service Innovation Scoreboard to compare the two regions to similar and best-performing regions. During site visits in 2013, one-hour interviews were conducted with about 10 key stakeholders per region. Interview summaries were returned for verification purposes. Some of the stakeholders agreed to fill out a self-assessment about the current state and service-inclusiveness of their policy mix. After an assessment report was shared with the regional stakeholders, policy workshops were organized early 2014 to verify the findings and to explore opportunities for further policy development. Apart from local stakeholders and peers from other regions, also independent experts participated in these sessions. The final assessment of the innovation strategies in both regions, including detailed descriptions of the present policy measures, can be found in the publicly available reports (ESIC, 2014a/2014b).²

We analyze the policy mixes of both regions on the basis of our four approaches: first we discuss the generic policy instruments (assimilation), then we describe how goods-focused policy is

² Subsequent activities in the ESIC project, involving interaction aimed at fine-tuning policy advice, are outside the scope of this chapter. Also, they came after the preliminary assessment of existing policy mixes on which the cases studies are based.

complemented by the sectoral and cross-sectoral variants of specific innovation policy (demarcation and pre-synthesis), and we conclude with the thematic policies (matching the full synthesis approach). For each service innovation approach, we describe which innovation system function or activity is addressed by a particular policy measure. The ESIC review of regional policy mixes considers a total of five functions. Although also inspired by frameworks from the TIS-literature (e.g. Hekkert et al., 2007), the chosen set mostly resembles a selection of the activities proposed by Edquist (2005; see also Borrás and Edquist, 2013). Building upon the ESIC analyses, we illustrate our approach by observing the following activities: creation of new knowledge, innovation generation (covering both competence building and provision of consultancy services relevant for innovation processes), creating and changing organizations for developing new fields of innovation (entrepreneurial activities), networking knowledge dissemination), and financing (covering both incubation activities as well as funding for innovation processes).³ For the sake of clarity, our analysis here does not take into account the innovation policies present at the (supra-)national level.

4.1 The case of Upper Austria

Regional background and policy goals

Upper Austria is the nation's most competitive and export-oriented region. Particularly strong is its performance in manufacturing industries like automotive, mechanical engineering, metal processing, chemicals, plastics, paper, wood, and automation.

Policy makers at Upper Austria's innovation agency concentrate on two policy goals. The first is to sustain the region's economic performance. A major problem here is the region's weakness in exploring new business models: Upper Austrian firms are highly inclined to stick to their traditional (and so far successful) focus on selling medium-tech goods. Although some regional stakeholders recognize the commodity trap, the willingness to explore new business models appears to be modest. A related problem concerns the labor market. Because many students leave the region, there is an increasing shortage of skilled personnel that can continue or transform businesses.

Upper Austria's second objective is to shape its new 'strategic program for economy and research' according to the grand challenges set by the European Commission. This has resulted in five action fields that form the core of 'Upper Austria 2014-2020': industrial processes, health / ageing society, energy, food / nutrition, mobility / logistics. With the exception of the first action field, none of these themes has a strong orientation towards either goods or services innovation.

³ All of these activities are typically affected by supply-oriented innovation policy measures. We fully acknowledge that demand-side activities and framework conditions (e.g. patent and tax laws, safety and environmental regulations) are essential for innovation as well (Edquist, 2005). For illustrative purposes, however, we limit ourselves to the set chosen in the ESIC analyses.

Regional policy mix

The number and diversity of policies at the regional level is rather high in Upper Austria. Each of the interventions is categorized in Table 1, below, but also plotted on the map we developed in section 2 (see Appendix B). A first observation is that its policy mix contains many measures fitting the assimilation approach. By jointly addressing all the innovation system's activities, we see this part of the policy mix is rather systemic. For instance, knowledge creation is supported by the Upper Austrian research funding programme (providing additional finance to research funded by the national Research Promotion Agency); competence building and networking are the goals of the Innovation Assistant Programme (university graduates helping SMEs with their innovation processes), entrepreneurial organizations find support in no fewer than three policy measures, and capital for innovation is provided through (amongst others) loan guarantees. All in all, half of the assimilation measures are inherently neutral, mostly those focused on entrepreneurship. The other half is R&D measures that have been opened up to services and service innovation.

Nevertheless, many of the originally goods-focused policies remain unaffected. As the composition of the policy mix reveals, technology support still lies at the heart of Upper Austrian innovation policy. Like in the case of assimilation policies, every system function is addressed by at least one goods-oriented intervention. The few demarcation measures all concern very specific industries. Two initiatives involve funding for a service industry, in addition to the funding measures that only support (energy) technology. The logistics network, originally an initiative for transport businesses, has currently become an instrument with a broader perspective on logistics.

At the moment of writing, Upper Austria's goal to make use of the transformative power of services has not yet resulted in a policy measure for service innovation as such (following the pre-synthesis approach). In fact, its reason for being interested in the ESIC analyses is exactly the wish to understand better how measures of this kind can be implemented.

Finally, post-synthesis refers to one measure of major importance for the region. Upper Austria's renowned Clusterland initiative traditionally focused on different manufacturing industries (e.g. automotive, mechatronics). In recent years, however, the program has been extended with Clusterland Networks devoted to topics like human resources and resource and energy efficiency. As the focal domains indicate, these networks stretch beyond any distinction between goods and services. Only the logistics network might be associated with a particular service industry, but the ambitions and members of this network indicate that its activities pertain to the development of integrated solutions.

Table 1: Policy mix in Upper Austria: detailed description of each instrument found in ESIC (2014a), pp 13-16.

Service innovation approach	Examples of policy instruments	Innovation system function / activity*				
		K	C	O	F	N
1. Assimilation						
Neutral measures that cover technological and service innovation on an equal basis	Innovation assistants (university-industry link)		x			x
	Upper Austrian research funding	x			x	
	Loan guarantees				x	
	Investment capital				x	
	Innovation award		x			
	Education account for young entrepreneurs			x		
	Economic stimulus program			x		
Founder Funds			x	x		
Goods-focused	Research and technology council	x				
	Innovation Network					x
	High Tech Incubator		x	x	x	
	Energy Technology Program				x	
	Green Energy & Environ. Technology				x	
	Technology Centres		x			
	Clusterland (clusters)	x	x	x		x
2. Demarcation	Tourism initiative				x	
	Business start-up (tourism & transport)			x		
	Local supply program				x	
	Logistics network		x			x
3. Pre-synthesis						
Cross-sectoral measures focused on service innovation and the link with manufacturing						
4. Post-Synthesis	Clusterland (networks)	x	x	x		x
	Thematic programs integrating opportunities from goods and services					

* Creating knowledge (K), innovation-oriented competence building and consulting (C), creating organizations (O), finance for innovation (F), and networking (N). Based on Edquist (2005) and Borrás and Edquist (2013).

4.2 The case of Limburg

Regional background and policy goals

Just like Upper Austria, Limburg's economy was traditionally based on manufacturing. Especially after closing its mines in the 1970s, industry has gained importance in the economic structure. Also with respect to its policy goals, Limburg is similar to Upper Austria (and probably many other European regions). The main objective is to sustain the success of the region by shaping a knowledge-based economy. Where possible, the region also aims to meet societal challenges.

Regional policy mix

As can be seen in Table 2, Limburg has only a small number of policies fitting the assimilation approach. In our categorization of system functions, the only one not affected is innovation and business model generation. Also the goods-focused interventions do not strengthen this function.

In Limburg's policy mix, one service-oriented initiative applies the demarcation approach. The Smart Services Hub was established by universities and public and private organizations engaged in financial, administrative and information-based services. By initiating joint projects, the hub aims to use knowledge transfer and collaboration for spurring innovative entrepreneurship. Its long-term aim is to become an expertise center that contributes to the renewal of businesses models in other industries, thus changing this to a pre-synthesis approach. An alternative trajectory is that it is developing into a hub specifically for creating and commercializing smart services, using combinations of modern technology (e.g. data servers, cloud computing) and clever applications of the functionality enabled by such technologies.

Currently, several instruments are already following a pre-synthesis way of designing systemic innovation policy. Whereas the goods-focused elements of Limburg's policy mix mostly concern financing and collaboration, the pre-synthesis interventions address a complementary set of functions. Almost all of them aim to generate new business models. Initiatives like the Service Science Factory and the Business Services School aim to bring service thinking to non-service industries as well as to service firms, not knowing what innovation might mean to them: their power lies in the experience of introducing service innovation in a wide variety of firms and having strong links with universities. While the Business Services School focuses on offering courses related to service innovation, the Service Science Factory positions itself as an institute where researchers, students and firms jointly work on actual business problems related to customer-centric thinking and service design.

Finally, Limburg's policy mix contains several interventions or policy initiatives that fulfil the post-synthesis approach. The chemicals/materials campus is classified as goods-focused due to the dominant role of manufacturing, but three similar initiatives take a more integrated perspective. The Document Services Valley, for instance, supports innovative entrepreneurship with respect to high tech services in the domains of printing, imaging and document management.⁴ A thematic focus is also clearly present on the agro-food and the health campus. Neither focuses exclusively on products or services: the goal is to come up with integral solutions where technology and services reinforce each other.

⁴ The Document Services Valley is about to drop the word 'Document' from its name. By positioning itself more prominently as an initiative for all sorts of (high-tech) services, just like its Business Services School, it might actually be on its way to moving from synthesis to pre-synthesis.

Table 2: Policy mix in Limburg: detailed descriptions of each instrument found in ESIC (2014b), pp 17-21.

Service innovation approach	Examples of policy instruments	Innovation system function / activity*				
		K	C	O	F	N
1. Assimilation Neutral measures that cover technological and service innovation on an equal basis	Innovation vouchers Starters funds Participation funds SILVER (Industrial Symbiosis Program)	x			x	x
Goods-focused	HighStarters TechStart Top Technology Clusters Limburg Ventures Chemicals / Materials Campus			x	x	x
2. Demarcation: Sectoral (vertical) programmes for services	Smart Services Hub	x	x	x		x
3. Pre-synthesis Cross-sectoral measures focused on service innovation and the link with manufacturing	LimburgMakers (part: servitizing entrepreneurs) Service Science Factory Service Business Acceleration Program Business Services School		x	x		
4. Post-Synthesis Thematic programs integrating opportunities from goods and services	Document Services Valley Health Campus Agro-Food Campus		x	x	x	x

* Creating knowledge (K), innovation –oriented competence building and consulting (C), creating organizations (O), finance for innovation (F), and networking (N). Based on Edquist (2005) and Borrás and Edquist (2013).

4.3 Comparison and opportunities for mutual policy learning

Despite similar economic positions and ambitions, the policy mixes in the examined regions are highly different. Limburg is clearly further on its way towards a service-inclusive policy mix. A more detailed comparison indicates several learning opportunities for both regions.

A remarkable feature of Upper Austria's policy mix is the number of measures. Apart from the confusion this may cause amongst local firms, it also seems to require more governance than the leaner policy mix in Limburg. A holistic perspective on policy mixes demands that policy interventions complement each other (Borrás and Edquist, 2013; Edquist, 2014). Not only does this imply that no underperforming system function should be ignored, it also implies that redundant support for the same function is avoided if there is no evidence of additional benefits from the overlap. Our overview demonstrates how especially goods-based innovation is heavily supported: taking into account both goods-focused and generic (assimilation) policies, each system function is addressed at least twice. At the same time, Upper Austria's extensive policy mix also suggests how to make the assimilation (and goods-focused) policies in Limburg more systemic. For instance, instruments like innovation assistants and innovation awards could potentially strengthen innovation-

oriented competence building in Limburg. The policy workshop did in fact reveal great interest in such instruments for encouraging firms to explore new ways of commercializing their knowledge.

The two regions can also learn from each other with respect to making demarcation measures more (pre-) synthesis-like. Both Upper Austria and Limburg aim to increase the importance of certain types of services (logistics and smart services, respectively) by strengthening the link with other industries. Their experiences of how to create this link is something the regions can fruitfully share.

Whereas pre-synthesis is missing in Upper Austria, this approach is strongly adhered to in Limburg's strategy to develop service-innovation policy. Its various initiatives provide highly useful examples of means to persuade manufacturing firms to explore services more. Such an instrument for 'infusing' other industries with service-thinking directly addresses Upper Austria's goal of modernizing its economy. A local variant of a service innovation laboratory has the potential to support manufacturing firms shifting to service-based business models. By embedding it in the university, like several initiatives in Limburg have done, opportunities arise to develop courses that meet the increasing demand for young engineers who can achieve business success in novel ways.

In addition to historically developed clusters, Limburg is also actively supporting the creation of new clusters and campuses. So far, these are less systemic in their scope than Upper Austria's Cluster Network. Moreover, the different clusters in Upper Austria are occasionally brought together by the central agency coordinating them. For Limburg, creating synergetic linkages between the local clusters remains a main challenge. Apart from opportunities for Limburg to learn from Upper Austrian experiences, we also observe the potential for policy learning in the other direction. Developing solutions in the domain of health (and ageing) is one of the ways Upper Austria is attempting to tackle societal challenges. This aim is currently being translated into policy formulation, whereas Limburg's health campus has been running for a number of years already.

5. Discussion

5.1 From analytical structure to policy implications

In the previous sections we developed an analytical structure not only for understanding how service innovation can be made part of systemic innovation policy, but also for assessing the service-inclusiveness of policy mixes. Apart from serving analytical purposes, the four approaches can help to formulate policy.

First, policy makers should carefully consider what goals they are ultimately trying to achieve (Borrás and Edquist, 2013). Whether these concern economic progress or innovation in a particular domain – as determined in complex political processes – it is essential that the policy mix supports the creation, diffusion and application of relevant knowledge (Edquist, 2014). According to the current views, this requires the government to develop policy that strengthens a set of functions or activities

that should be performed in an innovation system. Instead of trying to develop a single policy measures that is systemic all by itself (Smits and Kuhlmann, 2004), policy makers can also consider distinct measures that address a complementary set of system functions (Hekkert et al., 2007).

Second, policy makers need to have a thorough understanding of the various opportunities in which their innovation system can benefit from service innovation (Rubalcaba, 2006). Recognizing the different points of view is a prerequisite for determining which type of policy approach is appropriate within a certain context. Each way of looking at the nature of service innovation has its own focus. The specific innovation dynamics that a certain point of view brings to the fore, in turn, correspond with a distinct set of policy implications. We extend the traditional classification of service innovation approaches by distinguishing ‘pre-synthesis’ from full or ‘post-synthesis’. Due to its focus on similarities between instances of service innovation, the pre-synthesis approach is what we regard as an important step in the aim to move from studying specific service industries to developing completely integrated innovation theory. Applying the extended range of approaches to policy formulation illustrates how the existing and newly introduced lines of thought differ.

The last step is to assess which interventions would be appropriate additions to existing policy. This can be done by categorizing how existing policies deal with services (using the framework we introduced in section 3.1), and which functions they address. Such an analysis reveals opportunities for making policy mixes more systemic by showing which functions are overlooked in each of the approaches to policy innovation. While one approach might require policy makers to duplicate policy measures for each system function (one goods-focused instrument, and one for services), other approaches correspond to measures that address complementarities and interdependencies between the two domains.

It is important to note that we do not advocate adopting all approaches. Rather, we show how systemic policy can be shaped to each concept of the nature and potential of service innovation. In this respect our study departs from earlier work stating that systemic policy can only be achieved by introducing service-goods integration at the level of individual measures (Rubalcaba, 2006; Den Hertog et al., 2010). Our alternatives show that an assimilation approach can be systemic, as long as its relation to other instruments is well-balanced with respect to system functions.

The proposed variety in possible courses of action supports the fact that policy makers are restricted in their possibilities for transforming policy measures: what type of systemic policy can be realized depends on existing policy as well as the policy goals ultimately pursued (Borrás and Edquist, 2013). The four alternative approaches cannot be viewed in isolation, as specific innovation policy is often implemented to complement generic measures. Our aim is to support policy makers in ensuring that also these specific accents address all system functions. By creating an overview of the functions addressed by existing policy measures, policy makers can reach an informed decision on

how essential it is to facilitate support for a system function in the context of a specific goods- or services domain (in addition to the generic measures already present).

Drawing on a comparative case study, we illustrate how policy makers can analyze the service-inclusiveness of their policy mix and compare it with other policy mixes. The approaches we propose provide a framework for mutual policy learning: both the examined regions have introduced policy measures that, from a functional perspective, would complement the other region's policy mix. Extending the number of policy mixes against which a region is benchmarked, we reckon, would highlight even more opportunities for structured debates aimed at exchanging policy experiences.

5.2 Possibilities for further research

Further research could be devoted to identifying additional service-sensitive policy instruments and categorizing them according to the systemic approach they belong to. In line with the increasing scholarly attention for an all-encompassing account of innovation, integrative thematic policy instruments are of particular interest.

One notable example of how policy makers can benefit from more insight in service-inclusive specific innovation policy, concerns cluster policy (e.g. in the form of campus management). This kind of innovation policy is explicitly being promoted in the European Commission's new framework program, but the potential of well-considered service-orientation often remains unaddressed. A possible response is to explore the potential of supporting demarcation-like service clusters (Hsieh et al., 2012). A (pre- or post)synthesis view, however, would emphasize the interaction between distinct parties, including both manufacturing and service businesses, within the value chain around which a cluster is centered. In our empirical examination, we encountered substantial variance and doubt regarding ways to 'infuse' cluster policy with the topic of service innovation. Some clusters traditionally focused on manufacturing, like the chemicals/materials cluster in Limburg and Clusterland in Upper Austria. In both cases, the initiatives enable cluster members to jointly explore what service innovation can mean to them (a pre-synthesis line of thinking). Alternatively, the post-synthesis-like health campus in Limburg and Clusterland Networks in Upper Austria consider services as an intrinsic part of the economic activity they support: service-sensitivity is embedded in their thematic and interdisciplinary focus. How policy makers and campus managers can strategically exploit service innovation requires information on the orientation, design, implementation, governance and success of policy experimentation in different circumstances. Investigation of the complementary role of more generic policy instruments is also a crucial factor in this respect.

An alternative way to extend research on the integrative approaches to innovation policy is to explore another theme that is gaining popularity among (European) policy makers: smart specialization (Foray et al., 2009). This term is applied to policy agendas that take an integrative and knowledge-based perspective on transforming economic structures. Some key features of research and

innovation strategies for smart specialization (RIS3), accordingly, are: the focus of national or regional priorities and challenges, the exploitation and further development of local strengths, and the support for diverse forms of innovation (Camagni and Capello, 2013). To a large extent, these correspond with the principles of a full synthesis approach to policy formulation: the relevant policy instruments identified in our cases concern goods- and service-inclusive programs focused on particular strongholds. How to use service innovation policy for reinforcing existing domains of (regional) specialization seems to be a promising avenue for extending the current study. In particular, we consider it worthwhile to explore not only the role of services within those specializations, but also between them. Recent studies of regional development and technological relatedness (e.g. Frenken et al., 2007) show that knowledge flows between unrelated specializations are rare, but at the same time have the potential to cause disruptive breakthrough innovations (Castaldi et al., 2014). Since knowledge about service innovation is relevant throughout different specializations, policy makers could consider using this theme for linking previously unrelated industries. Essentially, some of the encountered pre-synthesis instruments already aim to position service innovation as the glue between regional strongholds. In the next chapter this will be explored in more depth.

6. Conclusion

As a nuance to our propositions and suggestions for further research, we conclude by stressing that this study takes an analytic and thus neutral standpoint with respect to which approach to service innovation is preferable. Instead of being unconditionally in favor of some particular form of service innovation policy, we merely emphasize the benefits of having alternative ways in which services can be made part of systemic innovation policy. While the sectoral approach (demarcation) and cross-sectoral approach (pre-synthesis) correspond with policy focused on service industries or service innovation as such, the other two approaches relate to a predominantly embedded role for services. Our main message is that, in principle, any of the approaches lends itself for a systemic policy mix. Both an implicit and an explicit focus can be appropriate: what matters is that a thorough analysis of the most suitable way to include services in policy mixes is deliberately considered rather than entirely neglected. The approaches we introduce are designed to support this type of thinking.

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Appendix A: Four ways to approach and govern service innovation

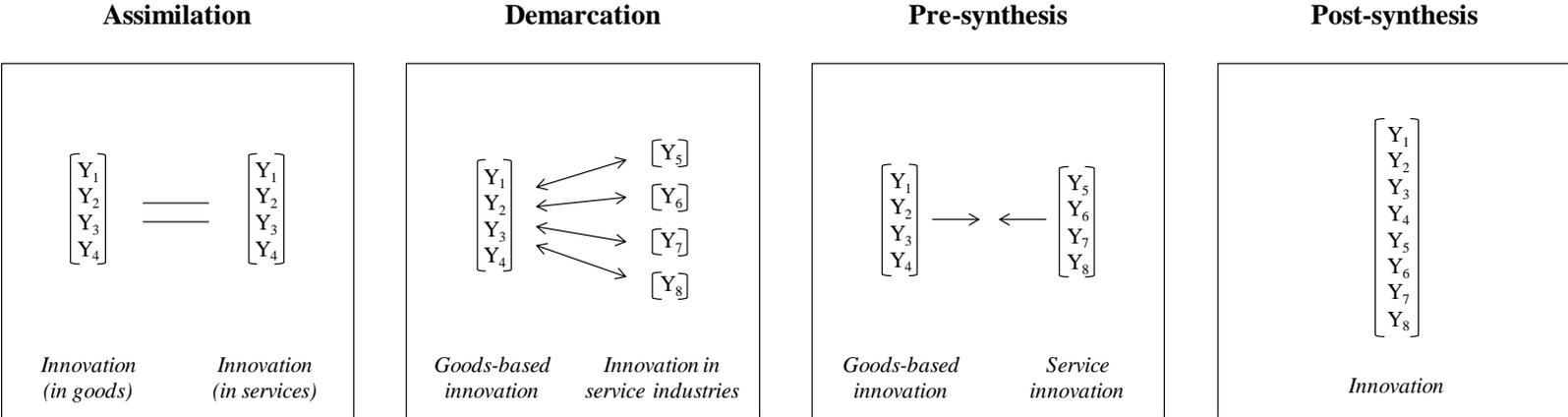


Figure A.1: An extended classification of views on the nature of goods-based and service-based innovation. Inspired by characteristics-based approach (Gallouj and Weinstein, 1997).

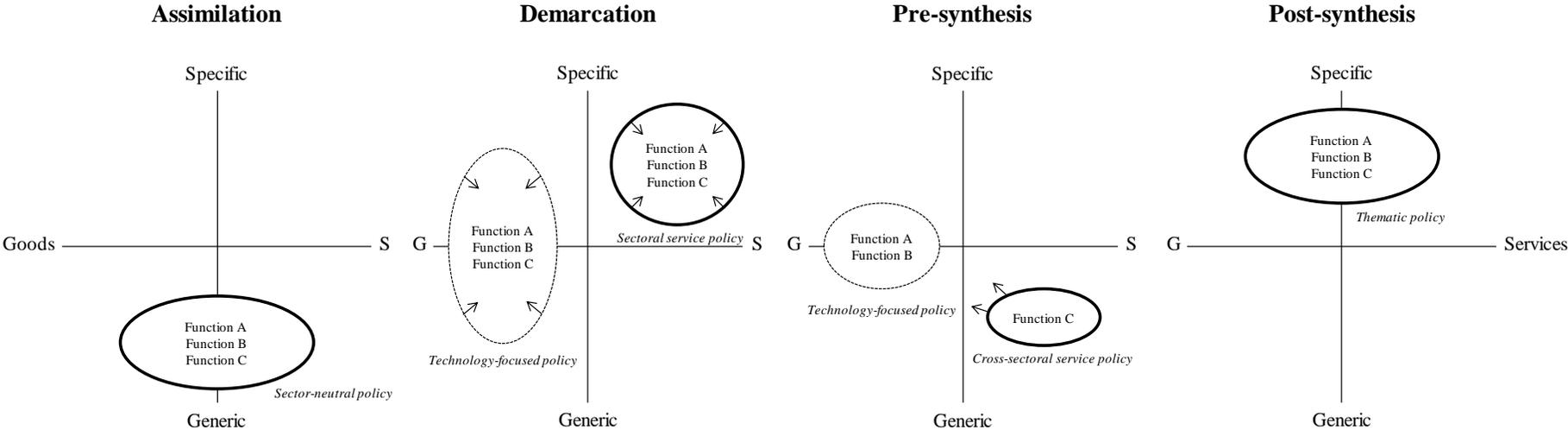


Figure A.2: Translation of service innovation viewpoints to four systemic approaches. Each approach corresponds with a different configuration of functions (and constituting activities) that determine novelty creation within an innovation system (Edquist, 2005; Borrás and Edquist, 2013; Hekkert et al., 2007).

Appendix B: Mapping the service-inclusiveness of policy mixes

Affected function of innovation system:

K = Creating knowledge

C = Competence building and consulting

O = Creating organizations

F = Finance for innovation

N = Networking

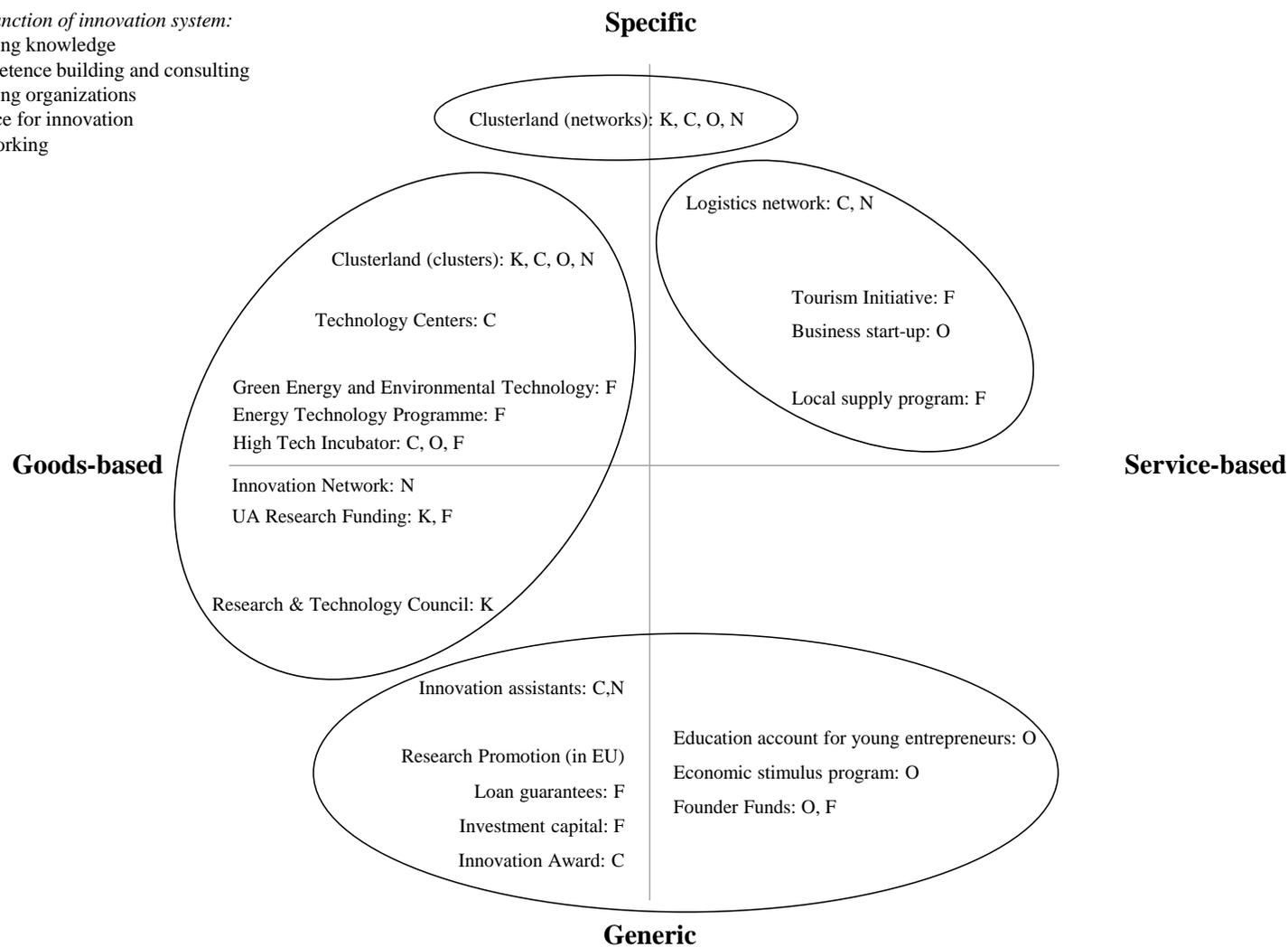


Figure B.1: Policy mix in Upper Austria: detailed description of each instrument found in ESIC (2014a), pp 13-16.

Affected function of innovation system:
 K = Creating knowledge
 C = Competence building and consulting
 O = Creating organizations
 F = Finance for innovation
 N = Networking

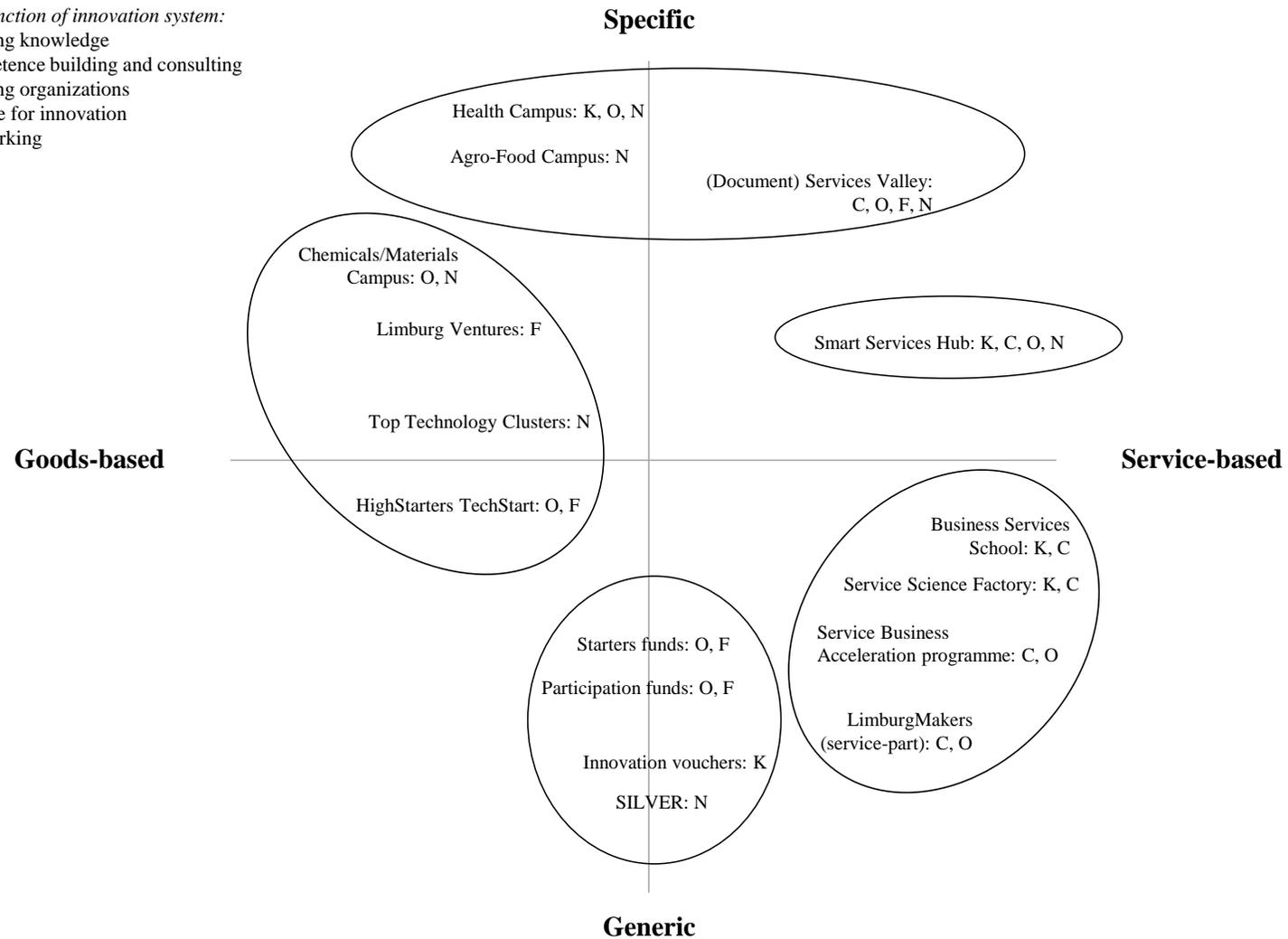


Figure H.2: Policy mix in Limburg: detailed descriptions of each instrument found in ESIC (2014b), pp 17-21.