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A holistic view on service innovation: Four approaches for developing systemic policy mixes

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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 (e.g. sectoral) 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 it with an additional point of view. Each viewpoint is associated with 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 of a comparative case study on two similar regions, we illustrate how the alternative approaches can be used for classification and comparison of service innovation policy options. We conclude with discussing possibilities for further research and actual policy formulation.

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Keywords: Innovation policy, service innovation, innovation systems

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1. Introduction

For several reasons, attention for service innovation is on the rise. After a period of neglect it is now widely acknowledged that ‘pure’ service providers do innovate, rather than just being adopters (Djellal & Gallouj, 2001; Gallouj & Djellal, 2010). Service businesses, especially when knowledge-intensive, can also be seen as important drivers of innovation by other actors in the innovation system (Den Hertog, 2000; Muller & Zenker, 2001). Some of these actors, in fact, have 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 & Lusch, 2004; Chesbrough, 2011).

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 technology-bias that characterizes many R&D policies (Miles, 2007). In pursuit of economic progress, innovation policy is being turned ‘service-friendly’ and ‘service-inclusive’, up to service-focused. Especially the last 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; EC, 2012; ESIC, 2012), and also the OECD has actively been tracing and spurring policy developments on this account (OECD, 2005; Janssen et al., 2012).

Policies addressing the issue of service innovation still tend to be of an experimental nature. Despite widespread interest from both academics and policy makers, 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. Not in the least place, this struggle is due to the fact that the topic of ‘service innovation’ stretches over a broad range of essentially different phenomena (see Carlborg et al., 2014). Whereas some policy interventions are positioned as service innovation policy when supporting particular service sectors (e.g. tourism, financial services), other measures carry this label when, for example, promoting the knowledge-broking 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 acclaimed fuzzy nature of service innovation (Gallouj & Savona, 2009) also explains why some policy makers are reluctant to overcome technology-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 industry policy, policy makers have a tendency to see service innovation only in the light of specific service sectors. Clearly, such a perspective does no right to the observation that services are of great importance for economic transformation in other sectors as well.

The current paper takes up the challenge of clarifying which types of service innovation policy measures are appropriate 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 some specific form of service innovation support (Rubalcaba, 2006; Rubalcaba et al., 2010). However, insight in why policy intervention is needed does not imply insight in how this can be done best.

The holistic view we introduce refers in the first place to more attention for the variety of roles services can play within innovation systems. A better understanding of those roles forms an excellent basis for determining which kind of intervention might be a suitable addition to existing policy measures. 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). 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 & Edquist, 2013, p. 1522). The functional perspective to innovation systems thereby provides a basis for balancing the variety of instruments within a policy mix (Hekkert et al. 2007). Systemic innovation policy, in this perspective, pertains to combinations of policy instruments that jointly support all the functions that characterize a well-functioning innovation system (Wieczorek & Hekkert, 2012). These functions, to be executed by both public and private parties, cover distinct processes related to the creation, diffusion and application of knowledge. From a functional perspective, identifying and solving weaknesses in the innovation system lies at the heart of policy development (Bleda & Del Río, 2013). The second aspect of the holistic view we present in this paper is more insight in how support for services can be made part of such a way of policy formulation.

Surprisingly, the intertwined systemic and functional lines of thinking have hardly been used for formulating service innovation policy (Rubalcaba et al., 2010). A possible explanation for this gap is the earlier identified lack of an analytical account of how service innovation can contribute to the pursuit of policy priorities. In the following sections, we discuss the various meanings that go under the label of service innovation (so-called ‘service innovation approaches’), we present a framework for assessing the service-inclusiveness of individual policy measures, and we 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 for services can contribute to achieving policy priorities and how this can be translated into instruments that complement existing policies.

2. Viewpoints on the nature of service innovation

2.1. The three traditional approaches

In order to support holistic 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 (notably technological) has far-reaching implications for considerations on how to support it (Rubalcaba, 2006). For instance, distinct policy interventions are required when regarding service innovation as an inherent part of all innovation dynamics versus recognizing particular roles within innovation processes or systems (Den Hertog et al., 2010).

Scientific inquiries into service innovation have traditionally been grouped to three main lines of thinking (Gallouj, 1994; Coombs & Miles, 2000). Together, these conceptions are believed to represent the evolution that service innovation research has gone through (Carlborg et al., 2014). Because each approach takes a fundamentally different stand with respect to the nature of service innovation, however, new theoretical perspectives form supplements to the discourse rather than that they have entirely replaced the older ones.

The categorization of approaches lends itself for a 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 characteristics. Following the pioneering work by Gallouj and Weinstein (1997), we use characteristics-based representations to visualize the respective assumptions on how the domains of technology and services relate to each other (Figure 1).

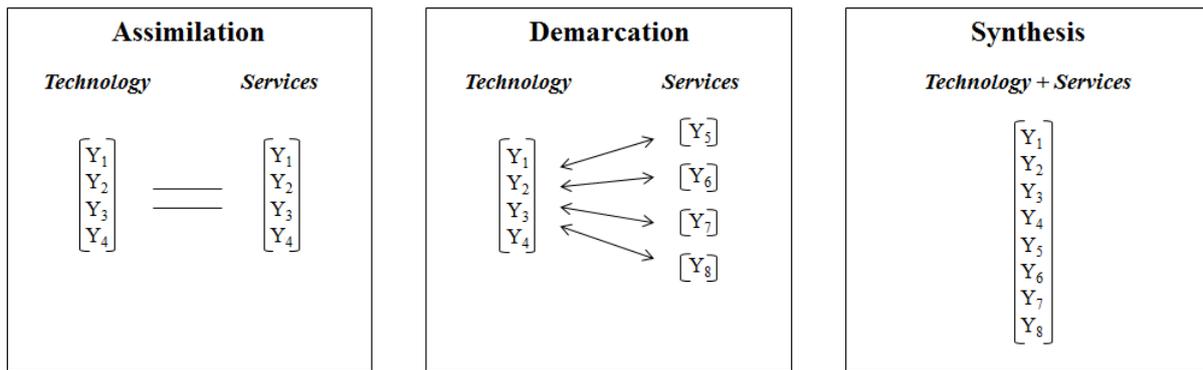


Figure 1: Three ways to think on the relation between technological innovation and service innovation. The figure is inspired by the characteristics-based approach (Gallouj & Weinstein, 1997). (Larger figure in the appendix)

The assimilation approach is built on the assumption that ‘most economic attributes of services are fundamentally similar to those of manufacturing sector’ (Miles, 2007, p. 262). All dissimilarities between the two domains can be thought of as matters of degree, rather than fundamental differences. The assimilation approach is particularly adhered to in statistical measurement of economic performance and innovation. For instance, studies on the use of R&D by service firms have questioned the applicability of standard indicators (Miles, 2005).

The demarcation approach forms an answer to many of the critiques concerning the assimilation approach. Rather than threatening all forms of economic and especially innovative activity as being 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. However, 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 & Savona, 2009). In our visualization this corresponds to unique characteristics for different service sectors, which are typically opposed to properties of technological innovation as a whole (hence still depicted as a single vector).

The synthesis approach, finally, is commonly regarded as the most promising research avenue. Rather than seeing service innovation as fundamentally equal or different from technological innovation, it integrates their characteristics into overarching theories and frameworks. By incorporating the peculiarities revealed by demarcation studies, the synthesis approach can enrich our understanding of innovation in general (Drejer, 2004). Provided that some features of innovation are more pronounced in services, studying the latter might increase the scope of research on innovation dynamics. A notable difference with the demarcation approach is that the synthesis view looks at service innovation activity, irrespective of the type of organization (and especially sector) in which it is performed (Rubalcaba et al., 2012). The most extreme form of the synthesis is conceiving service innovation as an opportunity for virtually all firms within an economy (Mina et al., 2014). According to the foundational premises of service-dominant logic, all economic activity essentially is a matter of exchanging services (Vargo & Lusch, 2004). This perspective builds on earlier works in which goods are described by the services they render.

2.2. From three to four schools of thought

Although the aforementioned approaches are argued to cover diversity in service innovation thinking, it can at least be called remarkable how none of the individual viewpoints appears to match adequately with the label of ‘service innovation’. To assimilationists, first, this notion would seem meaningless because it does not acknowledge there is any point in opposing it to 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 synthesis approach, finally, service innovation is a hollow term because the phenomenon is regarded as an intrinsic characteristic of innovation in general. This apparent contradiction within the classification of service innovation approaches, one could argue, eventually undermines the need for any policy explicitly devoted to service innovation at all: 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 current stand of literature lacks a satisfactorily appropriate label for contributions focused on communalities between instances of service innovation (i.e. service innovation an sich). Debates on the life cycle of service innovation thinking state that the integrative scope of the synthesis approach is preceded by sector-based studies of the demarcation approach (Carlborg et al., 2014). At the same time, however, the extensive literature devoted to analyses at the very level of service innovation and service sciences suggests that there is value in recognizing an intermediate stage. Many of the urges for moving towards integrative theory actually plea for better views on service innovation reality, rather than on innovation as such (Rubalcaba et al., 2012). Hence, we propose the idea of a ‘pre-synthesis’ approach, which can be understood as the line of research aiming to incorporate sector-based 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 (or can be applied) in a wide variety of contexts in which service innovation is the common denominator. By asking how the resulting collection of insights can inform innovation in non-service firms, pre-synthesis studies can be seen as a link between demarcation and synthesis efforts¹.

Figure 2, below, provides an illustration of how the additional approach can be positioned within the existing lines of thinking. As noted, demarcation mainly looks at idiosyncrasies of particular services, whereas synthesis attracts attention to individual service components within an integrated product portfolio (e.g. product-service systems, services around the product) or within a particular technology. Pre-synthesis, taking the middle way, focuses on the similarities across service innovation activities and how they relate to other innovation dynamics. As a result, pre-eminently a pre-synthesis approach can lead scholars to consider the role of services (as products) or service providers (the firms who deliver service products) within socio-economic systems and shed light on the interdependencies between manufacturing and services (Castellacci, 2008).

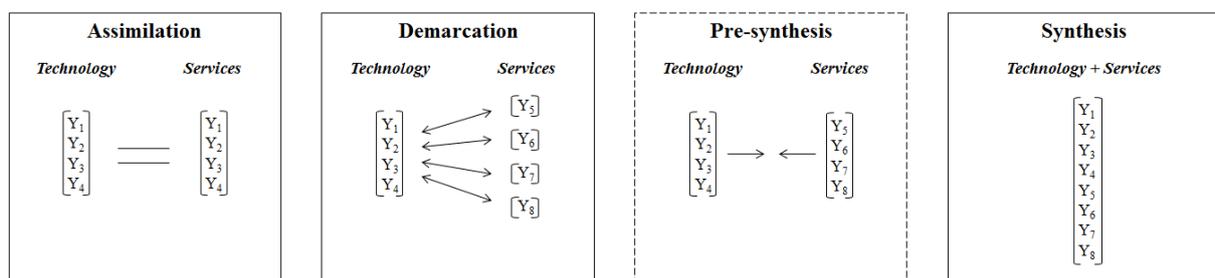


Figure 2: An extended classification of views on the nature of service innovation. (Larger figure in the appendix)

¹ If the focus would only be on collecting service innovation characteristics that are different from innovation in manufacturing, the label ‘post-demarcation’ would be more appropriate. Since we consider that the regular demarcation approach is already focused at identifying differences, adding a post-demarcation approach would hardly mean a contribution to the existing classification.

The difference between the proposed points of view on service innovation is perhaps not always clear-cut. What might at first sight seem particularly difficult to categorize, for instance, are studies on an aggregation of several (but not all) service sectors. A popular research topic is knowledge intensive business services, abbreviated as KIBS. Covering firms from information and communication sectors as well as those engaged in professional, scientific and technical activities, it concerns neither a single sector nor a feature of service firms in general (Miles, 1995). The proposed typology of service innovation approaches, however, does not so much pertain to a research topic, but rather to the way how it is studied. We exemplify this for the selected topic of KIBS.

When adhering to the assimilation approach it is common to investigate, for instance, the R&D intensity in KIBS versus R&D intensity in manufacturing (e.g. Leiponen, 2012). Taking a demarcation approach, on the other hand, one would be more inclined to investigate to what extent the notion of R&D is actually meaningful in a particular domain like KIBS (or even its different subsectors). An example here is the study by Miles (2007), who argues that KIBS can deploy innovative activities without attaching formal structures or budgets to them. Looking at the topic again from a pre-synthesis view, one might explore how insights in the innovation processes in KIBS can clarify or even guide the behavior of manufacturers. Shearmur and Doloreux (2013), for instance, have explored what KIBS contribute to innovation in manufacturing establishments. Finally, when adopting a synthesis approach, scholars could study the intensity to which organizations (regardless the sector they stem from) commit themselves to service innovation activities. An option here is to use service-inclusive frameworks for studying the importance of particular service innovation capabilities within KIBS and non-KIBS, or to assess how open innovation strategies relate to the extent a firm is service-oriented (Mina et al., 2014).

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 similarities between various occurrences of service innovation activity, however, has not earlier been introduced. As we will see now, an extra way of conceiving service innovation has implications for the act of policy formulation.

3. Towards service-inclusive systemic policy mixes

3.1. The service-inclusiveness of individual policy measures

Recognizing the discussed points of view might help policy makers to understand the various opportunities for benefitting from service innovation (Rubalcaba, 2006). Thereby, they 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 high 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 neutral 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, if policy mixes do not contain measures dedicated to service innovation, it does not imply that service innovation is not supported.

A comprehensive overview of options for service innovation support demands attention for the variety of policy measures that can possibly be of any relevance. In order to express how important a certain policy measure is for service innovation, we introduce a framework that allows us to map its 'service-inclusiveness'.

The horizontal axis in Figure 3 indicates to what extent a particular measure is aimed at either goods or services, which is the distinction we are primarily interested in. As noted above, apart from being supported by measures explicitly devoted to service or even manufacturing sectors, support for services can also be embedded in schemes with a wider scope. Therefore, 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, stretching over both goods-based as well as service-based activities (and sectors), we find policies that focus on, for instance, a certain problem, technology, or societal issue.

The advantage of the proposed framework is that it allows for objective comparisons of the sectoral orientation or service-inclusiveness of policy measures. Thereby, it 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 also allows us to clarify how services fit in the discussion on generic and specific innovation instruments (Rubalcaba, 2006; Rubalcaba et al., 2010).

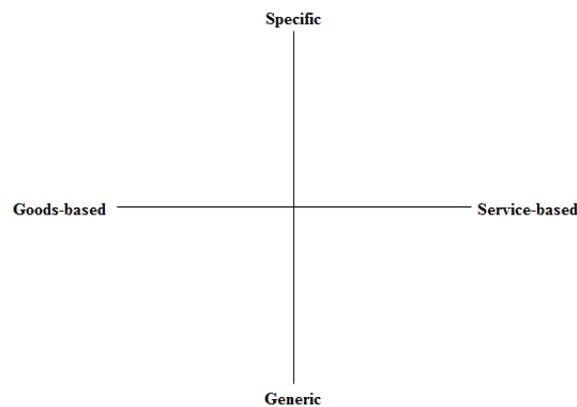


Figure 3: Framework for plotting the sectoral orientation of innovation policy measures. (Larger figure in the appendix)

3.2. Four approaches for developing systemic policy

Understanding the different approaches to service innovation does not yet answer the question how they can guide the development of systemic policy mixes. Policy mixes are regarded as systemic when they ensure the fulfillment of various basic functions of an innovation system (Borrás & Edquist, 2013). Several authors have proposed classifications in which a select number of those basic functions are described (e.g. Bergek et al., 2008). An empirical study by Hekkert et al. (2007), for instance, resulted in seven functions: entrepreneurial activities, knowledge development, knowledge diffusion, guidance of the search, market formation, mobilization of resources, and creation of legitimacy. Widely acknowledged is also the importance of collaboration and networking, as well as innovation and business model generation. The required activities can be executed by private as well as public parties. In case a function is weakly developed, policy makers might consider implementing additional support on that account (Acs et al., 2013).

According to holistic policy thinking, policy instruments do not have to be 'systemic' all by themselves (see Smits & Kuhlmann, 2004): they can be complementary when strengthening distinct system functions (Wieckzorek & Hekkert, 2007). 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 on this account has equated 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 are fulfilled.

In Figure 4, 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. We will now discuss the resulting four policy approaches by providing examples of concrete policy measures corresponding to each of them.

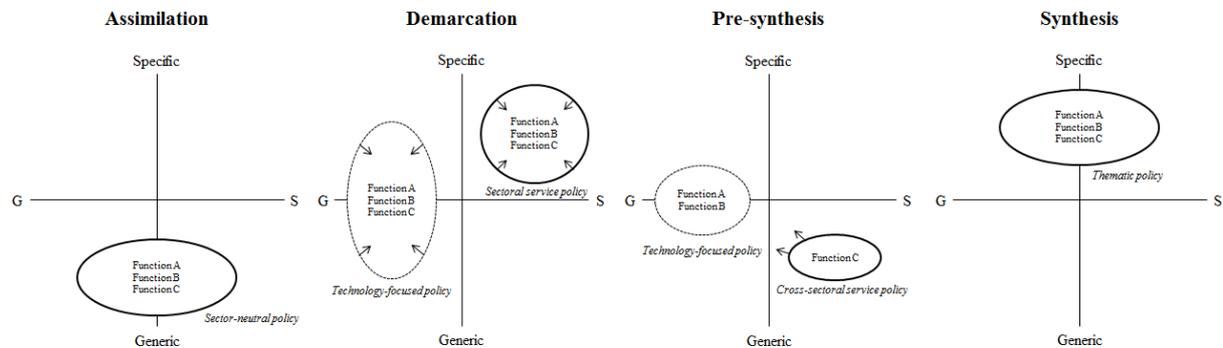


Figure 4: Translation of service innovation viewpoints to four systemic approaches. (Larger figure in the appendix)

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 how these measures could look 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 that concern the system function mobilization of resources, and in particular access to finance. Whereas such measures often used to focus on technological R&D, they are increasingly made eligible to intangible innovations (Miles, 1997). Likewise, recognizing that some fiscal measures particularly provide innovation incentives to manufacturing firms, tax schemes allowing firms to deduct innovation expenditures have since long 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 labour mobility schemes to the domain of services (Expert Group on Innovation in Services, 2007).

A second type of generic measures that fit 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 the research activities of universities and PRO's. 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 addresses business model generation by providing trainings with respect to 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). Also in the context of education there is a need to embed services better in curricula for studies like business administration, marketing, and the like.

Systemic policy according to a demarcation approach

Following the demarcation approach, a systemic innovation policy mix can be achieved by implementing a variety of measures that meet the needs of specific manufacturing and services sectors. 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 the peculiarities of service sectors can be addressed. Some of them are collected in reports like ‘Enhancing the performance of the services sector’ (OECD, 2005), 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 the system functions of financing innovation and growth and knowledge development and transfer. Green et al. (2011) stress how informal networks can be reoriented towards the requirements of service sectors. Their suggestion to support internationalization and remove trade barriers for services is particularly relevant for the system function regarding entrepreneurial activities. When it comes to generating innovation, many reports point at the importance of having appropriate and accessible ICT-infrastructures in place (e.g. OECD, 2005; Pilat, 2001).

Characteristic for policy mixes fitting this approach is that there is a certain extent of duplication in instruments addressing a particular system function. Sometimes this is limited to one instrument for the domain of technology, and one for the domain of services. However, as it is acknowledged that the service sector is highly heterogeneous (Pilat, 2001), most demarcative instruments only meet the needs of a particular service industry. For instance, in parallel to funding measures for technological R&D (possibly within a certain industrial sector), 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 generation of innovations, duplication results when respecting arguments for developing service-specific IPR instruments in addition to legislation typically focused on technology. Such service-specific IPR is particularly urged for in service industries dealing with franchises, software, or consultancy methods (OECD, 2005). Other examples of instruments for particular service sectors 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 to benefit from the contributions each domain can make to the overall functioning of the innovation system. The type of measures one can think of includes those that see service innovation in relation to other sectors. By regarding ‘service innovation’ as a non-sector-specific concept, the cross-sectoral 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 industry-focused demarcation approach as well as in the integrative synthesis approach (Den Hertog et al., 2010). Indeed, service innovation role-models and courses on service innovation might be thought of as demarcative when exclusively focused on service sectors. However, when designed to inform also other industries about how to engage in service innovation, this type of measures fit 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 much integrative as the programs in which opportunities of goods and services are unified. In our perspective, the ‘outward-looking’ measures for role-models, KIBS and creative industries are neither demarcation nor synthesis, but fit in a pre-synthesis approach in which the focus lies 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.

From a systemic perspective, policies corresponding with this approach focus at system functions where services can contribute the most: of key importance are the ideas of complementarities (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, 2010; Toivonen, 2007). 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. Apart from acting as cross-fertilizers, service businesses can also play an important role in generating new business models in other sectors. Notably creative industries and marketing agencies are known for their ability to provide input that might help client firms to turn inventions into successfully commercialized innovations (Mangematin et al., 2014).

Systemic policy according to a synthesis approach

Systemic policy mixes based on the synthesis approach contain interventions where support for technological and service innovation is entirely integrated in individual instruments or programs. Because we categorize policy focused at cross-sectoral linkages under pre-synthesis, involving mostly generic measures, our understanding of this approach is narrower than the one previously introduced (Den Hertog et al., 2010). Pure synthesis, in the extended classification of service innovation approaches, refers to measures that are specific for certain policy themes. Essential is that these themes do not correspond to an a priori distinction between goods and services (even if the policy eventually turns out to bring forward innovations belonging to only one of the domains).

Policy interventions that see services innovation and technological innovation in relation to a specific topic can be found for practically every function of the innovation system. A strong example is found in cluster policy. According to Porter (1998), clusters are “geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (universities, standards agencies, and trade associations) in particular fields that compete but also cooperate” (Hsieh et al., 2012). Due to agglomeration and network effects along the value chain, these fields are typically broader than a single manufacturing or service sector; more common is that the cluster is concentrated on a specific technology (e.g. biotechnology) or a domain like health, sustainability, or energy. It is increasingly understood that successful innovations in these domains depend on technology just as much as on services, and especially on how they are aligned to each other. Cluster policy typically supports the interaction of the different actors that are present. Thereby, it can affect system functions like knowledge development and transfer (e.g. when affecting universities) and collaboration and networking. Often, clusters or campus management organizations also provide facilities for start-ups, like advisory services and incubation funds. These policies concern system functions like entrepreneurial activities and financing innovation and growth.

Another example of specific policy in which services-sensitivity can be fully embedded is public procurement of innovation. Addressing system functions like business model generation and access to finance, 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 & Edquist, 2013). Like most demand-side policy instruments, participation in schemes for public procurement for innovation 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’.

4. A comparative case study

Having outlined the different approaches for achieving systemic policy mixes, based on an analytical account of the opportunities of service innovation, we now provide two empirical illustrations at the level of regional innovation systems². The objective of this section is to demonstrate how the service-inclusiveness of policy mixes can be assessed by classifying present policy instruments according to the four approaches. We also show how our analytical structure can be used for identifying where extra support might be needed. Comparing policy mixes across regions might provide fruitful inspiration in this respect.

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. Both case studies are part of the activities by the European Service Innovation Centre, an initiative of the European Commission, and have thus been performed with the same methodology. The practices used for information sourcing follow most of the suggestions done by Borrás & Edquist (2013). First, information about the economic-performance and policy mix of the region was retrieved through extensive desk research. Part of this phase was a benchmark exercise in which indicators from the European Service Innovation Scoreboard were used to compare our regions to similar and best-performing regions. During site visits in 2013, one-hour interviews have been 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 sharing an assessment report with the regional stakeholders, policy workshops have been organized early 2014 to verify our 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.

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 complemented by the sectoral and cross-sectoral variants of specific innovation policy (demarcation and pre-synthesis), and we conclude with the thematic policies (matching with the synthesis approach). For each approach, we analyze the system functions that are addressed by a particular measure. Given the variety of classifications that are available, we chose for a set of five functions that is largely based on the work by Wieckzorek & Hekkert (2012) and Bergek et al. (2008). The functions we use for the illustration of our approaches are: Entrepreneurial activities (E), Knowledge generation (K), Innovation and business model generation (I), Finance for innovation (F), and Collaboration and Networking (C). For the sake of clarity, our analysis here does not take into account the innovation policies present at the national or supranational level.

4.1. The case of Upper Austria

Regional background and policy goals

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

Policy makers at Upper Austria's innovation agency are concerned with two policy goals. First, their objective is to sustain the economic performance of the region. A major problems here is the regions' weakness to explore 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, willingness to explore new business model is

² Note that the approaches for formulating systemic policy mixes are equally applicable at other levels, e.g. NIS (national).

found to be modest. A related problem concerns the labour market. Because many students leave the region, there is an increasing shortage of skilled personnel that can continue or transform businesses.

A second objective of Upper Austria is to shape its new 'strategic program for economy and research' according to the grand challenges set by the European Commission. This 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 exception of the first action field, none of these themes has a strong orientation towards either goods or services innovation.

Regional policy mix

The number and diversity of policies at the regional level is rather high in Upper Austria (Table 1). A first observation is that the policy mix in Upper Austria contains many measures fitting the assimilation approach. By jointly addressing all functions, to some extent, this part of the policy mix is rather systemic. Only the function of innovation and business model generation is weakly supported, given the fact that the policy measure 'innovation award' is modest in terms of budgets. Half of the assimilation measures are inherently neutral, mostly focused on entrepreneurship. The other half consists of 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 lays at the heart of Upper Austrian innovation policy. Like in the case of assimilation policies, every system function is addressed by at least one technology-oriented intervention. The few demarcation measures that are present have significantly lower budgets and concern very specific sectors. Two initiatives involve funding for a service sector, in addition to the funding measures that only concern (energy) technology. The logistics network is originally a sectoral initiative for transport businesses, but is currently aiming to develop in an instrument with a broader perspective on logistics.

At the moment of writing, Upper Austria's ambition 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, her reason for being interested in collaboration with the European Service Innovation Centre is exactly the wish to understand better how measures of this kind can be implemented.

Synthesis, finally, contains one measure of major importance for the region. Upper Austria renowned Clusterland initiative is traditionally focused on different manufacturing sectors (e.g. automotive, mechatronics). In the past years, however, the program was extended with Clusterland Networks devoted to topics like human resources and resource- and energy efficiency. As the focal domains indicate, these networks stretch over any distinction between goods and services. Only the logistics network might be associated with a particular service sector, but the ambitions and members of this network clearly indicate that its activities pertain to the development of integrated solutions.

Service innovation approach	Examples	System function*				
		E	K	I	F	C
1. Assimilation Neutral measures that cover technological and service innovation on an equal basis	Innovation assistants		x			x
	Research promotion				x	
	Loan guarantees				x	
	Investment capital				x	
	Innovation award			x		
	Education account for young entrepreneurs	x				
	Economic stimulus program	x				
Founder Funds	x					
Goods-focused	Research and technology council		x			
	Innovation Network					x
	High Tech Incubator	x		x		
	Energy Technology Programme				x	
	Green Energy & Environ. Technology				x	
Technology Centres			x			
2. Demarcation Sectoral (vertical) programmes for services	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. Synthesis Thematic programs integrating opportunities from goods and services	Clusterland (networks)	x	x	x		x

Table 1: Policy mix of Upper Austria .

* Entrepreneurial activities (E), Knowledge generation (K), Innovation and business model generation (I), Finance for innovation (F), and Collaboration and Networking (C). Based on Wieczorek & Hekkert (2012).

4.2. The case of Limburg

Regional background and policy goals

Just like Upper Austria, Limburg's economy is traditionally oriented at manufacturing. Especially after closing its mines in the 1970's, 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 the policy mix of Limburg, there is one service-oriented initiative belonging to the demarcation approach. The Smart Services Hub is 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 ambition is to become an expertise-center that contributes to the renewal of businesses models in other sectors, which would make it move to a pre-synthesis approach. An alternative trajectory is that it develops into a hub specifically for creating and commercializing

smart services, which concerns combinations of modern technology (e.g. data servers, cloud computing) and clever applications of the functionality enabled by such technologies.

Currently, already several instruments do follow 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 have the objective of business model generation. Initiatives like the Service Science Factory and the Business Services School aim to bring service thinking to non-service sectors as well as to service firms not knowing what innovation might mean to them: their power lies in the experience with introducing service innovation in a wide variety of firms and having strong links with universities. Whereas 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 meet the synthesis approach. The chemicals/materials campus is grouped 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 management³. A thematic focus is also clearly present in the agro-food and health campus. Neither of them is exclusively focused on products or services: the goal is to come up with integral solutions where technology and services reinforce each other.

Service innovation approach	Examples	System function*				
		E	K	I	F	C
1. Assimilation Neutral measures that cover technological and service innovation on an equal basis	Innovation vouchers Startersfonds Participatiefonds SILVER		x			
Goods-focused	Hoogstarters TechStart Top Technology Clusters Limburg Ventures Chemicals / Materials Campus	x			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 (servitization part) Service Science Factory Service Business Acceleration Program Business Services School	x		x		
			x	x		
		x			x	
			x	x		
4. Synthesis Thematic programs integrating opportunities from goods and services	Document Services Valley Health Campus Agro-Food Campus	x		x	x	x
		x	x			x
						x

Table 2: Policy mix of Limburg

* Entrepreneurial activities (E), Knowledge generation (K), Innovation and business model generation (I), Finance for innovation (F), and Collaboration and Networking (C). Based on Wieczorek & Hekkert (2012).

³ 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 actually might be on its way moving from synthesis to pre-synthesis.

4.3. Comparison and opportunities for mutual policy learning

Despite starting from a similar economic situation and ambition, the policy mixes in the examined regions are highly different. The most prominent observation is that Limburg is further on its way towards service-inclusive policy mix. A more detailed comparison points at several learning opportunities for both regions.

Remarkable about the Upper Austrian 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 and their support for system functions would allow for the combination of a few measures. Our overview demonstrates how especially technological and goods-based innovation are heavily supported. Taking into account both goods-focused and generic (assimilation) policies, each system function is addressed at least twice. At the same time, the extensive policy mix of Upper Austria also provides suggestions for how to make the assimilation (and goods-focused) policies in Limburg more systemic. For instance, an instrument like innovation awards would be a promising candidate for strengthening support for innovation and business model generation in Limburg. In fact, the policy workshop did reveal great interest in using such an instrument 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 have the ambition to increase the importance of a certain type of services (logistics and smart services, respectively) by strengthening the link with other sectors. How this link can be created might be something where the regions can fruitfully share experiences.

Whereas pre-synthesis is missing in Upper Austria, this approach is strongly adhered to in Limburg's strategy to develop service-innovation policy. In fact, the various initiatives that have been deployed there provide highly useful examples of means for persuading manufacturing firms to orientate themselves more to services. Such an instruments for 'infusing' other sectors with service-thinking directly addresses the Upper Austrian goal of modernizing its economy. A local variant of a service innovation laboratory has the potential to support manufacturing firms with making a shift towards service-based business models. By embedding it in the university, like several initiatives in Limburg have done, opportunities arise for developing courses that meet the increasing demand for young engineers with an ability to continue business success in novel ways.

In addition to historically grown clusters, Limburg is also actively supporting the creation of new clusters and campuses. So far, these are less systemic in their scope than the Cluster Network of Upper Austria. Moreover, the different clusters in Upper Austria are occasionally brought together by the central agency that is 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 potential for policy learning in the other direction. Developing solutions in the domain of health (and ageing) is one of the ways how Upper Austria tries to contribute to societal challenges. This is ambition is currently being translated into policy formulation, whereas Limburg has its health campus already running for a number of years.

5. Discussion

5.1. From analytical structure to policy implications

In the previous sections we developed an analytical structure for understanding how service innovation can be made part of systemic innovation policy, as well as for assessing the service-inclusiveness of policy mixes. Apart from serving analytical purposes, the four approaches laying at the heart of our holistic view can also be of guidance in the practice of policy formulation.

First, policy makers should consider carefully what goals they ultimately try to achieve (Borrás & Edquist, 2013). Whether this concerns economic progress or innovation in a particular (socially desirable) domain, essential is that the policy mix supports the creation, diffusion and application of relevant knowledge. According to the functional perspective, this requires the government to develop policy that strengthens a set of functions that should be performed in an innovation system. Instead of trying to develop policy measures that are entirely systemic by themselves (Smits & Kuhlmann, 2004), policy makers can also consider distinct measures that address a complementary set of system functions (Wieckzorek & Hekkert, 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 on this account 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 a certain point of view brings to the fore, in turn, correspond with a distinct set of policy implications. We extended the traditional classification of service innovation approaches with the category of 'pre-synthesis'. Due to its focus on similarities between instances of service innovation, we regard this newly defined approach as an important step in the ambition to move from studying specific service sectors to developing integrated innovation theory. Applying the extended range of approaches to policy formulation illustrates how the existing and newly introduced lines of thought differ from each other.

The last step, finally, is to assess which interventions would be an appropriate addition 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 the domain of services), other approaches correspond to measures that address complementarities between the two domains.

Important to note is that we do not urge for adopting all approaches. Rather, we show how systemic policy can be shaped according to each of the conceptions of the nature and potential of service innovation. In this respect our paper departs from earlier work, in which it was stated 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 a purely 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 meets the fact that policy makers are restricted in their possibilities for transforming policy measures: what type of systemic policy can be realized depends on currently existing policy as well as the policy goals that are ultimately pursued. The four alternative approaches cannot be seen entirely independent from each other, as specific innovation policy is often implemented as a complement to generic measures. Our aim is to support policy makers in ensuring that also these specific accents address all system functions. By creating an overview with respect to the functions addressed by each of the service innovation approaches, policy makers obtain a basis for deciding how essential it is to facilitate support for a system function in the context of a specific domain (in addition to the generic measures already present).

Drawing on a comparative case study, we illustrated 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 of the examined regions have introduced policy measures that, from a functional perspective, would complement the other region's policy mix.

5.2. Possibilities for further research

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

One 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 new framework program by the European Commission, but the potential of a well-considered service-orientation remains often unaddressed. A possible response in this respect is to explore the potential of supporting demarcation-like service clusters (Hsieh et al., 2012). A (pre-)synthesis-view, however, would emphasize especially 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 of the clusters have traditionally been focusing on manufacturing, like the chemicals/materials cluster in Limburg and the Clusterland clusters in Upper Austria. In both cases, these clusters are approached with initiatives in which cluster members jointly explore what service innovation can mean to them (conform a pre-synthesis line of thinking). Alternatively, the synthesis-like Health Campus in Limburg and the Clusterland Networks in Upper Austria consider services as an intrinsic part of the economic activity they are supporting: 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 amongst (European) policy makers: smart specialization (Foray et al., 2009). This term is applied to policy agenda’s 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 on national or regional priorities and challenges, the exploitation and further development of local strengths, and the support for diverse forms of innovation. To a large extent, this corresponds with the principles of a synthesis approach to policy formulation: the relevant policy instruments identified in our cases concern technology and service-inclusive programs focused at particular strongholds. How to use service innovation policy for reinforcing existing domains of (regional) specialization seems to be a promising avenue for extension of 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 on 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., 2013). Since knowledge about service innovation is relevant throughout different specializations, policy makers could consider using this theme for linking previously unrelated sectors. Essentially, some of the encountered pre-synthesis instruments already aim to position service innovation as the glue between regional strongholds.

6. Conclusion

As a nuance to our propositions and suggestions for further research, we conclude by stressing that this paper takes an analytic and thus neutral standpoint with respect to which approach to service innovation is to be preferred. 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) do correspond with policy focused on service sectors or service innovation as such, the other two approaches are associated with a predominantly embedded role for services. Our main message is that, in principle, any of the approaches lend itself for a systemic policy mix. Both an implicit and an explicit focus can be appropriate: what matters is that at least the best way to include services in policy mixes is deliberately considered rather than being neglected. The approaches we introduced are designed to support this type of thinking.

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Figures

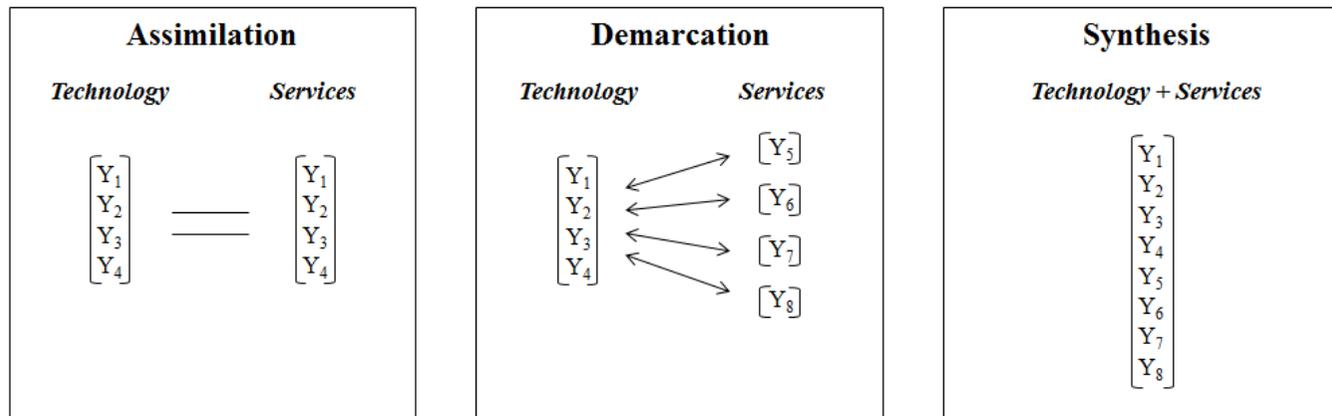


Figure 1: Three ways to think on the relation between technological innovation and service innovation. Inspired by characteristics-based approach (Gallouj & Weinstein, 1997)

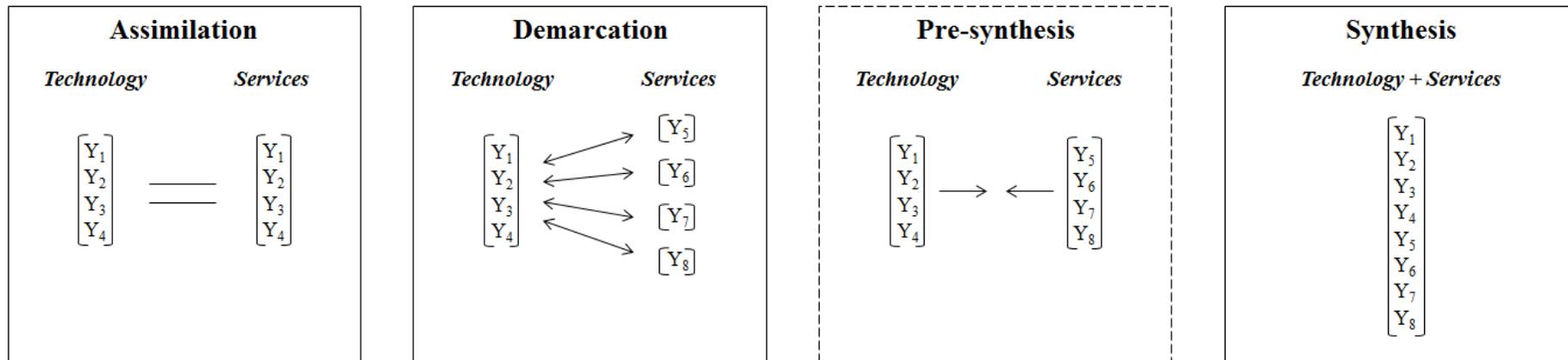


Figure 2: An extended classification of views on the nature of service innovation

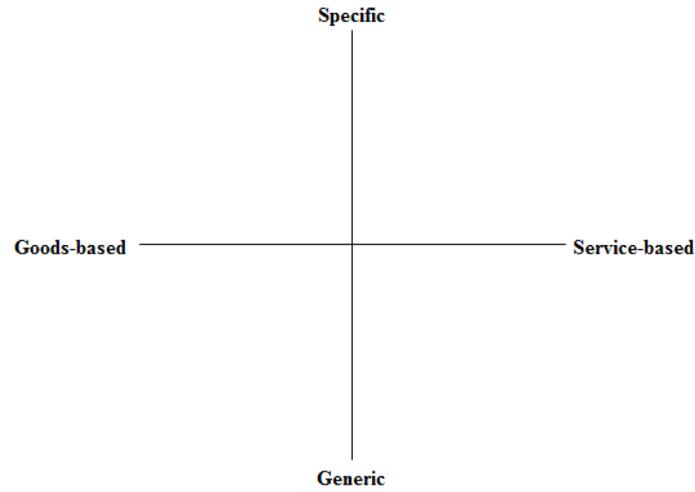


Figure 3: Framework for plotting the sectoral orientation of innovation policy measures.

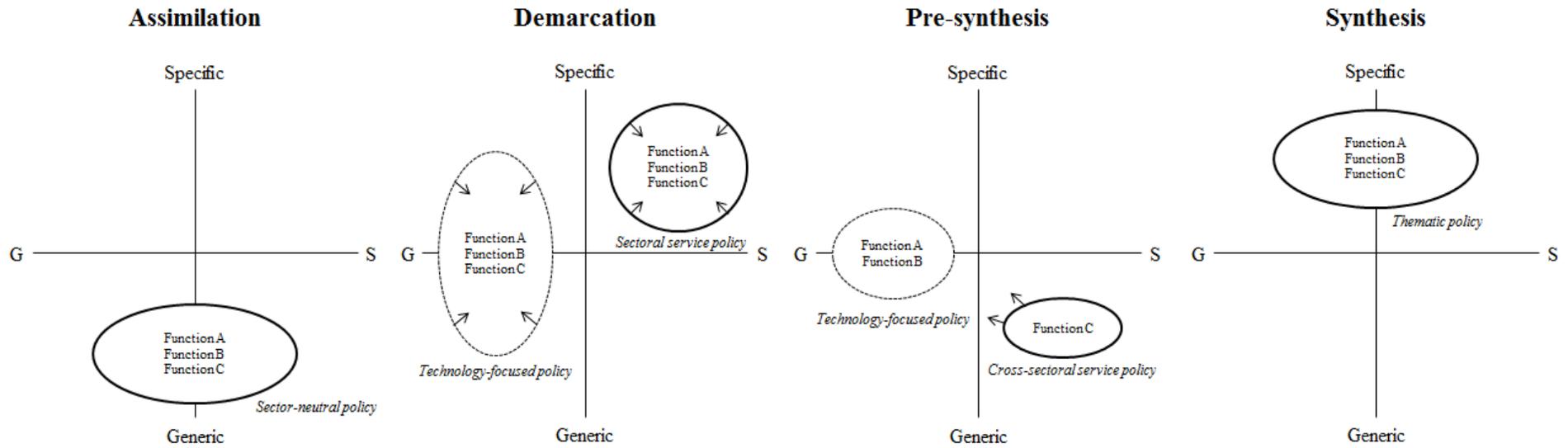


Figure 4: Translation of service innovation viewpoints to four systemic approaches.