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Demand-oriented innovation policy: Mapping the field and proposing a research agenda for developing countries

Abstract

This article conducts a scoping review of demand side innovation policies and its associated instruments in relevant English language academic literature. Demand-side innovation policies aim to improve contextual conditions to encourage innovation adoption to address government-defined societal challenges. From the demand approach, innovation policy is expected to involve a directionality, which originates from collective priorities around relevant problems. Based on a scooping review of the innovation policy literature from the demand perspective, this research has characterized trends in the discussion about innovation policies that target such challenges, a perspective that complements the traditional supply side policy instruments. Findings indicate that literature on demand-side policies has mainly addressed energy and sustainability issues in European countries and China. Additionally, although demand-side policies have been advocated for a relatively long time, the literature recognizes that a policy mix involving also the supply-side can be more effective in encouraging innovation. In Latin America, demand-side policies have been poorly understood, leading to a defective implementation of policies and instruments. The stage of research on demand-side policies is still evolving and this article advances research propositions on innovation policy, with a deep focus on how they can be implemented in innovation-lagging developing countries.

Keywords: Innovation policy; Innovation; Supply-side, Developing countries; Problem-solving policy.

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1. Introduction

Government institutions in charge of the development of science, technology and innovation have implemented policies and incentives to support academic organizations, companies and start-ups in their technology development and innovation. Typically, these policies originate from an approach that aims to encourage the advancement of innovation through capacity building (Cimoli 2013, 144; Lundvall et al. 2011, 144), which may have resulted, in some cases, in the development of new products and services, usually technology-based, that are eventually commercialized in the market. However, little progress has been made in the study of those policies that lead these organizations to scalable results from a systemic perspective, beyond the behaviour of the individual or the conditions that foster innovation (Acs and Correa 2015, 5). Hence, it is essential to place greater emphasis on the role of demand as a systemic element that encourages scientific and technological innovation, whose potential economies of scale have been identified as the key element associated with high-impact entrepreneurship (Acs 2008, 63; Acs 2010, 13).

There is a variety of factors that encourage or discourage innovation (Anisimov 2015), and innovation policy aims to identify the right combination of such variables that help the innovation process to develop, particularly those innovations that are relevant to society and governments (Edler and Fagerberg 2017, 4). Innovation policy instruments are the public measures used by the State to achieve a desired effect (Zhi et al. 2014, 309), whose application is context-dependent (Edler and Fagerberg 2017, 4). Innovation policy makes sense in the case of market failure, innovation system failure, or to achieve a specific societal mission (Bugge et al. 2018, 470). According to Bugge et al. (2018, 478), innovation policy making is today widely inclusive towards solving societal challenges.

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In general, innovation policy has been classified in two groups: supply-side (SS) and demand-side (DS). SS policies seek to build capabilities in economic agents to innovate and commercialize (Edler et al. 2012, 35). This objective ought to be achieved through: 1) investment subsidies; 2) grants and fiscal incentives for R&D; 3) direct support to private innovation and start-up firms (e.g. training, consulting services, clusters, innovation networks and co-working spaces); 4) regulation to foster more innovation (e.g. intellectual property rights); and 5) financial support for new born or small and medium-side enterprises (Langer 2001, 399; Edler et al. 2012, 35; Jang et al. 2015, 12603; Edler and Fagerberg 2017, 11; Hanley and Douglass 2014, 222).

Conversely, DS policies improve conditions for the uptake of innovations (Edler et al. 2012, 34). Their main goal is to encourage the use of the innovation (Zhi et al. 2014, 318) by developing and creating new markets (Langer 2001, 395). This objective is achieved through 1) consumer subsidies; 2) the influence of the State in its role as a purchaser (public procurement); 3) training and creating awareness mechanisms to build up and broaden absorptive capacity for innovation; 4) policies to mitigate deficiencies in the flow of information between buyers and suppliers; 5) feed-in-tariffs, net metering, green tags, renewable energy portfolios; 6) financial support for users; and 7) Government mandates and regulatory framework to structure the market in favour of innovations (Edler et al. 2012, 38). In general, network effects, aggregate demand, technological developments, changes in market structure, regulations, large buyers and pre-commercial public policies are some of the mechanisms identified as DS policies (Edquist 2011, 1734; Henrekson and Stenkula 2010, 603; Priem et al. 2002, 349).

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This study examines recent scholarly literature on innovation policy and classifies the empirical experience of DS and SS-oriented instruments by geography, sector and tactical combinations of such instruments, delivering a broad synopsis of innovation policy research. To achieve this objective, this paper conducts a research team-based scooping review of literature on innovation policy instruments, capturing trends and research perspectives on innovation policies from both the SS and DS perspectives.

The article is structured as follows: Section 2 details the steps taken to carry out the scooping review of literature. In Section 3, a thematic analysis of existing literature is presented, which focuses on the identification of regional, sectoral and tactical approaches present in the scholarly literature. A discussion of findings along with research proposals is developed in Section 4. The article closes with implications for policy makers and researchers in Section 5.

2. Method

To include the broad body of theoretical and empirical studies and to map the main concepts underlying innovation policy, this article opted to conduct a scoping review of literature. A scoping study was deemed suitable since it investigates the extent, depth, and different types of existing studies, summarize them, and identify research gaps (Arksey and O'Malley 2005, 21). Instead of handling the narrower research questions and quantitative nature of systematic reviews of literature, scoping reviews can handle a broad range of study designs in disciplines with emerging evidence that makes difficult to conduct a systematic review (Levac et al. 2010, 3). Since scoping reviews were originally devised to serve the purposes of medical and health needs, this study adapted the methodology according to the outline of Arksey and O'Malley (2005, 4) and informed by the refinements by Levac et al. (2010, 4) and Peters et al.

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(2015). The steps involved in the methodological framework include 1) identifying the research questions, 2) searching for studies, and 3) selecting relevant studies.

2.1. Identifying the research questions

Consistent with the context provided above, this paper departs from the assumption that informing policy makers on the effects of demand-oriented instruments is critical to understand how development and commercialization of innovations can be fostered. However, theoretical reviews on demand-oriented policies are limited to summarizing existing literature instead of conducting thorough reviews and identifying research gaps worth to investigate in future studies. To address this issue, this study aims at identifying an overarching framework showing the preferred research targets in the literature, particularly for demand-oriented instruments. This is important to uncover the missing attributes needed to frame effective innovation policies in view of the critical societal challenges. In this sense, the research questions guiding the scoping review are the following:

1. What is the sectoral focus of DS innovation policy?
2. What lessons can be learned from a country comparison?
3. What combinations of policy instruments have been analysed in the scholarly literature?

2.2 Searching for relevant studies

To identify relevant studies, the scoping team agreed upon time span, language, sources of literature, and search terms. The time span runs from 2000 to 2018. This period was chosen after preliminary readings helped identify the seminal studies on demand-oriented studies. Although previous studies exist, they lack the innovation focus that guides the review. Language of choice was English to assure replicability of the review as well as future

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extension by other researchers. Search was conducted in electronic databases, including Scopus and Web of Knowledge since they contain more high-quality journals than other databases and listings. The search terms were firstly defined to reflect the broad aspects of the demand-oriented perspective, innovation, and policy, and were refined after the scoping team gained a sense on the scope of the review. The search term 'demand-' was particularly challenging since initial searches resulted in extensive searches the broad discipline of economics beyond the focus on innovation policies. The database search string that was developed to guide this search is outlined in Table 1. Subsequently, the search terms were refined along with other inclusion criteria, outlined in Table 2.

Table 1. Database search string

Topic	String search
Demand	("demand side" OR "demand oriented" OR "demand-side" OR "demand-oriented")
	AND
Innovation	(innovat* OR "R&D" OR "research and development" OR invent* OR "product development" OR "new product development" OR NPD OR "value proposition" OR "process innovation" OR "product innovation" OR "service innovation" OR "organi?* innovation")
	AND
Policy	(policy OR policies OR "policy making" OR policymaking OR instrument* OR initiative* OR intervention* OR tool*)
	AND
Societal challenges	(challenge* OR objective* OR mission OR mandate OR "societal challenge*" OR needs OR wants OR goal* OR development OR problem* OR prior*)

Source: Authors' own elaboration.

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Table 2. Inclusion and exclusion criteria for search refinement

Criterion	Inclusion	Exclusion	Justification
Type of study	Conceptual and empirical (qualitative/quantitative) studies. Peer reviewed. Research papers, conference papers, and book chapters. Relevant reports from international agencies.	Working papers, magazines and lower-tier journals.	Maintain a high quality of research debate.
Language	English	Other than English	Easier to gather information and communicate results
Time frame	2000 to 2018	Previous to 2000	Seminal papers were published from 2007 onwards.
Field	Government, industry, academia, social and triple helix perspectives.		
Relevance	Focus on demand-oriented policies and its instruments. Level of analysis. Firm, industry and market but also Government (all levels), NGO's, and social organizations. The term innovation consistent with the development, launch, and diffusion, and acceptance of new products, services, processes. Relationships among stakeholders.	Specific types of demand as electricity-related grid demand.	Focus on the research question.

Source: Authors' own elaboration.

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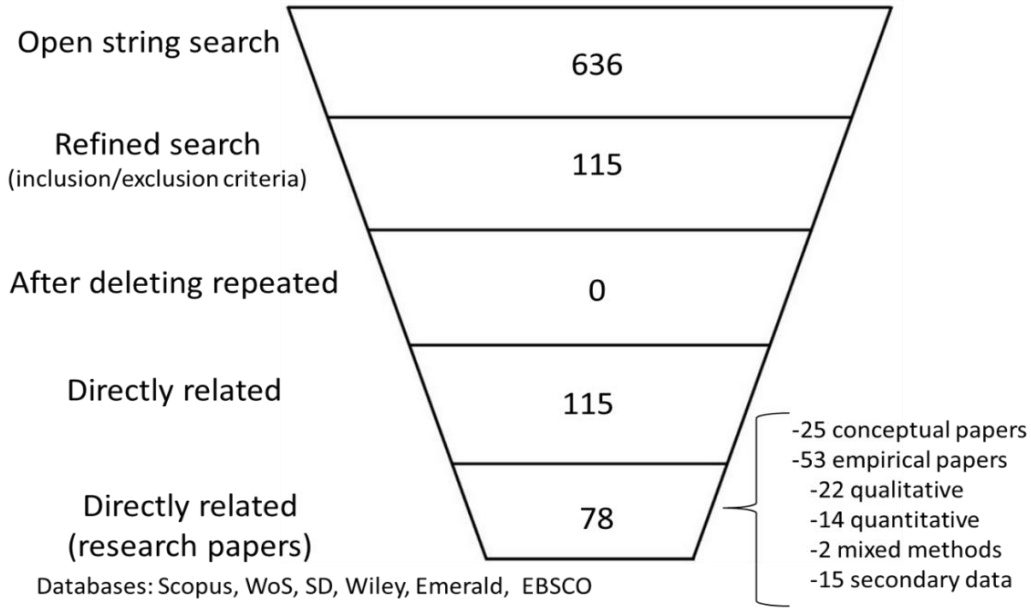
2.3 Selecting relevant studies

According to the inclusion criteria discussed, the search resulted in 636 articles. Articles were screened by two members of the scoping team. After assessing title, abstracts, and key words, 78 articles were kept since article domain was in the scope of the review –innovation policy (see Appendix 1). Disagreements in the assessment were settled by the third member of the scoping team. Grey literature from preliminary searches was included to the final search number. Figure 1 illustrates the process of article selection.

Figure 1. Flow diagram for article selection. Source: Authors' own elaboration



Source: Authors' own elaboration

3. Thematic analysis of the literature

This section analyses the main characteristics of the data. To chart the resulting number of articles, the scoping team assessed descriptive attributes of the articles by country, industrial sector, research objectives, and type of article (theoretical / empirical). A rubric was used to

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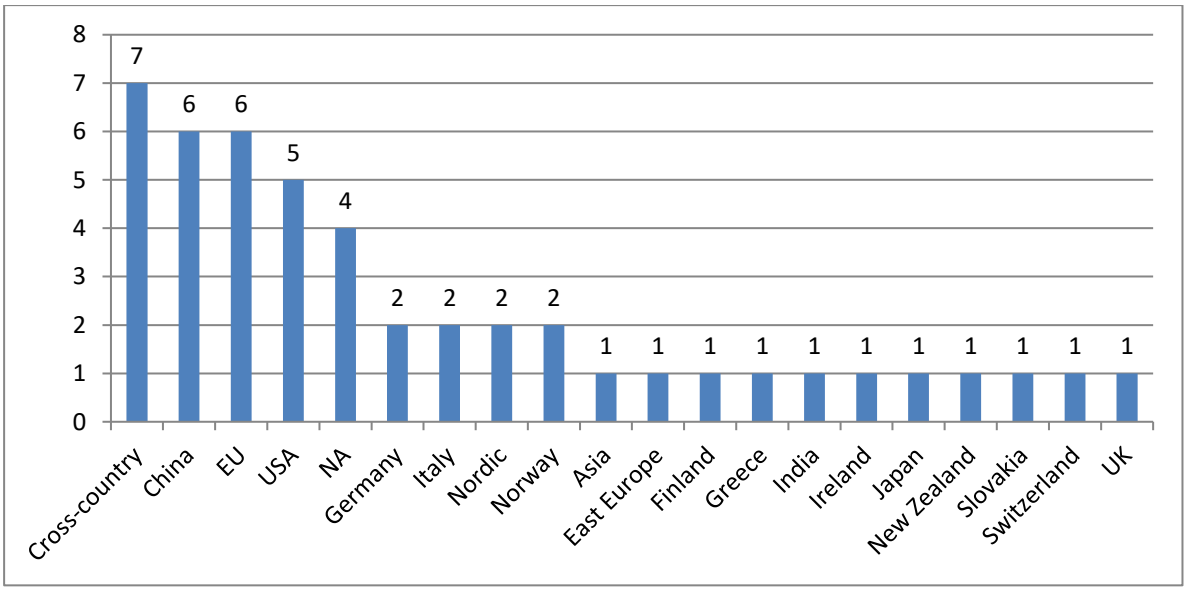
assess the core attributes of the articles, as robustness of theory, methodology, generalizability of results, and implications for practice.

From the 78 articles in the final review, 30 are conceptual papers that propose different models and frameworks to assess a number of policy and instruments. From the remaining 53 empirical papers, 22 refer to qualitative studies while only 14 papers include quantitative methodologies. Mixed methods are conducted in two papers. Qualitative research involves case studies mainly. A thematic classification of the papers by industry show that 10 paper addresses energy issues, five paper analyzes environmental technologies, five papers analyzes innovations in the pharmaceutical sector, three papers analyzes innovations related to electric automobiles, and three3 papers refers to IT innovations. Urban issues are addressed in five papers and government policies are analyzed in by eight papers. The remaining 14 papers analyze issues in R&D as well as macroeconomic issues related to such policies. Fig. 2 and 3 illustrates number of articles by country and by industry respectively.

Figure 2. Number of papers by country/ region



Source: Authors' own elaboration.

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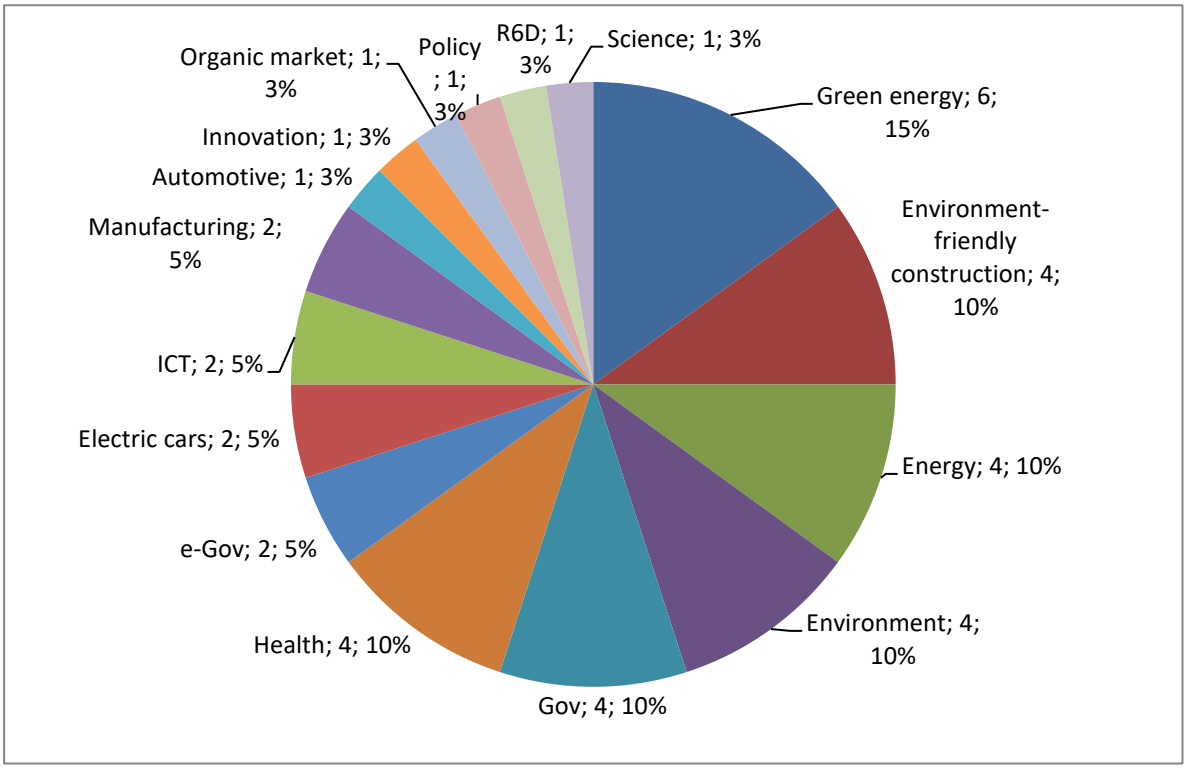
In particular, Fig. 2 shed light on the countries as unit of analysis for DS studies; cross-country comparisons, along with China, European Union, and United States ranks the first places (NA: Country data not available). This is consistent with early calls to develop alternate approaches to innovation policies which were firstly made in the European Union.

As shown in Figure 1, though cross-country studies represent the majority of research, the innovation policy literature has targeted China, the European Union (EU) and the United States (USA) as main innovation policy cases. However, if individual European countries are added to EU cases, the number of innovation policy research papers totals around 17, outnumbering any other region in the world. This is a clear indicator of the European dominion of the innovation policy literature.

Figure 3. Articles by industry



Source: Authors' own elaboration.

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From a sectoral perspective, Fig. 3 shows that most of existing research on DS policies refers to energy and sustainability issues. Most articles analyse innovation policies related to sustainability issues, namely, energy, environment-friendly construction, environmental solutions and clean-tech. Health and other government-related activities follow. This is in line with seminal papers which call or new policy approaches mainly to solve societal problems and also to fulfil mission-oriented innovative products.

4. Findings

In this section, we discuss key findings from the literature, which are exemplified from a regional, sectoral and tactical perspective; the latter referring to how different types of innovation policy instrument are combined to deliver outcomes that are more effective.

4.1. The sectoral focus of demand-side innovation policy

DS policies are expected to encourage immature markets (Jiang et al. 2018, 9). In our scoping review the effectiveness of DS instruments identified by authors were clearly related with certain economic sectors, but at the same time presented incomplete or adverse effects. For instance, in the generic pharmaceutical market, the effect of aggressive DS policies such as mandatory generic substitution, increased demand for generics, although at the same time it had adverse effects on competition, in that the lowest priced option captured the majority of sales, reducing the number of competitors (Kanavos 2014, 230).

In the transportation sector, DS policies such as regulatory frameworks or mandates have prompted public and private investment in low carbon vehicle technologies, —these policies have been a key determinant of Toyota's investment in hybrid electric vehicles (Whitmarsh and Köhler 2010, 437). Kesidou and Demirel (2012, 867) found similar effects in the eco-

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innovation sector. Regarding green product innovation, the literature indicates that SS subsidies and voluntary agreements have positive effects, while taxes and regulations have negative effects on product innovation (Stucki et al. 2018, 251). Nevertheless, government regulation, although crucial for stimulating investment in innovations, is still insufficient and does not necessarily lead to the adoption of innovation (Kesidou and Demirel 2012, 866). Similar to the DS policies, SS instruments have shown little effectiveness in the adoption of innovation by customers, particularly in the transport sector (Whitmarsh and Köhler 2010, 434).

Another DS instrument, the Public Procurement of Innovations (PPI) adopted a number of definitions according to local contexts, for example, Public end Users Driven Technological Innovation - PDTI (Puig-Pey et al. 2017, 167) and Green Public Procurement of Innovations or GPPI (Peñate-Valentín et al. 2018, 408). Regardless of the specific definition, the majority of case studies converge in that PPI influence the development and diffusion of innovations. Exemplary cases include the CERN research center (Landoni 2017, 587) in which the industry - R&D center interface has incentivized some innovations. Pickernell et al. (2011, 650) argue that PPI has a role on local and regional economic development by engaging small and medium enterprises at varying levels of territorial government scales. At the city level, evidence shows the benefits from implementing DS policies in terms of market creation and urban competitiveness (Lember et al. 2011, 1385). A similar case is offered by European cities that shared a list of urban needs in relation with urban robotic technologies whose development was successfully fulfilled through PPI (Puig-Pey et al. 2017, 169). An interesting case is the role of catalogues of technology-based products as an indicator of what products need to be developed and commercialized in China (Li and Georghiou 2016, 10).

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The previous discussion of literature shows that industries unrelated to energy and sustainability may also benefit from implementing DS innovation policies with a number of instruments to assess the extent to which innovation is enhanced. Hence, we propose the following research proposition:

> *RP1: The implementation of DS instruments in high impact industries (e.g. software, aerospace, or genomics) enhances innovation and technology-intensive outputs, and the outcome is heterogeneous across industries.*

4.2. Country comparison

In the scoping review, we observe differences in the implementation of innovation policies across countries. It seems that, as Jang et al. (2015, 12593) assert, the choice of instruments to support innovation is related to a country's level of development. For instance, the innovation policies in United States, Germany, Japan, Denmark, China, Singapore and the Republic of Korea include both push technology (SS) and pull market (DS) instruments in balance (Zhi 2014, 314 ; Buen 2006, 3888; Jang et al 2015, 12594). Germany and Japan place less emphasis on the SS compared with United States and China; this later country stands out for being a quick learner that follows international policy experience (Zhi 2014, 314). A limited extent of innovation, especially in the wind technology has been reported in Norway, which has a short-term focus on the policy instruments and lacks DS measures, despite being a developed country (Buen 2006, 3896).

From the scoping review, it is clear that studies focus on developed and industrialized countries, clearly noticeable by the fact that data from developing countries is not always available and is less reliable (Wesseling 2016, 4). Nevertheless, some scholars such as Jang et al. (2015, 12591) have analyzed innovation policies in 17 Asian countries, including developing economies such as Thailand, Indonesia, Malaysia, and the Philippines. They

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observed that most of these countries just follow the trend of innovation policies implemented by developed nations. Other less advanced countries such Myanmar, Lao PDR, Brunei Darussalam, and Cambodia lack SS and DS policy instruments, and just rely on technology transfers to foster innovation (Jang et al. 2015, 12608).

Latin American countries have had limited success in innovation policies by only "cutting and pasting" those policies implemented in OECD countries without any consideration the local context (Arocena and Sutz 2010, 573). In this sense, Arocena and Sutz (2010, 574) indicates that SS instruments, e.g. tax reductions and funds for innovations, have been more frequently adopted than DS instruments like public procurement, which has been hardly adopted in the region.

Clearly, innovation policies implemented in advanced countries have paved the way (Kuhlmann and Rip 2018, 448-450), and there is need to develop research avenues that aim to understand the potential of DS instruments in the contexts of emerging countries. While DS policies have been enacted in developed, economically stable but low-growth countries, little is known of the effects of such policy approaches in developing countries, which exhibit a different setting in socio-economic-political dimensions. Therefore, we propose:

> *RP2: Adapting DS policies and their associated instruments to the Latin American setting would complement the standard SS instruments already in place in such a way that local and multinational companies would increase innovation and technology-intensive output.*

4.3. Combinations of policy instruments

SS innovation policies tend to focus on firm-level capabilities and economic outcomes, nevertheless, some authors claim that their effectiveness and distributional consequences are still unclear (Hanley and Douglass 2014, 228). Subsidies have also gained scholarly

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disapproval as they support R&D activity but not successful enterprising (Jiang et al. 2018, 9). Additionally, subsidies can generate distortions in business health perception, including the reliance disease and wrong financial reporting (Jiang et al. 2018, 9).

According to the literature, the effectiveness of SS and DS policies alone has been repeatedly questioned. For instance, in the study developed by Karmarkar-Deshmukh and Carl (2009, 18) about ethanol, government subsidies and federal tax credits showed to be effective to encourage the production; nevertheless, this increase in production has led to a decrease in patents. In this sector, government research grants and awards have proved to be more effective to increase patents (Karmarkar-Deshmukh and Carl 2009, 36-38).

These heterogeneous results on the effectiveness of SS can be explained because of the emphasis on product or process innovation - more positive effects are observed on process innovation than on product innovation - (Stucki et al. 2018, 255). The characteristics of the innovation players can help also to explain this variation, since negative policy effects were observed for "typical innovators" (those who develop products that are new to the firm), but not for "technological leaders" (those who create innovations that are new to the market) (Stucki et al. 2018, 255). Hence, an appropriate combination of SS and DS policies appear to be more effective, according to the literature.

On the other hand, implementing demand-oriented instruments requires clear innovation policy transition strategies (Alkemade et al. 2011, 127-128), coupled with a systemic approach in which technology development paths are aligned with all other government policies, such as the industrial and economic policy. The literature acknowledges that PPI is subject to contextual variables as policy regulation, interpretation, and interaction between tender participants and the government (Dale-Clough 2015, 18-21). Similarly, instruments

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from SS-oriented policies may interact with PPI to positively develop green innovations (Peñate-Valentín et al. 2018, 408-409).

From the literature review that the design of effective innovation policies require considerations for both supply and demand perspectives, whose applications needs to be context-dependent, and designed according to the stage of innovation and the desired effect. Hence, the development of an appropriate innovation policy requires a deeper understanding of those contextual elements that determine strengths and weaknesses of selected policies.

Finally, recommendations for establishing the appropriate policy mix involve considerations about the evolving stage of the sector: while SS policies are more functional in early stages, in the mature stages, DS policies should gradually replace them. Once the industry enters a self-balanced phase, the withdrawal of these policy instruments should be considered (Zhi 2014, 318). Denmark and Germany are good models of balancing an innovation policy mix, according to the sectoral stage (Buen 2006, 3889; Zhi 2014, 318). However, the evaluation of innovation policy has been restricted to SS policies, as there is a research gap around DS indicators, complicating the identification of successful DS measures (Edler et al. 2012, 44). The previous discussion calls for an assessment of interaction effects of instruments. Hence, we propose:

> *RP3: The interaction of DS and SS instruments leads to higher innovation and technology-intensive output.*

Conclusion

This study has reviewed key scholarly literature about innovation policy, particularly DS innovation policy and advances three research proposals. This type of policies is guided by government-defined interests around innovation development along with creating a demand

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for such innovations. Beyond capacity-building and technology-push models, DS innovation policy accepts directionality based on contextual understanding of societal challenges.

However, the literature has mainly analysed DS policy cases in more developed economies, with some exceptions. Europe stands out as the focus of academic research in the topic, indicating regional concerns about problem-solving policies, especially sustainability and energy-related issues. Our analysis has been systematic from a methodological perspective and has been classified as a scoping review in consideration to the research questions posed in this article. This study has indicated the inclination of scholarly research around the DS innovation policy from a sectoral, geographical and tactical approach.

Cases of policy results at the sectoral and geographical level have been also provided, emphasizing varied degrees of success, leading to tactical recommendations around mixed policies, whose application depends on context and the maturity of the sector. Given the limited experiences of DS innovation policy application in developing economies, this research identifies the need to build a research agenda around DS, mixed innovation policies and related instruments in developing countries. Noteworthy, some studies advice for a combination at different degrees of DS and SS policies –a policy mix– which may provide deeper insights in achieving higher levels of innovation and fulfilment of societal challenges. In our review, only a handful of studies critically analyses such policy mix. Hence, this research avenue remains open to academic debate and further research.

This research has implications for public policy, such as inviting researchers and policy practitioners to assess the experience of advanced economies around the implementation of DS innovation policies, including DS-SS mixed models. Particularly, developing economies such as Latin American's can take advantage of these experiences to design purposive DS

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innovation policies adapted to their local contexts. DS or mixed innovation policy adoption should include a deep understanding of Latin American's priorities and conditions, demanding a positive attitude towards risk. Managerial perceptions and data from a national-wide survey in Mexico on research and technological development (ESIDET) may serve as a basis for further research to address the research questions advanced in this paper. Such studies are underway.

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#	Authors	Year	Title	Journal / Conference
1	Magdaniel, F C	2016	Technology campuses and cities: A study on the relation between innovation and the built environment at the urban area level	A+BE Architecture and the Built Environment
2	Karmarkar-Deshmukh, R	2009	Private sector innovation in biofuels in the United States: Induced by prices or policies?	AgBioForum
3	TÕnurist, P	2016	STATE OWNED ENTERPRISES AS INSTRUMENTS OF INNOVATION POLICY	Annals of Public and Cooperative Economics
4	Qiang, Zhi	2014	**China's solar photovoltaic policy: An analysis based on policy instruments**	APPLIED ENERGY
5	Anisimov, Ivan	2015	INNOVATION POLICY FEATURES IN THE OECD COUNTRIES	BALTIC JOURNAL OF ECONOMIC STUDIES
6	Minglei, D	2013	Research on the technological innovation strategy and policies of china's new urbanization	BioTechnology: An Indian Journal
7	Doran, J	2016	The Importance of the Diverse Drivers and Types of Environmental Innovation for Firm Performance	Business Strategy and the Environment
8	Whitmarsh, L	2010	Climate change and cars in the EU: The roles of auto firms, consumers, and policy in responding to global environmental change	Cambridge Journal of Regions, Economy and Society
9	Janssen, M A	2000	Climate change policy targets and the role of technological change	Climatic Change
10	Hanley, Caroline	2014	High Road, Low Road, or Off Road? Economic Development Strategies in the American States	ECONOMIC DEVELOPMENT QUARTERLY
11	Baraškina, Irēna	2009	Development of Organic Agriculture in Europe: from Origins to the Current Level of Life-Cycle.	Economic Science for Rural Development Conference Proceedings
12	Zhang, H	2017	Has government intervention effectively encouraged the use of waste cooking oil as an energy source? Comparison of two Chinese biofuel companies	Energy
13	Mundaca, L	2018	Demand-side approaches for limiting global warming to 1.5 °C	Energy Efficiency
14	Banales-Lopez, S	2002	Public policy for energy technology innovation - A historical analysis of fluidized bed combustion development in the USA	ENERGY POLICY
15	Christiansen, A C	2002	New renewable energy developments and the climate change issue: A case study of Norwegian politics	Energy Policy
16	Kimura, O	2010	Public R&D and commercialization of energy-efficient technology: A case study of Japanese projects	Energy Policy
17	Lin, Chen-Chun	2013	A comparison of innovation policy in the smart grid industry across the pacific: China and the USA	ENERGY POLICY
18	Stucki, T	2018	How different policy instruments affect green product innovation: A differentiated perspective	Energy Policy
19	kuzemko, C	2017	Policies, politics and demand side innovations: The untold story of Germany's energy transition	Energy Research and Social Science
20	pickernell, D	2011	Competing agendas in public procurement: An empirical analysis of opportunities and limits in the UK for SMEs	Environment and Planning C: Government and Policy
21	baldock, Robert	2016	An assessment of the business impacts of the UK's Enterprise Capital Funds	ENVIRONMENT AND PLANNING C-GOVERNMENT AND POLICY
22	Groba, F	2015	Chinese Renewable Energy Technology Exports: The Role of Policy, Innovation and Markets	ENVIRONMENTAL & RESOURCE ECONOMICS
23	wesseling, J H	2016	Explaining variance in national electric vehicle policies	Environmental Innovation and Societal Transitions
24	nemet, G F	2018	Negative emissions - Part 3: Innovation and upscaling	Environmental Research Letters
25	radosevic, S	2009	Research and development, competitiveness and European integration of South Eastern Europe	Europe - Asia Studies
26	hunt, Richard A	2018	An opportunity space odyssey: historical exploration of demand-driven entrepreneurial innovation	EUROPEAN JOURNAL OF INNOVATION MANAGEMENT
27	Georghiou, L	2011	From priority-setting to articulation of demand: Foresight for research and innovation policy and strategy	Futures
28	warnke, P	2016	Small seeds for grand challenges-Exploring disregarded seeds of change in a foresight process for RTI policy	Futures
29	Grabowski, H	2005	Perspective: Encouraging the development of new vaccines - R&D subsidies for new drugs to treat rare diseases are much larger than those for new vaccines to prevent more common diseases	Health Affairs
30	kanavos, Panos	2014	Measuring performance in off-patent drug markets: A methodological framework and empirical evidence from twelve EU Member States	HEALTH POLICY

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#	Authors	Year	Title	Journal / Conference
31	Hu, Jia	2016	Pharmaceutical pricing and reimbursement in China: When the whole is less than the sum of its parts	HEALTH POLICY
32	arora, A	2015	Public support for technical advance: The role of firm size	Industrial and Corporate Change
33	leimbach, T	2010	Assessing national policies to support software in Europe	Info
34	aberg, Susanne	2015	Does CERN procurement result in innovation?	INNOVATION-THE EUROPEAN JOURNAL OF SOCIAL SCIENCE RESEARCH
35	dale-Clough, Lisa	2015	Public procurement of innovation and local authority procurement: procurement modes and framework conditions in three European cities	INNOVATION-THE EUROPEAN JOURNAL OF SOCIAL SCIENCE RESEARCH
36	lember, Veiko	2015	Quo vadis public procurement of innovation?	INNOVATION-THE EUROPEAN JOURNAL OF SOCIAL SCIENCE RESEARCH
37	neck, R	2018	How to Achieve the Take-off into Sustained Growth: A Case Study for Slovenia	International Advances in Economic Research
38	su, Y.-S.	2016	An assessment of innovation policy in Taiwan's electric vehicle industry	International Journal of Technology Management
39	sartorius, C	2008	Promotion of stationary fuel cells on the basis of subjectively perceived barriers and drivers	Journal of Cleaner Production
40	rizzi, F	2014	Environmental value chain in green SME networks: The threat of the Abilene paradox	Journal of Cleaner Production
41	rainville, Anne	2017	Standards in green public procurement - A framework to enhance innovation	JOURNAL OF CLEANER PRODUCTION
42	eisenberg, Rebecca S	2017	Promoting healthcare innovation on the demand side	JOURNAL OF LAW AND THE BIOSCIENCES
43	spulber, D F	2013	How do competitive pressures affect incentives to innovate when there is a market for inventions?	Journal of Political Economy
44	Gambardella, A	2017	The user innovation paradigm: Impacts on markets and welfare	Management Science
45	Edler, Jakob	2017	Innovation policy: what, why, and how	OXFORD REVIEW OF ECONOMIC POLICY
46	Landoni, Matteo	2017	Innovation policy in progress. Institutional intermediation in public procurement of innovation: satellite telecommunications in Italy	R & D MANAGEMENT
47	Edler, J	2012	Evaluating the demand side: New challenges for evaluation	Research Evaluation
48	Edler, J	2007	Public procurement and innovation-Resurrecting the demand side	Research Policy
49	Edquist, C	2012	Public Procurement for Innovation as mission-oriented innovation policy	Research Policy
50	Kesidou, Effie	2012	On the drivers of eco-innovations: Empirical evidence from the UK	RESEARCH POLICY
51	Guerzoni, Marco	2015	Demand-side vs. supply-side technology policies: Hidden treatment and new empirical evidence on the policy mix	RESEARCH POLICY
52	Rogge, Karoline S	2016	Policy mixes for sustainability transitions: An extended concept and framework for analysis	RESEARCH POLICY
53	Raiteri, Emilio	2018	A time to nourish? Evaluating the impact of public procurement on technological generality through patent data	RESEARCH POLICY
54	Yi, H	2012	Policy Tool Interactions and the Adoption of State Renewable Portfolio Standards	Review of Policy Research
55	Puig-Pey, Ana	2017	Public entities driven robotic innovation in urban areas	ROBOTICS AND AUTONOMOUS SYSTEMS
56	Vonortas, N S	2000	Technology policy in the United States and the European Union: Shifting orientation towards technology users	Science and Public Policy
57	Arocena, R	2010	Weak knowledge demand in the South: Learning divides and innovation policies	Science and Public Policy
58	Timmermans, Bram	2013	Coordinated unbundling: A way to stimulate entrepreneurship through public procurement for innovation	SCIENCE AND PUBLIC POLICY
59	Leitch, S	2014	The fall of research and rise of innovation: Changes in New Zealand science policy discourse	Science and Public Policy
60	Bergek, A	2015	Integrating the supply and demand sides of public support to new technology-based firms	Science and Public Policy
61	Georghiou, Luke	2016	Signaling and accrediting new technology: Use of procurement for innovation in China	SCIENCE AND PUBLIC POLICY
62	Boon, Wouter	2018	Demand, challenges, and innovation. Making sense of new trends in innovation policy	SCIENCE AND PUBLIC POLICY
63	Bugge, Markus M	2018	Governing socio-technical change: Orchestrating demand for assisted living in ageing societies	SCIENCE AND PUBLIC POLICY
64	Chicot, Julien	2018	Public procurement of innovation: a review of rationales,	SCIENCE AND PUBLIC POLICY

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			designs, and contributions to grand challenges	
65	Wesseling, Joeri H	2018	Public procurement for innovation to help meet societal challenges: a review and case study	SCIENCE AND PUBLIC POLICY
66	Trindade, Paula Cayolla	2018	SPP Toolbox: Supporting Sustainable Public Procurement in the Context of Socio-Technical Transitions	SUSTAINABILITY
67	Jang, E K	2015	Policy instruments for eco-innovation in Asian countries	Sustainability (Switzerland)
68	Mengolini, A	2016	Exploring community-oriented approaches in demand side management projects in Europe	Sustainability (Switzerland)
69	Jiang, C	2018	The effectiveness of government subsidies on manufacturing innovation: Evidence from the new energy vehicle industry in China	Sustainability (Switzerland)
70	Safarzyńska, K	2010	Demand-supply coevolution with multiple increasing returns: Policy analysis for unlocking and system transitions	Technological Forecasting and Social Change
71	Yun, S	2015	Advancing societal readiness toward renewable energy system adoption with a socio-technical perspective	Technological Forecasting and Social Change
72	Caloghirou, Y	2016	Public procurement for innovation: A novel eGovernment services scheme in Greek local authorities	Technological Forecasting and Social Change
73	Steward, F	2012	Transformative innovation policy to meet the challenge of climate change: Sociotechnical networks aligned with consumption and end-use as new transition arenas for a low-carbon society or green economy	Technology Analysis and Strategic Management
74	Tsoutsos, T D	2005	The sustainable diffusion of renewable energy technologies as an example of an innovation-focused policy	Technovation
75	Cohen, B	2014	Municipal demand-side policy tools and the strategic management of technology life cycles	Technovation
76	Saastamoinen, J	2018	Should SMEs pursue public procurement to improve innovative performance?	Technovation
77	Lember, V	2011	Urban competitiveness and public procurement for innovation	Urban Studies
78	Srinivas, S	2006	Industrial Development and Innovation: Some Lessons from Vaccine Procurement	World Development