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SPP Toolbox: Supporting Sustainable Public Procurement in the Context of Socio-Technical Transitions

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Received: 27 October 2017; Accepted: 25 December 2017; Published: 28 December 2017

Abstract: Public procurement can shape production and consumption trends and represents a stimulus for both innovation and diversification in products and services, through a direct increase in demand. In recent years, the interest in demand-side policies has grown and several approaches have emerged, such as Green Public Procurement (GPP), Sustainable Public Procurement (SPP) and Public Procurement of Innovation (PPI), representing strategic goals to be achieved through public procurement. In this context, there is a need to guide and support public organizations in the uptake of GPP, SPP and PPI practices. To respond to the challenges raised by the operationalization of such strategies, this paper proposes a new tool—the SPP Toolbox—for guiding public organizations as they re-think the procurement process, raising their ambitions and broadening their vision, thus changing the organizational approach towards culture, strategies, structures and practices. This toolbox integrates insights from GPP, SPP and PPI objectives and practices, in the context of the emergence of socio-technical transitions. The toolbox coherently links GPP, SPP and PPI, allowing flexibility in terms of goals, yet promoting an increasing complexity of institutionalized practices and skills—from GPP to SPP and then from SPP to PPI, organized in a framework fully integrated into the organizational strategy.

Keywords: Green Public Procurement; Sustainable Public Procurement; Public Procurement of Innovation; toolbox

1. Introduction

The high purchasing power of public organizations and of public authorities in particular, is a market factor with enormous potential [1], representing 16% of the gross domestic product of the EU [2,3] and covering a wide range of goods and services, including: office equipment, building components, transport vehicles, building maintenance, transport services, cleaning, catering and works [1]. In other words, public procurement can shape production and consumption towards more sustainable trends [1], by stimulating innovation in the value chain and promoting the diversification of the products and services mix [4,5].

In recent years, the interest in demand-side policies has grown and several approaches have emerged, such as Green Public Procurement (GPP), Sustainable Public Procurement (SPP), Public Procurement of Innovation (PPI) and, more recently, Circular Procurement (CP) [6], representing strategic goals to be achieved through public procurement [7]. At the European level, in particular,

GPP has increasingly played a central role in environmental policies [4], while PPI and CP are also becoming a priority on the European agenda [8,9]. The current literature on this topic acknowledges that GPP, SPP and PPI are able to support innovative activities, as discussed below. However, procurement of innovation challenges currently institutionalized practices and skills, requiring a different approach from that used in the procurement of regular off-the-shelf goods [3,9]. That is, different types of coordination may be required, in order to enhance the effectiveness of public procurement as a strategic (eco)-innovation policy instrument [3].

It is well established that sustainable development requires large scale transformations in the way societal functions are fulfilled [10], involving a "transition" or "system innovation" away from the prevailing socio-technical system—which includes technology, regulations, user practices, markets, cultural meaning, infrastructures and networks—towards another [11,12]. Thus, public procurement should seek to contribute to sustainable development—addressing environmental and social consequences [11], within the broad vision of inducing socio-technical transitions.

We argue that GPP, SPP and PPI approaches would benefit from considering insights from socio-technical transitions theory. To address this gap, the Sustainability Transition Procurement Model (STP Model) was developed [13]. This model maps out the key factors that influence the transformation of socio-technical systems towards sustainability, integrating different approaches towards public procurement, i.e., GPP, SPP and PPI, in a multi-level framework.

Within public organizations, local authorities are particularly relevant, since they have a territorial responsibility for both economic well-being and quality of life of their constituents and hence they are likely to find particular types of unmet needs and market failures, corresponding to a high potential for steering innovative activities [14]. Gee and Uyarra [15] acknowledged that public authorities can orchestrate system innovation through public procurement. Adding to that, Knutsson and Thomasson [16] demonstrated that, even for small local authorities, it is possible to influence the market through innovative procurement processes, spreading innovation to other public services through networking.

These contributions justify the focus of our research on the ability of public organizations to re-think the procurement process, fulfilling their potential to shape supply chains and market development [14,16] and, ultimately, contributing to socio-technical transitions. This re-thinking should address the organization's wider strategies and purchasing and contractual cycles, as well as the range of procurement methods being used [14].

Despite the high interest in public procurement policies, the uptake of GPP, SPP and PPI practices among European public organizations has been limited [1,14,17]. Furthermore, PPI is a costly and time-consuming process, requiring a greater degree of in-house competencies, as a higher effort is needed to develop innovative solutions than for regular forms of procurement [18–20]. In order to overcome this hurdle, additional efforts are required to support local authorities in the process of broadening their ambitions and vision [14].

Having said that, the aim of this paper is to address this gap and respond to these challenges, by further developing the STP Model into a tool—the SPP Toolbox—which assists public organizations, including public authorities, in the institutionalization of GPP, SPP and PPI practices, changing the organizational approach towards culture, strategies, structures and practices, in the context of the emergence of socio-technical transitions.

We begin by briefly reviewing the concepts of GPP, SPP and PPI, followed by deepening the context of public procurement (Section 2). Then, the STP model is described in Section 3, which provides the framework to develop the SPP Toolbox. The research methods for developing the SPP Toolbox are described in Section 4. Building on the STP Model and other frameworks, the SPP Toolbox is explained in Section 5. The results from the practical implementation of the SPP Toolbox in three Portuguese public organizations are presented in Section 6, followed by the discussion (Section 7) and conclusions (Section 8).

2. Background to GPP, SPP and PPI Approaches

This section reviews the concepts of GPP, SPP and PPI and their contribution to innovation for sustainability, while discussing some challenges for tools supporting public authorities in the institutionalization of GPP, SPP and PPI practices.

Green Public Procurement (GPP) is based on the use of environmental criteria in public tendering [17], developing capacity for green supplies and markets [21] and stimulating the innovation capabilities of suppliers [1,5]. It aims to achieve value for money, while reducing the environmental impact of purchased products and services over their whole life-cycle [21]. GPP is becoming a cornerstone of environmental policies, both at the European Union and Member State level, as well as worldwide [22,23]. Its role in supporting sustainable consumption and production patterns has strongly increased and currently it is spreading throughout public authorities [1]. By operating as a market trigger, GPP can act as a strong stimulus for eco-innovation [1].

Sustainable Public Procurement (SPP) is the procurement of goods and services incorporating environmental, economic and social concerns into tendering and, therefore, into the procurement process [24,25]. The approach is therefore very similar to GPP, adding social concerns. According to Bratt et al. [17], SPP supports sustainable product-service system innovation.

We adopt the definition of Public Procurement of Innovation (PPI), developed by Rolfstam [3], which defines PPI as the whole range of purchasing activities, carried out by public agencies that lead to innovation. This view is in line with Preuss [26] and Uyarra and Flanagan [27], who also proposed a wider scope for the innovation processes, including: product and service innovation through innovation in organizational processes; societal innovation; the recombination of existing goods and services; and, innovation in the delivery of existing services. In the context of our research we are particularly concerned with PPI for ecological and sustainable innovation. PPI is understood as a tool for stimulating the development of new products—goods, services or systems but it can also refer to public procurement that attempts to open up innovation possibilities, without necessarily targeting new products [9,27,28]. Lember et al. [28] recognize that PPI induces radical, new-to-the world breakthrough technologies; promotes incremental innovations where existing products are adapted to the local context and are, thus, new to a country or a region; promotes new organizational and/or technological capabilities; and, promotes innovations in mature markets.

Public procurement of innovation requires more radical approaches than GPP and SPP [29], resulting in a complex and interactive process where there is a key activity of learning by interaction [9]. The most immediate practical implication is that evolving from GPP to SPP and from SPP to PPI, requires public organizations in general and public authorities in particular, to have an improved approach, involving an increasing complexity of institutionalized practices and skills, as has been already demonstrated elsewhere [13].

On the other hand, GPP, SPP and PPI practices need to be fully integrated into organizational strategies, in order to allow the significant shift from "purchase-cost" to "life-cycle cost" approaches, as well as to carry out the corresponding cultural, managerial and operational changes required to effectively contribute to sustainability. These particular needs were stressed by Testa et al. [5] and Amann and Essig [7] for GPP, by Bratt et al. [17] for SPP and by Knutsson and Thomasson [16] for PPI.

Having into consideration the required implementation conditions to overcome the slow uptake of GPP, SPP and PPI, Testa et al. [5] argue that the adoption of guidelines and tools can assist organizations in becoming more GPP oriented. The importance of guidelines, toolkits and documents in promoting GPP and SPP practices has been highlighted by several studies [5,30] and also applies to PPI. Furthermore, this can be especially important for small public authorities [5].

The lack of guidelines was tackled, at the EU level, by the Buying Green Handbook, published by the European Commission in several languages [31] and by the EU training toolkit on GPP [32]. The European Secretariat of ICLEI (Local Governments for Sustainability) has also published the Procura+ Manual [33,34], which is a reference for procurers. The European Commission has launched

very recently the "eafip" toolkit to provide support to policy makers in designing PPI strategies and to procurers and their legal departments in implementing such procurements [35].

A large variety of tools and guides is available in grey literature, namely through the Procurement Forum platform [36], which developed a compilation of existing tools and guides. A thorough analysis of such compilation provides an idea of the type of available tools. First, in what regards to format, the tools/guides provide the information in descriptive documents, not allowing to be filled, in an interactive mode (e.g., the Buying Green Handbook). Second, concerning the content, we have identified tools/guides which are very general, applying to all sectors and discussing a wide range of issues (e.g., the Buying Green Handbook, Buying for a better world UNEP); tools that address just one approach to public procurement—GPP and/or SPP, social procurement (e.g., BuyGreen and make a difference, +Sustainable City Council, Buy Fair); tools addressing specific territories, at national, region or local level; tools that are sector-specific, addressing, for instance, the purchase of vehicles, energy, timber, catering (e.g., Clean fleets guide, Guide of purchasing electric and hybrid vehicles); and, tools addressing specific technical issues—life-cycle costs (LCC), functional specifications (e.g., Climate information for green procurers, Functional specifications guide). Even though there is such a diversity of tools and guides, there is evidence of a considerable gap for tools focusing on: (a) the integration of GPP, SPP and PPI together, as part of an organizational evolution towards more complex forms of procurement; (b) the framework to address the different levels of GPP, SPP and PPI and their role in the socio-technical transitions.

3. Background: The STP Model

The Multi-Level Perspective (MLP) framework on sustainability transitions [37] is recognized as a main approach for the understanding of major system level shifts in social, economic and technological practices at a necessary scale to meet the present challenges of sustainability [38]. The MLP theory considers that transitions result from non-linear interactions at three levels: niche, regime and landscape [10,37]. Niches are "protected spaces," such as R&D laboratories, subsidized demonstration projects, or small market niches, where users have special demands and are willing to support emerging innovations that deviate away from existing regimes [10]. Regimes are formed by socio-cultural, user/market, science/technological practices and rules, referring to the "meso" context. Landscapes, on the other hand, refer to the external macro context, such as demographical trends, political ideologies, societal values and macro-economic patterns [10,37]. Overall, regimes are embedded within landscapes and niches are embedded within regimes [37]. Transitions are characterized by the interaction between the three levels: niche-innovations build up internal momentum; whilst, changes at the landscape level create pressure on the regime; and, destabilization of the regime creates windows of opportunity for niche innovations [10].

This theory focuses on the development of radical innovations by producers and on the role of political governance, thus neglecting the potential of trajectories in consumption processes that are also of critical importance to orchestrate a system transition [38]. Despite this focus, the MLP associates the category of "special users," described as early adopters that engage intensively in modifying and developing the innovation ready for market release, to processes of radical socio-technical innovation [38]. This is also supported by Raven [39], who locates radical transformation of regimes in early niche markets, constituted by early adopters with different preferences than mainstream users, often willing to pay a higher price to particular benefits they gain from innovation. This type of approach is the core of GPP, SPP and PPI.

Gee and Uyarra [15] demonstrated, by using an empirical case, the potential of public bodies to orchestrate system innovation by actively managing the required interdependencies between technologies, institutions and practices, thus establishing public procurement as an additional governance mechanism for the transformation of socio-technical systems. These studies demonstrate the relation between socio-technical transitions and consumption and specifically public procurement,

providing ground to the development of a model that incorporates insights from GPP, SPP and PPI practices into the MLP framework.

The STP Model, presented in more detail elsewhere [13] maps out the key factors that influence the transformation of socio-technical systems towards sustainability (Figure 1), integrating different approaches towards public procurement, i.e., GPP, SPP and PPI, building on Geels' multi-level perspective (MLP) [10,37,40]. The STP model is focused on public procurement organizations and addresses each of the three interdependent levels that are structuring the MLP framework: niche, regime and landscape. Each level is composed of one or more building blocks, each one having related key factors.

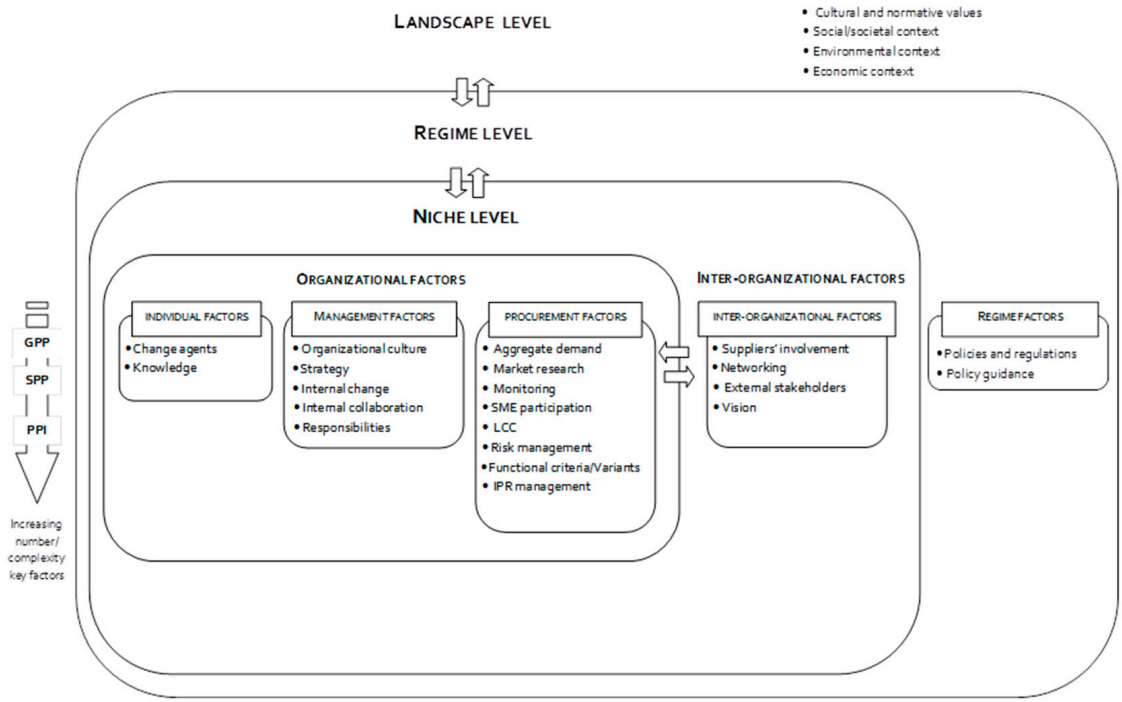

Figure 1. The Sustainability Transition Procurement Model (STP Model).

In the MLP framework, the niche level provides the seeds for systemic changes, supporting the emergence of innovations [10,37,40]. Niche development can happen in special geographical locations or in specific domains, acting as a vehicle for learning, building new social networks (for instance producers, scientists, users, policy makers) and improving the innovation so that it gains momentum for diffusion to other niches or even replace dominant regime practice [41]. In Strategic Niche Management (SNM) theory, success or failure of a niche can be explained by analyzing the interactions between three main niche processes: (i) shaping of expectations—articulating expectations and visions in order to attract resources and new actors and provide direction to the process; (ii) building social networks—new combination of actors, in order to promote the emergence of new social networks; and, (iii) learning processes—social embedding to increase chances on successful diffusion [41,42]. In the STP model, the niche level is characterized by the organization's internal practices (organizational factors), as well as by external practices concerning its relationships with others, which are required for spreading innovation (inter-organizational factors).

The organizational factors block is divided into three categories: (1) individual factors, accounting for the role of the individuals within the organization and encompassing two key factors (change agents and knowledge); (2) management factors, referring to the organization's culture, strategies, structures and practices required for supporting GPP, SPP and PPI and encompassing five key factors (organizational culture, strategy, internal change, internal collaboration and responsibilities);

and (3) procurement factors, which focus on practices that support GPP, SPP and PPI, encompassing the following key factors: aggregate demand, market research, monitoring, SME (small and medium size companies) participation, LCC (Life cycle costs), risk management, functional criteria/variants and IPR (intellectual property rights) management.

The inter-organizational factors block relates to implicit knowledge located within collective interactions, which can be oriented towards suppliers, similar organizations and/or other external stakeholders. Accordingly, this block encompasses four key factors: suppliers' involvement, networking, external stakeholders and vision. Moving from GPP to SPP to PPI, the organization increasingly needs to: develop earlier and longer-lasting collaborative activities with suppliers [43]; work in networks with similar organizations that use each other as reference points, sharing best practices, promoting interactive learning and spreading knowledge [44,45]; and, engage with other external stakeholders, such as managers in public agencies, policy-makers, public procurers, potential users, suppliers, researchers and non-governmental organizations [3,15,43]. These relationships are addressed in the key factors suppliers' involvement, networking and external stakeholders. Furthermore, inter-organizational interactions spread knowledge and best practices to other actors, creating a common vision [15,46], hence contributing to change the existing regime—this referring to the STP model' vision key factor. Thus, the three main niche processes described above (shaping of expectations, building social networks and learning processes) correspond to the inter-organizational building block. The multi-faceted relationships and on-going iterative engagements can shape local and national strategies and align policies at national and local levels, thus influencing the regime level, as demonstrated by Gee and Uyarra [15].

In the STP Model, as in the MLP perspective [37], the regime level consists of the routine-based behavior of organizations and of other actors involved, encompassing two key factors: policies/regulations and policy guidance. Thus, the regime level includes short to medium term policies and regulations which favor the introduction of environmental, social and innovation considerations in public procurement. The European Directives on public procurement [47] constitute an example, allowing for environmental and social criteria and defining new procurement procedures such as the "innovation partnerships," which acknowledge a strong link between procurement and innovation [48].

The landscape level is translated, in the STP Model, into the perceived social/societal, environmental and economic context, influenced by cultural and normative values. Long term European initiatives such as the Innovation Union [49] and the comprehensive product policy as recently referred by the EU Council conclusions on "Eco innovation: enabling the transitions towards a circular economy", includes a call on the Member States to " ... make active use of the product sustainability and circularity criteria in the process of green procurement ... ." Based on previous experience, those will most likely consist of landscape pressures addressed to the national governments and to the public procurement organizations. At a more general level, the concern on unsustainable production and consumption patterns has grown in society, as demonstrated by European Commission studies [50], corresponding to a change in cultural values and adding pressure to regime.

In short, the STP Model captures the institutionalization and operationalization of GPP, SPP and PPI at different levels, from an organization's perspective. The niche level includes the key factors that need to be developed, not only within the organization but also between organizations; the regime level refer to the policy key factors that can be triggered by public organizations; and, the landscape level is the wider context of public organizations, involving a number of societal aspects [13]. The alignment of the various successful developments at the niche level, reinforced by changes at the regime level, as well as by pressure from the landscape level, will determine whether a regime shift will occur [51], contributing to a system innovation or socio-technical transition, oriented towards delivering sustainable responses to the societal issues perceived at the landscape level.

4. Research Approach

Addressing the drivers and gaps identified in Sections 1–3, this research proposes a new tool—the SPP Toolbox—to support the development of a Sustainable procurement strategy, oriented towards GPP, SPP and PPI. The SPP Toolbox aims to guide and support public organizations, including public authorities, as they re-think the procurement process, helping them raise their ambitions and broaden their vision, thus changing the organizational approach towards culture, strategies, structures and practices, in the context of the emergence of socio-technical transitions.

The approach taken in the SPP Toolbox was adapted from the GPP Management Model, proposed by the European Commission [52] and ICLEI [33,34], which is comprised of five phases: (1) preparation; (2) target setting; (3) developing an action plan; (4) implementing the action plan; (5) monitoring progress and reporting results. The use of a Deming cycle type of tool offers a simple, flexible and comprehensive approach, facilitating the integration with the existing management systems [53]. Additionally, the SPP Toolbox assembles a range of perspectives, as well as practical skills, concerning the key factors mapped out at the niche level of the STP Model (Figure 1).

The toolbox was initially focused on GPP and SPP. It was developed from the existing literature and prototype versions were then tested and applied in three public Portuguese organizations which operate at the local level: Torres Vedras (Municipality of Torres Vedras), Loures (Municipality of Loures) and LIPOR (Intermunicipal Waste Management Company of Greater Porto, Portugal), generating three case studies.

The research method was based on multiple case studies, as it allows the researcher to analyze different contexts for each of the cases, i.e., to analyze within each setting and across settings. In a multiple case study, we are examining several cases to understand the similarities and differences between cases [54]. The exploratory case study is developed in line with the grounded theory approach, which assumes that the natural occurrence of social behavior within real-world contexts is best analyzed by deriving "bottom-up" grounded categories and concepts [55], i.e., it implies the discovery of theory from data. The research presented in this paper assumes this iterative process of travelling back and forth between the theory and the evidence.

The strategy for selecting the cases considered the following criteria: public organizations that illustrated different sizes, organizational structures, purchasing power and with some experience in GPP, SPP or PPI. Willingness to participate was also an important factor that shaped the final selection of cases. Torres Vedras is a medium-sized city, located in a rural area, with 79,500 inhabitants. Its municipality employs 550 people. The municipality of Loures, by contrast, is part of the Lisbon Metropolitan Area and has 200,000 inhabitants and employs about 2100 people. Finally, LIPOR is the inter-municipal waste management enterprise of the Oporto region, employing 191 people. All three organizations have a procurement department but purchasing activities are more centralized in Loures and LIPOR than in Torres Vedras. With reference to their experience in GPP, SPP and PPI, all three organizations had some previous experience but this was limited to GPP. LIPOR, in particular, implemented the SA 8000 social accountability management system and, therefore, has applied a code of conduct for all suppliers and subcontractors, since 2009. The three organizations thus represented different situations and were considered adequate examples for testing the SPP Toolbox. The case studies were implemented in the period 2012–2014, via regular meetings held in the three organizations' premises, with the aim of implementing the six steps of the SPP Toolbox.

In addition, the development of the SPP Toolbox involved a participatory process, through the consultation of key Portuguese public procurement stakeholders (i.e., municipalities, central public administration and other public organizations) in several events organized at the National Laboratory of Energy and Geology (LNEG), including: (1) Portuguese SPP Network meetings, held on the 15 March 2012 (22 participants), 23 November 2012 (14 participants) and 9 April 2014 (18 participants); (2) one meeting especially dedicated to getting feedback from the organizations participating in the three case studies, held on the 20 June 2013; and (3) a one-day workshop on GPP, held on the 21 May 2014 (48 participants). The method for gathering feedback from participants included the

step-by-step presentation of the SPP Toolbox, followed by discussion and comments, which were then recorded in the form of minutes. Additionally, a questionnaire was handed out at the end of the meeting, which assessed the participants' view of each step of the SPP Toolbox, based on the following topics: relevance, implementation difficulty/capability, positive/negative aspects and measures to overcome obstacles. The questionnaire also asked respondents to evaluate the toolbox as a whole.

Results from the three implementation case studies, as well as the participatory process, fed into an iterative design process, whereby collected suggestions and feedback were built progressively into the next version of the tool. Changes were tracked using version control.

From 2015 to 2016, the SPP Toolbox was further improved to better accommodate the key factors mapped out at the niche level of the STP Model, as well as PPI approaches.

5. The SPP Toolbox

The SPP Toolbox is a step-by-step tool developed to operationalize the STP Model (Figure 1) in public organizations, including public authorities (available online at http://sppbizzi.eu/en/login). The tool is aimed at procurement officers, officers from other departments and top-level decision makers belonging to public organizations, such as local authorities, regional authorities and central government bodies.

The SPP Toolbox targets procurement organizations and their transformative potential for contributing to the niche formation process through the use of GPP, SPP and PPI approaches.

Therefore, the SPP Toolbox assembles a range of perspectives, as well as practical skills, concerning the key factors mapped out at the niche level of the STP Model, as shown in Figure 2.

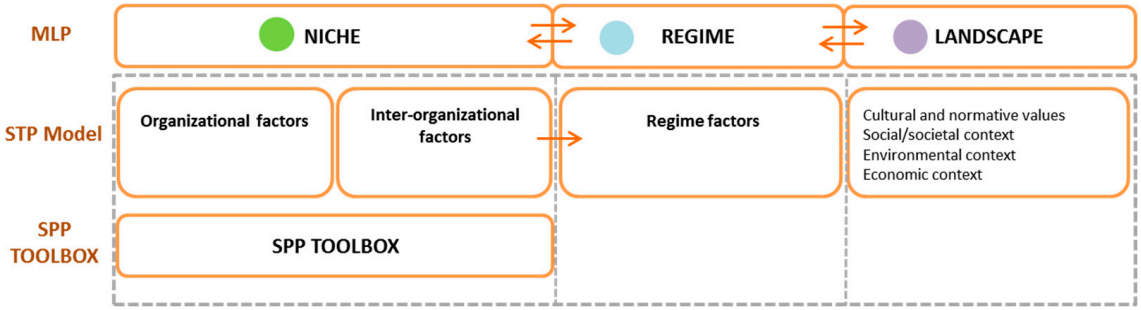

Figure 2. Scope of the SPP Toolbox.

The SPP Toolbox is mainly focused on sustainability and, for this reason, the term "sustainable procurement" is widely used. However, the goal is that the organization defines and implements a Sustainable Procurement Strategy (SPP strategy) oriented towards GPP, SPP and PPI. The SPP strategy is composed of the SPP vision, policy, targets and the action plan.

The SPP Toolbox is a Deming Cycle type of tool and it encompasses six steps: (1) preparatory steps; (2) SPP policy and targets; (3) develop the action plan; (4) implement the action plan; (5) monitoring & reporting; and, (6) revision. An outline of the SPP Toolbox is presented in Figure 3, illustrating the main activities to be performed in each of the six steps. Each step will be presented in detail in the following sections.

A distinct feature of the SPP Toolbox is its form format, allowing the collection and registration of information along the six steps.

Step 1: Preparatory steps

This step involves preliminary activities, including getting support from top management and different departments for GPP, SPP and PPI activities. In order to create an appropriate Sustainable Procurement Strategy and implement it effectively, a responsible team needs to be defined, comprised of management, technicians and legal experts and coordinated by a senior officer and an

elected member. The responsible team will be in charge of implementing the SPP Toolbox within the organization, while the elected official is responsible for maintaining political commitment to SPP. A list of relevant internal and external actors is essential for defining the responsible team, as well as for stakeholder consultation and involvement in the subsequent steps of the SPP Toolbox. Additionally, the scope of activities is defined, e.g., the decision as to whether to apply the system to the whole authority, or just to some departments.

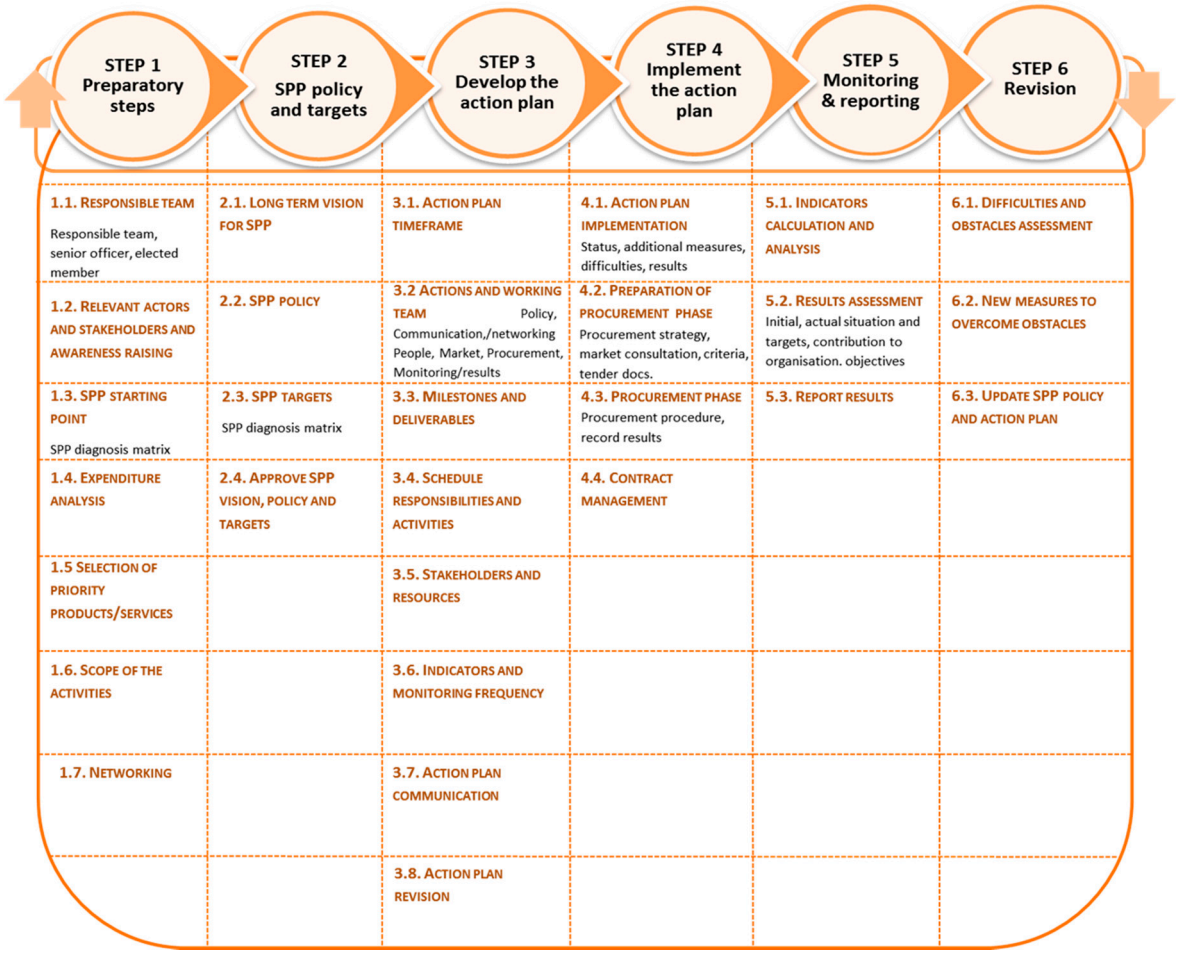

Figure 3. The SPP Toolbox cycle.

The organization's starting point regarding its procurement practices is captured using the SPP Diagnosis Matrix (Table 1), adapted from the UK Sustainable Procurement Task Force Flexible Framework [56,57]. The Flexible Framework is a widely used self-assessment mechanism which allows organizations to measure and monitor their progress on sustainable procurement over time. The framework was designed so that it could be used by all organizations. Although it covers activities and reporting requirements which are mandatory for all UK central government bodies [56], thus corresponding to the regime level, in the Portuguese context it constitutes a good practice, that can be applied to procurement organizations, thus currently it operates mostly at niche level. Some adaptations were introduced, both at themes and contents level.

The SPP Diagnosis Matrix, described in Table 1, allows public organizations to determine the level of development, from 1 to 5, of their procurement practices and skills across six different dimensions: policy, vision and targets; communication and networking; people; market; procurement; monitoring and results.

Table 1. The SPP Diagnosis Matrix.

Level	Policy, Vision and Targets	Communication and Networking	People	Market	Procurement	Monitoring and Results
5	Sustainable procurement policy in place, action plan and targets regularly reviewed, with commitment from top management. Sustainable procurement policy is part of a wider sustainable development strategy.	Networking with similar organizations, with potential suppliers and other stakeholders, including public agencies, policy-makers, potential users, researchers, NGO and the general public. This iterative engagement results in a common vision that will be communicated to staff, suppliers and key stakeholders, shaping local and national strategies and policies.	Sustainable procurement champion and a working team identified. Regular advanced training for key procurement staff. Performance objectives include sustainable procurement factors. These can include benefits achieved.	Supply chain improvement program in place, including sustainability audits. Achievements are formally recorded and best practices shared with other organizations.	Sustainability considered at an early stage and in all later stages of the procurement process. PPI is considered for key contracts. Actions to minimize risks, aggregate demand, promote SME participation and manage IPR in the procurement process. Functional criteria/variants are considered in the procurement process.	Assessment of the contribution of procurement actions to the organization's sustainable development objectives.
4	Sustainable procurement policy in place and endorsed by top management.	Communicated to staff, suppliers and key stakeholders. Networking with similar organizations, with potential suppliers and other stakeholders, including public agencies, policy-makers, potential users, researchers, NGO and the general public.	Sustainable procurement champion and a working team identified. All procurement staff have received basic training in sustainable procurement.	Collaborative activities with suppliers, through a program of supplier engagement, initiated with top management involvement, geared towards continuous sustainability improvements. Program involves. two-way communication between procurers and suppliers.	Inclusion of sustainability criteria in key contracts. Life cycle costs (LCC) approach adopted in some contracts. Market research activities to consider alternatives.	Indicators are defined and monitored systematically, to assess the implementation regarding policy, communication, people, procurement processes, market and monitoring. actions.
3	Existing sustainable procurement objectives but no sustainable procurement policy in place.	Communicated to staff and suppliers. Networking with similar organizations.	Sustainable procurement champion. Key procurement staff have received basic training in sustainable procurement.	Key suppliers identified based on expenditure analysis and sustainability impact and targeted for engagement.	Key sustainability objectives (derived from organization plans and policies) and expenditure analysis used for prioritization of contracts.	Some indicators are monitored but not systematically.
2	Pockets of excellence within purchasing driven by individual personalities.	Communication to staff regarding SPP. Attendance of some GPP/SPP/PPI events.	No assigned responsibilities for sustainable procurement. Some individuals with basic training in SPP.	Some *ad hoc* working with suppliers based on compliance.	Expenditure analysis undertaken and some contracts include general sustainability criteria. Contracts awarded on the basis of value-for-money, not lowest price.	Indicators were defined but not monitored.
1	No sustainable procurement policy in place, or activity undertaken by the organization.	No communication practices within the organization regarding SPP.	No assigned responsibilities for sustainable procurement. No awareness/training in SPP.	No liaison with suppliers regarding sustainability issues.	Contracts do not include sustainability aspects. Compliance with legal requirements.	Results are not monitored.

An important aspect to consider in Step 1 is the decision about which product/service groups to focus on. This decision depends on a number of factors. Within the SPP Toolbox, the definition of priority products/services is informed by: the expenditure analysis, resulting in the identification of the planned procurement actions, economic value and contract period; the analysis of the organization's, local, national and European policies and strategies, as well as its alignment with the procurement actions; the SPP potential of each product/service; and, the view of internal stakeholders, based on discussions with relevant actors regarding their perception of the most important products/services. The SPP potential of each product/service results from the weighting of several aspects, including: the availability of sustainability criteria; the existence of sustainable alternatives in the market; the environmental and social impact of the product/service; the importance of the purchase for the market; and, the potential for PPI. After deciding on the priority products/services, the responsible team defines the requirements that apply to all products/services to be procured, as, for example, the application of a code of conduct for suppliers. The result is a list of priority products/services, i.e., a list of priority procurement needs, as well as a list of general requirements.

Additionally, Step 1 starts the implementation of the inter-organizational factors block, including the search for and engagement with: active networks of suppliers ("suppliers' involvement" key factor); public procurers ("networking" key factor); and, other stakeholders, such as managers, policy-makers, potential users, researchers and non-governmental organizations (external stakeholders key factor).

Step 2: SPP policy and targets

The main objective of Step 2 is the development and approval of a high-level policy statement, to provide the organization with an official commitment to SPP implementation, outlining the key goals and targets which the authority aims to achieve and against which progress can be judged [58].

The first task is thus the development of the organization's long-term vision for sustainable procurement, involving meetings with top management and relevant actors. The SPP policy, providing a statement of commitment, scope, timeframe, broad goals and targets, is developed using the same method. During this step, targets are defined, using the SPP diagnosis matrix, by assessing the situation that the organization wants to achieve by the end of the timeframe, within each of the six dimensions.

Step 3: Develop the action plan

The purpose of Step 3 is to develop an action plan to provide clear and practical details as to how the targets set in the SPP policy will be achieved, i.e., the roadmap for the activities that will be implemented afterwards (Table 2). The first task is then to establish the timeframe for the SPP action plan, taking into account the SPP policy timeframe defined previously.

The SPP action plan consists of actions defined for attaining each target, set earlier in Step 2, within the six dimensions. Each action is then further defined in terms of its: description, division into sub-actions (if necessary), milestones, deliverables, planning, indicators and monitoring frequency. In addition, a working team is created, with assigned responsibilities for implementing actions, identification of relevant internal and external stakeholders and necessary human, financial and organizational resources. As regards the "procurement" dimension, the tasks concern the definition and planning of procurement procedures.

Step 4: Implement the action plan

This step refers to the actual implementation of the SPP action plan, covering the six dimensions: policy, vision and targets; communication and networking; people; market; procurement; monitoring and results. The main objective is to assess whether the actions scheduled previously are being implemented or not, identify any problems encountered and develop corrective measures. An important feature is the recording of difficulties, obstacles and lessons learned which constitutes a mechanism for organizational learning to support GPP, SPP and PPI. Finally, results from the implementation of each action are recorded.

As regards to procurement, Step 4 includes the definition of the procurement strategy, market consultation, sustainable criteria and drafting of tender documents, followed by tender publication, evaluation, awarding the contract and contract management. The definition of the procurement strategy is fundamental in determining which goals are targeted by the procurement action—environmental, social, or innovation, as well as the level of ambition, which leads to the choice of the most appropriate approaches—GPP, SPP or PPI and tools, as Life-cycle costing (LCC). Eventual conflicts and trade-offs when combining different objectives are solved at this stage. Ultimately, these will be a matter of political decision. Step 4 also includes the recording of tender results, which is a significant mechanism for organizational learning.

Table 2. Example of an action plan.

Theme	Action	Deadline	Responsibilities
Procurement	Develop a document with the guidelines of the Strategic Plan and have it approved.	December 2013	Logistics Division
	Annual definition of the number/percentage of procedures that include sustainable factors or clauses.	2014–2017	Logistics Division
	Tender for the contracting of security and surveillance services, with inclusion of environmental and social criteria.	July 2013	Logistics Division
	Tender for the contracting of school transport service, with inclusion of environmental and social criteria.	September 2013	Logistics Division
	Tender for the contracting of urban pest control service, with inclusion of environmental and social criteria.	May 2013	Logistics Division
Procurement	Tender for the contracting of school transport service, with inclusion of environmental and social criteria.	September 2014	Logistics Division
	Tender for the contracting of communications services (fixed, mobile and data), with inclusion of environmental and social criteria.	April 2014	Logistics Division
	Tender for the contracting of cleaning services for the municipal facilities, with the inclusion of environmental and social criteria.	October 2014	Logistics Division
People	Communication of performed actions (meetings, news, others) in the intranet and website of the municipality.	2014–2017	Logistics Division
	Training in sustainable procurement for the procurers.	2014–2017	Logistics Division/Human Resources Management Division
Market	Organization of an awareness seminar aimed at suppliers, in order to call their attention to good practices in sustainable procurement.	2014–2017	Logistics Division
	Meeting with suppliers for experience exchange.	2014–2017	Logistics Division

Step 5: Monitoring & reporting

The purpose of Step 5 is the assessment of the results of the SPP strategy against the defined targets and the organization's sustainable development objectives. Step 5 also involves reporting these results, both internally and externally. Hence, this step comprises the calculation of indicators and assessment against their correspondent objectives. Each indicator, with the corresponding description and calculation method, was defined earlier in the action plan, established in Step 3. Taking these results into account, the contribution of the actions, defined in the SPP action plan, towards the established targets, is assessed. This allows the definition of the organization's situation, after implementing the SPP action plan, across the six dimensions, using the SPP diagnosis matrix. Hence, the initial situation is compared with both the targets and the current situation, to determine the organization's evolution. Finally, the contribution of the SPP activities (i.e., during the SPP policy or SPP action plan timeframe), towards the organization's sustainable development objectives, is also evaluated. These results are then compiled in a report and communicated to relevant internal and external stakeholders.

Step 6: Revision

Step 6 involves reviewing the SPP activities and the SPP policy, focusing on barriers, corrective actions and further improvements, hence constituting an additional mechanism for organizational learning. Then, once all six steps of the SPP Toolbox have been completed, the process is repeated again, initiating a new cycle of organizational improvement.

To summarize, implementing the SPP Toolbox in a public organization will result in the following: an approved SPP vision, policy and targets; the SPP action plan, with actions scheduled and implemented in a given timeframe across the six dimensions (policy, vision and targets; communication and networking; people; market; procurement; monitoring and results); a report describing the contribution of the SPP activities towards achieving both the defined targets and the organization's sustainable development objectives; and, a graphical representation of the organization's evolution, from the initial to the current situation, against the defined targets. These elements will be presented with more detail in the next section.

6. Testing the SPP Toolbox: Three Case Studies

The case studies were implemented in the period 2012–2014 and the activities were supported by a European funded project. In order to introduce the necessary activities for the SPP Toolbox operationalization, regular meetings were held in each organization's premises, with the aim of explaining the methodology, planning the activities to be performed until the next meeting and gather and discuss results. Further support was given by regular e-mail and skype communication. Additionally, the three organizations participated in a network of Portuguese public procurers, exchanging experiences and attending a series of trainings on GPP, SPP and PPI. Engagement activities with suppliers provided information on what requirements could be introduced in the tenders.

As referred in Section 4, the toolbox was initially focused mainly on GPP and SPP. It did not exclude PPI, neither explicit this option. Each of the three public organizations followed the six steps envisioned in the SPP Toolbox, to develop a SPP vision, policy and targets, operationalized through the SPP action plan. This allowed flexibility in the objectives to be achieved, according to the characteristics, experience and knowledge of each organization, which, in turn, was reflected in the results attained, as detailed in the following sections.

In what regards to regime, this period was characterized, at European level, by an increasing focus on GPP and SPP, translated in the evolution of the procurement directives from 2004 to 2014 [47], highlighting the possibility of using environmental and social criteria and opening up the link between procurement and innovation. At the national level, an opposite shift was occurring, corresponding to the end of the first National GPP Action Plan 2008–2010 [59]—which was not replaced until 2016—and to the economic crisis, which focused tenders' evaluation on economic criteria (purchase price), thus counteracting the trend for an increasing number of public authorities adhering to GPP and SPP. Thus,

in Portugal, the regime was characterized by GPP practices, unlike SPP and PPI. During this period, the European landscape has evolved, with the release of long term policies exerting an increasing pressure on public procurement calling for the inclusion innovation goals, for example the European Union [49], as discussed in Section 1.

Case study 1: Torres Vedras

Torres Vedras had some prior ad hoc experiences with GPP, supported by a top politician; this stimulus was crucial for the decision to implement the SPP Toolbox. A general GPP commitment approved by the municipal council already existed; the head of the procurement department participated in GPP training activities; and, there were occasional contacts with suppliers. The scope of the activities implemented in Torres Vedras covered all departments of the municipality, except for the Municipal Water and Sanitation Services. Torres Vedras developed a SPP vision, policy and targets, operationalized through the SPP action plan within the timeframe 2013–2020. The main results from the SPP Toolbox implementation were: (1) implementation of a procurement procedure for the acquisition of urban pest control services, with the inclusion of sustainability criteria and the contract subsequently being awarded to a company that fully met all requirements; (2) definition of sustainability criteria for the procurement of school meals and uniforms; (3) consultation meetings with suppliers in the fields of construction works, professional clothes and food/catering, regarding the main obstacles faced by suppliers in complying with the EU GPP criteria, as well as strategies to meet such requirements; and, (4) definition of a code of conduct for suppliers, which was approved by the council.

Figure 4 represents the development of the municipality during the period of implementation of the case study (2012–2014) and the results set for 2020 (the horizon of the SPP policy).

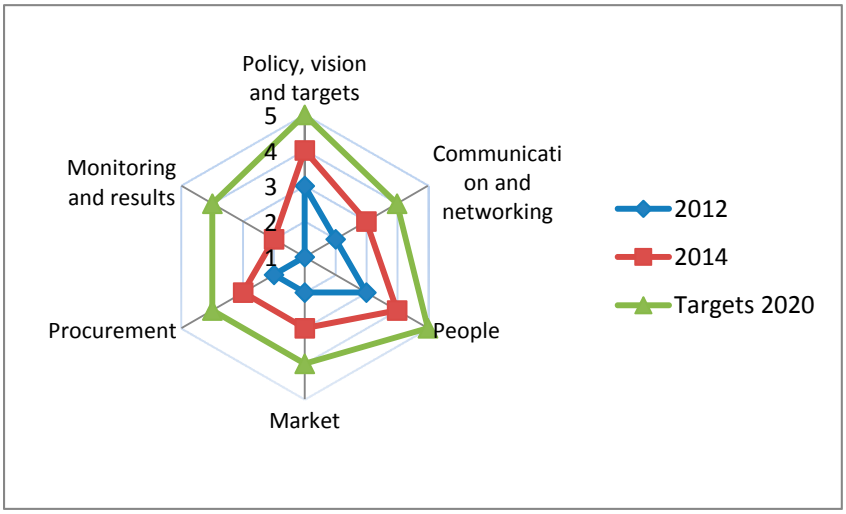

Figure 4. Evolution of SPP Diagnosis Matrix for Torres Vedras.

Case study 2: Loures

Loures had some prior ad hoc experiences with GPP. In this case, middle management—the head of procurement department—acted as a champion within the organization. As in Torres Vedras, the head of procurement department attended GPP training sessions. As described earlier, procurement activities are highly centralized in Loures, highlighting the importance of the procurement department. The scope of activities in Loures covered all departments of the municipality and the action plan timeframe was 2013–2017. Loures developed a SPP vision, policy and targets, operationalized through the SPP action plan. Additionally, the municipality conducted the following activities within the pilot project: (1) definition of sustainability criteria for surveillance services, school transportation

and pest control services; (2) procurement procedures for the acquisition of surveillance services, school transportation and pest control services (public tenders), integrating the sustainability criteria defined previously, including the application of the code of conduct for suppliers, developed in another project; and (3) consultation meetings with suppliers of food and catering, in order to identify the main obstacles to complying with SPP procedures and strategies for meeting such requirements. An interesting outcome, at organizational level, was the definition of SPP targets for the evaluation of personnel performance indicators working on the public procurement department.

After 2014, Loures municipality made some efforts in the direction of PPI, developing a tender for rental of low-carbon multifunction devices, with energy efficiency criteria beyond the latest Energy Star requirements.

Figure 5 shows the development of Loures Municipality, during the participation in the case study and the target situation in 2017 (the horizon of the SPP policy).

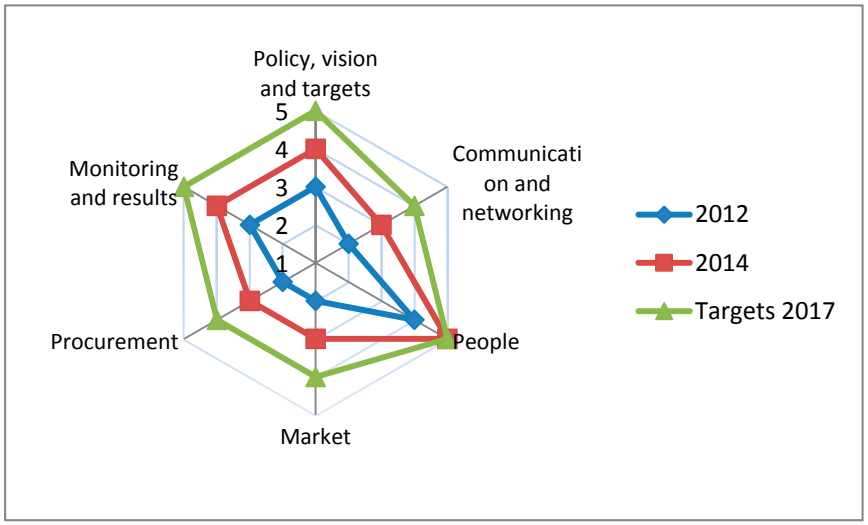

Figure 5. Evolution of SPP Diagnosis Matrix for Loures.

Case study 3: LIPOR

Due to its organizational culture, which recognizes sustainability as a core activity, LIPOR also had ad hoc experiences in GPP/SPP. Since 2009, they implemented the SA 8000 social accountability management system and applied a code of conduct for all suppliers and subcontractors. LIPOR developed a SPP vision, policy and targets, operationalized through the SPP action plan. The scope of activities chosen covered all departments of the organization but the SPP action plan was mainly focused on cleaning services. The following activities were developed within this scope: (1) definition of sustainability criteria for cleaning services procurement; (2) development of tender documents for the procurement of cleaning services following a restricted procedure with prior qualification, allowing for the selection of suppliers; (3) inclusion of SPP and functional criteria for cleaning services, as well as social criteria, including a commitment to comply with the Code of Conduct for Suppliers and Subcontractors; (4) market dialogue activities with cleaning services suppliers, in order to communicate LIPOR's objectives and to assess the supplier's ability to comply with the sustainability criteria, defined in the new cleaning services contract; and (5) development of a contract monitoring plan, to verify the progress against the criteria defined in the contract (namely technical/service capabilities, material resources, human resources, audits and corrective measures).

The SPP Diagnosis Matrix for LIPOR (Figure 6) tracks the progress achieved and the expected results for the 2017 horizon.

After 2014, LIPOR has consolidated the experience and knowledge acquired, acting as front-runner in the Portuguese local authorities' panorama, by using LCC and highly demanding energy efficiency criteria in the rental of low-carbon multifunction devices, as well as tendering the supply of electricity from 100% renewable sources.

7. Discussion

The potential of the SPP Toolbox to stimulate niche formation is discussed below using two different perspectives: matching the SPP Toolbox with the STP model and, analyzing the results from the case studies.

7.1. Operationalizing the SPP Toolbox in the STP Model

With the aim to foster the transformative potential of procurement to contribute to socio-technical transitions for sustainability through niche formation and therein using the GPP, SPP and PPI approaches in particular, a new tool to guide public organizations has been developed.

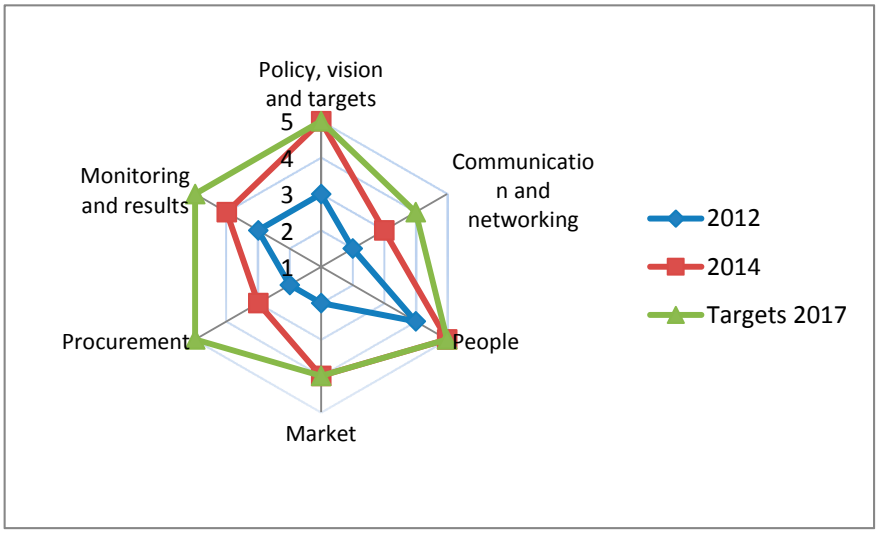

Figure 6. Evolution of SPP Diagnosis Matrix for LIPOR.

The development of the SPP Toolbox involved a participatory process: the tool was presented and discussed in meetings with key Portuguese stakeholders, including the organizations participating in the three case studies. In general, the SPP Toolbox was assessed as a relevant and useful management tool, with an adequate structure and flexibility. However, it was pointed out that the main barriers to implementing the SPP Toolbox are the mind-sets of the organizations, shaped by the current regime and landscape and the time and resources needed.

Designing and developing the SPP Toolbox required assembling a broad range of perspectives, for completeness, while combining it with a logical structure, through the use of the GPP Management Model, proposed by the European Commission [52] and ICLEI [33,34]. Furthermore, it required developing practical skills concerning key factors proposed at the niche level of the STP Model, as mentioned in Section 5, namely: individual factors, management factors, procurement factors and inter-organizational factors.

Individual factors focus on the role of individuals within the organization and the key factors identified were "change agents" and "knowledge". Change agents refer to willingness to change, motivation, ambition, commitment and the role of individuals as champions, facilitators and leaders [5,14,16,24,26,30,45,46,60,61] and are developed in Step 1, while defining the responsible team. Change agents are then further operationalized in the "people" dimension of the SPP Diagnosis Matrix, which involves the definition of targets related to personnel performance indicators (Step 2),

action plan definition (Step 3) and implementation of the action plan (Step 4). The "knowledge" key factor, which accounts for skills and training [1,5,16,18,20,43,45,46,61,62], is also developed in a similar way in the "people" dimension of the SPP Diagnosis Matrix.

Management factors cover organizational culture, strategy, internal change, internal collaboration and responsibilities. Organizational culture maps out informal cultural attributes of the organization [14,24,30], developed in Step 2, in the definition and approval of the SPP policy. This is also reflected in the setting of targets for the "policy, vision and targets" dimension of the SPP Diagnosis Matrix (Step 2), which is then translated into the action plan in Step 3. Step 4 is particularly important for the operationalization of this key factor, as it includes the collection of difficulties and lessons learned during the implementation of the action plan, contributing to the embedded organizational learning and hence to this key factor. Additionally, organizational culture is reinforced in Step 6, regarding new measures for overcoming any obstacles identified. Strategy is developed in the priority products and services definition in Step 1 and across the whole of Step 2, including the "Policy, vision and targets" dimension of the SPP Diagnosis Matrix, which is then translated into the action plan, in Step 3 and implemented in Step 4. These steps fully operationalize the procurement strategy, allowing alignment with the corporate strategy and the development of an internal vision for solving societal problems [14,17]. The key factor "internal change" is related to the promotion and management of a flexible organizational structure [5,15,26,30,45] and it is therefore developed within the definition of the responsible team, in Step 1, which involves creating an adaptation group to facilitate the process of change. Internal collaboration concerns the promotion of relationships between the organization's various departments [5,14,45] and it is applied while defining the relevant actors, in Step 1 and stakeholders and resources, in Step 3. Finally, the key factor "responsibilities" [1] is developed in the responsible team definition (Step 1), together with responsibilities and planning (Step 3).

Procurement factors focus on practices for supporting GPP, SPP and PPI, including: aggregate demand [20], market research [46], monitoring [7], SME participation [20], Life Cycle Costs (LCC) [21,46], risk management [20], functional criteria/variants [18,20,43,46] and IPR management [20]. All these key factors, excluding monitoring, are operationalized in Step 4, during the preparation of the procurement strategy. The definition of the procurement strategy is a fundamental task, as it defines the level of ambition of each procurement action regarding GPP, SPP or PPI. In addition, procurement factors were already considered in the definition of targets in Step 2, using the "procurement" dimension of the SPP Diagnosis Matrix. The targets are then translated into the action plan, in Step 3 and implemented, in Step 4. The key factor "monitoring" is developed in a similar way: it is considered in Step 2 (targets definition), using the "monitoring and results" dimension of the SPP Diagnosis Matrix and then further developed in Step 3 (action plan), Step 4 (contract management) and, finally, Step 5, which is specifically dedicated to the calculation of indicators and the assessment of results.

Inter-organizational factors relate to implicit knowledge located within collective interactions, which can be oriented towards suppliers, similar organizations and other external stakeholders. Accordingly, this block encompasses the following key factors: suppliers' involvement [3,4,7,14,15,18,25,26,30,43–46,63,64], networking [3,15,16,26,43–45] and external stakeholders [3,15,24,26,43,44]. These are developed in the networking section of Step 1. They are then further implemented in Step 2, targets definition, applying the SPP Diagnosis Matrix ("communication/networking" and "market" dimensions) and then translated into the action plan, in Step 3 and implemented, in Step 4. "Vision" is another key factor that contributes to the inter-organizational factors block. It concerns the spreading of knowledge and best practices to other actors, creating a common vision, eventually shaping local and national strategies [15,46]. This key factor is developed in the networking section of Step 1, as well as in Step 2 (targets definition), applying the SPP Diagnosis Matrix ("communication/networking" dimension). It is then translated into the action plan, in Step 3 and implemented, in Step 4. The inter-organizational factors, by shaping

local and national strategies and aligning policies at national and local levels can eventually influence the regime level, as demonstrated by Gee and Uyarra [15].

The development of practical skills concerning the key factors proposed at the niche level of the STP Model in each step of the SPP Toolbox, described above, is illustrated in Figure 7. It shows that all key factors are operationalized coherently within the SPP Toolbox structure: Steps 1–6 and the SPP Diagnosis Matrix.

Being mainly anchored at the organization level, the SPP Toolbox does not operationalize regime and landscape factors—as envisioned in the STP model. However, it addresses the regime and landscape levels in Step 1, during the analysis of the organization's local, national and European policies and strategies, aligning them with the procurement actions. Furthermore, regime and landscape are taken into account in Step 2, during the development of the organization's long-term vision for sustainable procurement and also in the definition of targets in Step 2, using the "policy, vision and targets" dimension of the SPP Diagnosis Matrix. In both steps, pressures from landscape, as the perceived social/societal, environmental and economic context, influenced by cultural and normative values can be integrated and further developed into the organization' procurement strategy (Step 4). On the other hand, use of the SPP Toolbox can contribute to change the regime and landscape factors in the long term, by contributing to mainstreaming GPP, SPP and PPI strategies, as assumed in the MLP framework.

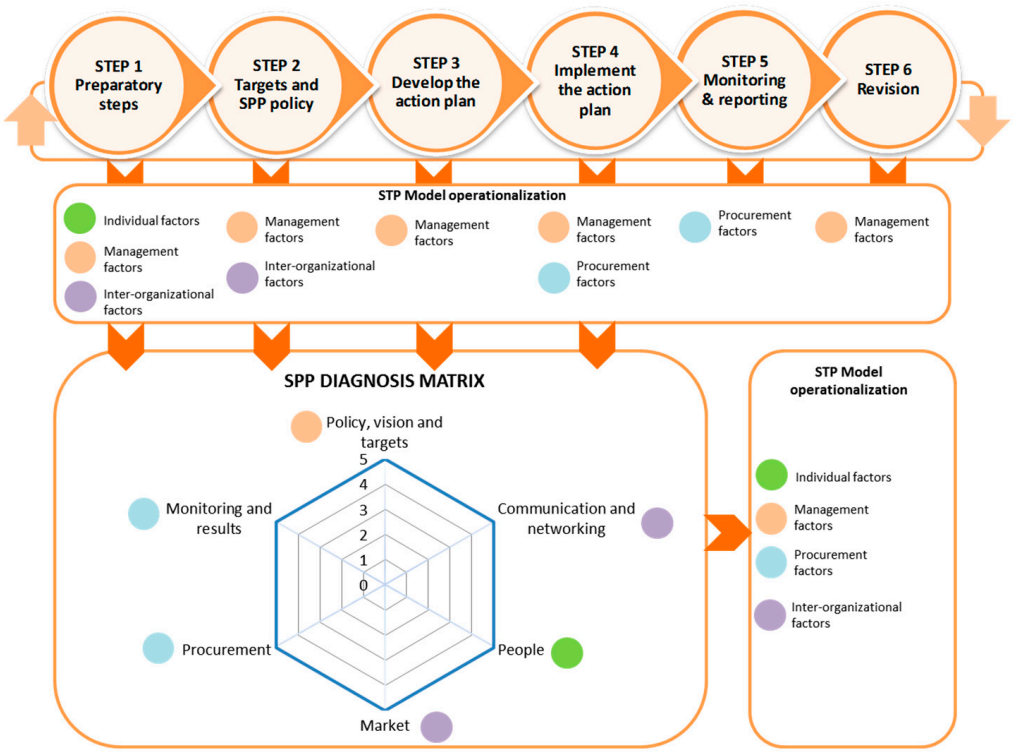

Figure 7. Operationalizing the SPP Toolbox in the STP Model.

7.2. Results from Case Studies

The results of the case studies presented in Section 6 reveal that, despite the differences between the three public organizations and their starting point, all three achieved relevant improvements across the six dimensions of the SPP Diagnosis Matrix: policy, vision and targets; communication and networking; people; market; procurement; monitoring and results. This means that the tool efficiently develops the six dimensions, with a good degree of flexibility, allowing adaptation to different organizational situations. The flexibility of the SPP Toolbox is reinforced by the possibility of

restricting the scope of activities to just a part of the organization and by orientating the SPP action plan to a specific action, or group of actions, as in the case of LIPOR.

In order to track the key factors development in the three case studies, the results were translated into organizational factors and inter-organizational factors, displayed in Table 3. The analysis of this information supports the following findings: (1) organisational factors were well developed in the three cases, achieving a similar situation by the end of the project, in spite of the different starting point of each organization; (2) regarding the evolution of GPP to SPP and PPI approaches, by the end of the project (2014), Torres Vedras and Loures positioned in GPP/SPP practices, while LIPOR started the first steps to PPI by developing functional criteria in the tender; after 2014, Loures and LIPOR raised their ambitions by challenging the incumbent suppliers and expanding the experience to LCC, in the case of LIPOR; these experiments placed those local authorities in a better position to move forward to PPI; this might confirm the need of public organizations to gain experience, starting with GPP and then moving towards SPP and ultimately to PPI; (3) in what concerns inter-organizational factors, relationships with incumbent suppliers changed for all case studies, due to early market engagement activities, similarly to networking activities, establishing the first steps for a shared vision. Thus, inter-organizational factors development, which are the basis for niche formation, were still in an inception phase, with the initial establishment of social networks. Expectations and visions, as well as learning process would need much more development, in order to ensure a success trajectory, as explained in Section 3.

These results compare to Gee and Uyarra [15] findings on the factors required for system change. The empirical study has shown that there is a need to develop both organizational factors (organizational renewal, strategy) and inter-organizational factors (engagement with national bodies, multiple stakeholders, including final users, aligning planning, market and regulations), to ensure systemic changes. Comparing these findings with the results from the three case studies, we can conclude that Torres Vedras, Loures and LIPOR did develop organizational factors and addressed inter-organizational factors in an incipient way. Niche formation would need much development of inter-organizational factors, namely by expanding the social network, creating a shared vision and embedding learning processes.

The case studies also showed that, besides the negative effect of the national regime, the three public authorities were able to integrate issues that formed the wider landscape at European context, as well as from the European regime, illustrating the importance of the influence of bottom-up and top down approaches.

Table 3. Key factors development for the three case studies.

	Individual Factors	Management Factors	Procurement Factors	Inter-Organizational Factors
		Torres Vedras		
2012	**Key factor change actors:** Top management commitment to GPP. **Key factor knowledge:** Head of procurement department with training in GPP.	**Key factor organizational culture:** General GPP policy, no targets; No organizational learning. **Key factor strategy:** No procurement strategy. **Key factor internal change:** No flexible organizational structure. **Key factor internal collaboration:** No internal collaboration. **Key factor responsibilities:** No responsibilities.	Occasional tenders with GPP criteria.	**Key factor suppliers' involvement:** Seldom contacts with suppliers. **Key factor networking:** No networking.
2014	**Key factor change actors:** Top management commitment to GPP/SPP and responsible team for SPP. **Key factor knowledge:** Responsible team with training in GPP/SPP/PPI.	**Key factor organizational culture:** GPP/SPP policy with targets approved by top management; Lessons learned from tenders. **Key factor strategy:** Procurement strategy aligned with corporate strategy. **Key factor internal change:** Flexible organizational structure—responsible team and working team. **Key factor internal collaboration:** Collaboration between procurement, environmental departments and other internal stakeholders. **Key factor responsibilities:** Responsibilities within the responsible team.	Action plan with planned GPP/SPP tenders; Tender -urban pest control services with SPP criteria; SPP criteria definition—school meals; uniforms. Code of conduct for suppliers; Market research activities for priority products/services; Monitoring of indicators defined within the action plan.	**Key factor suppliers' involvement:** Early market engagement—construction works, professional clothes and food/catering. **Key factor networking:** Networking activities with other public authorities.
		Loures		
2012	**Key factor change actors:** Middle management commitment to GPP—champion. **Key factor knowledge:** Head of procurement department with training in GPP.	**Key factor organizational culture:** No GPP policy, no targets; No organizational learning. **Key factor strategy:** No procurement strategy. **Key factor internal change:** No flexible organizational structure. **Key factor internal collaboration:** No internal collaboration. **Key factor responsibilities:** No responsibilities	Occasional tenders with GPP criteria	**Key factor suppliers' involvement:** Seldom contacts with suppliers. **Key factor networking:** No networking
2014	**Key factor change actors:** Top management commitment to GPP/SPP and responsible team for GPP/SPP. GPP/SPP personnel performance indicators. **Key factor knowledge:** Responsible team with training in GPP/SPP/PPI.	**Key factor organizational culture:** GPP/SPP policy with targets approved by top management; Lessons learned from tenders. **Key factor strategy:** Procurement strategy aligned with corporate strategy. **Key factor internal change:** Flexible organizational structure—responsible team and working team. **Key factor internal collaboration:** Collaboration between procurement, environmental departments and other department in criteria definition for tenders. **Key factor responsibilities:** Responsibilities within the responsible team.	Action plan with planned GPP/SPP tenders. Tenders—surveillance services; school transportation; pest control services with SPP criteria; Code of conduct for suppliers; Market research activities for priority products/services; Monitoring of indicators defined within the action plan.	**Key factor suppliers' involvement:** Early market engagement—food/catering. **Key factor networking:** Networking activities with other public authorities.

Table 3. *Cont*

	Individual Factors	Management Factors	Procurement Factors	Inter-Organizational Factors
		LIPOR		
2012	**Key factor change actors:** Top and middle management commitment to GPP. **Key factor knowledge:** Head of procurement department with training in GPP.	**Key factor organizational culture:** No GPP policy, no targets; No organizational learning. **Key factor strategy:** No procurement strategy. **Key factor internal change:** No flexible organizational structure. **Key factor internal collaboration:** No internal collaboration. **Key factor responsibilities:** No responsibilities.	Occasional tenders with GPP criteria.	**Key factor suppliers' involvement:** Seldom contacts with suppliers. **Key factor networking:** No networking.
2014	**Key factor change actors:** Top management commitment to GPP/SPP and responsible team for GPP/SPP. **Key factor knowledge:** Responsible team with training in GPP/SPP/PPI.	**Key factor organizational culture:** GPP/SPP policy with targets approved by top management; Lessons learned from tenders. **Key factor strategy:** Procurement strategy aligned with corporate strategy. **Key factor internal change:** Flexible organizational structure—responsible team and working team. **Key factor internal collaboration:** Collaboration between procurement, sustainability and energy departments and other department in criteria definition for tenders. **Key factor responsibilities:** Responsibilities within the responsible team.	Action plan with planned GPP/SPP tenders; Tenders—cleaning services with SPP/PPI criteria—functional criteria; Code of conduct for suppliers; Contract monitoring plan; Market research activities for priority products/services; Monitoring of indicators defined within the action plan.	**Key factor suppliers' involvement:** Early market engagement—cleaning services. **Key factor networking:** Networking activities with other public authorities.

8. Conclusions

The purchasing power of public authorities is a market factor with enormous potential to contribute to sustainable development [1] but it is often orientated towards off-the shelf products (goods, services). The procurement of existing products should be partially replaced by the procurement of results, in terms of solving societal problems and satisfying needs [43]. Furthermore, this solving of societal problems and thus public procurement, should be framed in terms of contributing to socio-technical transitions towards sustainability.

This paper proposes a new tool—the SPP Toolbox, for guiding and supporting public organizations as they re-think the procurement process, raising their ambitions and broadening their vision, thus changing the organizational approach towards culture, strategies, structures and practices. It targets procurement organizations and their transformative potential, enabling to assemble a range of perspectives in a single tool.

First, the toolbox integrates insights from GPP, SPP and PPI approaches, allowing different practices, according to the organization's vision, procurement strategy and the level of ambition that was defined. This allows for flexibility in terms of goals, yet promoting an increasing complexity of institutionalized practices and skills—from GPP to SPP and then from SPP to PPI. The results from the SPP Toolbox testing, based on three case studies, suggest that public organizations need to follow a learning curve by gaining experience, starting with GPP and then moving towards SPP and ultimately to PPI. As shown both in the cases of Loures and LIPOR, this is an iterative process that builds on experience and broadening of the vision.

Second, the toolbox follows a systemic approach embedded into the organizational strategies and the management cycle. The integration of new procedures into organizational strategies allows that the considerable cultural, managerial and operational changes required contribute effectively to sustainability. These results are in line with previous work from Testa et al. [5]; Amann and Essig [7] for GPP, from Bratt et al. [17] for SPP and from Knutsson and Thomasson [16] for PPI.

Third, it includes insights from socio-technical transitions framework, considering public procurement as an additional mechanism for niche formation, through the three main niche processes: (i) shaping of expectations—articulating expectations and visions in order to attract resources and new actors and provide direction to the process; (ii) building social networks—new combination of actors, in order to promote the emergence of new social networks; and, (iii) learning processes—enabling social embedding to increase chances of successful diffusion [41,42]. This is supported by Gee and Uyarra' [15] empirical study, which has shown that there is a need to develop both organizational (organizational renewal, strategy) and inter-organizational factors (engagement with national bodies, multiple stakeholders, including final users, aligning planning, market and regulations), to ensure systemic changes.

The three case studies illustrate the improvement of the organizational factors, which are of primary importance for supporting the process of organizational change. The development of inter-organizational factors, which are the basis for niche formation, was still in an inception phase, corresponding to the initial establishment of social networks. Expectations and visions, as well as learning process would need much more development, in order to ensure a success trajectory and influence the regime. Hence, a thoroughly development of PPI activities would be needed, to strengthen the three main niche processes. This shows the interdependence between GPP/SPP and PPI activities to ensure systemic changes: GPP and SPP activities ensure the development of the organizational factors and the first steps of inter-organizational factors, while PPI ensures even more development of organizational factors but mainly, the development of inter-organizational factors. In this way, despite the focus at niche level of the SPP Toolbox, the full implementation of the inter-organizational factors can eventually influence the regime, as represented in Figure 8.

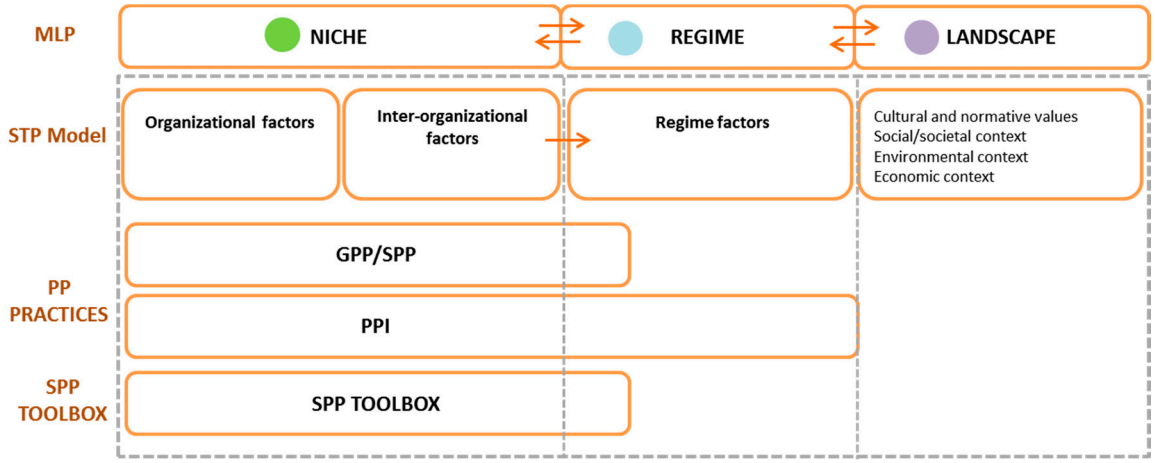

Figure 8. Relation between MLP perspective, STP Model, public procurement (PP) practices and the SPP Toolbox.

The main contribution of this study lies in the fact that it provides a tool that assembles a range of perspectives (Figure 8), guiding and supporting public organizations, as they re-think the procurement process.

To sum up, the main contribution of this study lies in the fact that it provides a tool for guiding and supporting public organizations, as they re-think the procurement process. The SPP Toolbox incorporates different approaches at different levels, including procurement practices (GPP, SPP, PPI) and individual, management and inter-organizational dimensions, into one tool. This allows for flexibility in the objectives to be achieved, which can be developed in increasing degrees of complexity. Furthermore, this study operationalizes a theoretical approach—the STP Model (based on a literature review on GPP, SPP and PPI, within the context of the emergence of socio-technical transitions)—into a practical tool. Thus, it provides crucial insights, contributing to the progress in this field.

This work constitutes a timely contribution to the debate regarding the role of the public sector in achieving sustainable development, given that insufficient attention that has been paid, up to now, to how public organizations can effectively orchestrate the emergence of new socio-technical systems using public procurement as an additional governance mechanism [15].

Future studies might seek to extend the application of the SPP Toolbox, through further cases, especially focused on PPI, fully developing inter-organizational factors and relating them with the niche formation process.

Acknowledgments: The authors would like to thank to NOVA School of Science and Technology and LNEG—National Laboratory of Energy and Geology, I.P. for their role in facilitating this research. Part of this research was funded by LIFE+ programme (contract number LIFE 09 ENV/PT/50). CENSE is financed through the Strategic Project Pest-OE/AMB/UI4085/2013 from the Portuguese Science and Technology Foundation. The authors would also like to thank the anonymous reviewers of this paper for helpful suggestions that have improved the paper.

Author Contributions: Paula Cayolla Trindade conceived and designed the SPP Toolbox and wrote the paper. Paula Antunes and Paulo Partidário have provided overall guidance for the research and have significantly contributed to the structure and revision of the paper.

Conflicts of Interest: The authors declare no conflict of interest. Part of this research was funded by LIFE+ programme (contract number LIFE 09 ENV/PT/50). The founding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript and in the decision to publish the results.

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