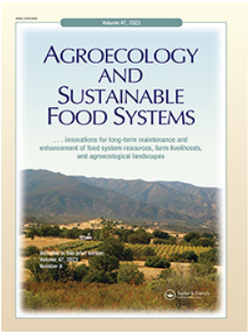

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The contribution of green public food procurement to sustainability: evidence from two case studies in Spain

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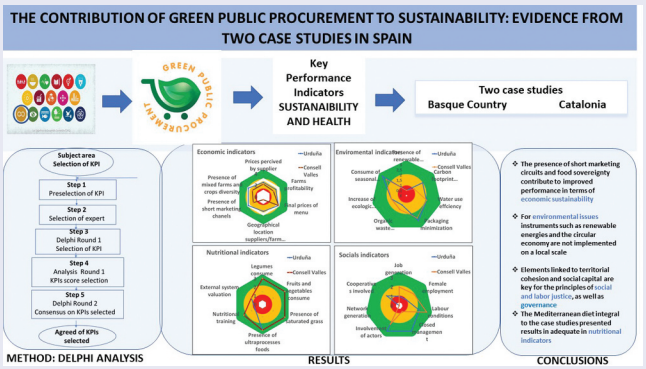
ABSTRACT

Green Public Food Procurement (GPFP) has revealed itself to be an ally for achieving ecological transition objectives, however there is little work attempting to assess its contribution. This work proposes a set of sustainability and health indicators that comprise a tool able to evaluate the performance of GPFP. A Delphi analysis and a participatory process is used to determine Key Performance Indicators that have been tested through two case studies in Spain. The results obtained show that the presence of short marketing circuits and food sovereignty and institutions rooted in the territory contribute to improved economic sustainability and good performance in terms of health. However, for environmental issues the performance is somewhat lacking, as instruments such as renewable energies and the circular economy are not implemented on a local scale. Elements linked to territorial cohesion and social capital are key for the principles of social and labor justice, as well as governance, to prevail. The Mediterranean diet integral to the case studies presented results in adequate health indicators. These types of indicators would be a useful tool for introducing sustainable food certification as a driving force for changing the food model.



KEYWORDS

Green public procurements; key performance indicators; sustainability; food system; Delphi method; school canteen

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Introduction and objectives

Over the past two decades of this century, the sustainability of the food system has been questioned (Chaudhary, Gustafson, and Mathys 2018). We live in a globalized world where production and consumption patterns have become universal (Movilla-Pateiro et al. 2021). The issue of food security is a global and dual problem, affecting food availability that results in malnutrition problems and poor diet quality, influencing both health and well-being. It is evident that a deterioration of the food model in terms of health is occurring in both developing and developed countries (Afshin et al. 2019).

We are facing a global problem that has been addressed through global agreements, such as the 2030 Agenda proposed by the United Nations, which commits the signatory countries to comply with 17 sustainable development goals (SDGs) (United Nations UN 2019). The European Union is also tackling the unsustainability of a food system that affects not only people's health but also ecosystems through the impact of climate change and biodiversity loss. The change in the agricultural production model implies the loss of land associated with rural areas and family farming (De Schutter, Jacobs, and Clément 2020). The Green Deal launched by the European Commission through the Farm to Fork Strategy – the main agricultural and food instrument – proposes specific objectives for the year 2025 linked to the use of pesticides and fertilizers and an increase in the ecological surface area (European Commission EC 2020).

The European Common Agricultural Policy (CAP) is endowed with a budget able to promote a production model that is complicit in achieving Farm to Fork objectives. However, there are discordant voices suggesting that the CAP may not be the most appropriate instrument for advancing toward sustainable forms of food production, marketing and consumption (Arabska 2021).

In the municipal scope, a slower and less ambitious movement is proposing initiatives in accordance with the 2030 Agenda; the Milan Pact is a clear example of this (FAO 2018). The signatory cities to the pact agreed on the need to transform the food system in order to achieve the SDGs and comply with the Paris agreement on the fight against climate change. This transformation should generate benefits in the social, economic and environmental spheres, including the eradication of poverty, as well as the mitigation and adaptation to climate change. This consensus implies a radical change in the current paradigm of the 20th century agrarian model, and will affect the food system, agriculture and life in rural areas. These are local initiatives to address a global problem, and implemented with an eminently practical approach, sharing experiences, collaboratively developing innovative solutions, that seek to promote sustainable and territorialized systems of food production-marketing and local consumption (Caron et al. 2018).

Among these solutions is a tangible, but less highly regarded instrument despite its enormous potential to achieve the aforementioned objectives: Green Public Food Procurement (GPFP) (Fuentes-Bargues, Ferrer-Gisbert, and González-Cruz 2018). The traditional role of public institutions has been limited to designing aid and financially supporting instruments that stimulate change, in line with the support model for sustainable agriculture proposed by the CAP, for example. However, the public authorities can also promote changes by participating in the market, demanding products or services, or even as an intermediary (Bocchi et al. 2019). In this sense, there are two market-intervention models that could be adopted by the public sector. On the one hand, there is the developing country Public Food Purchase developed by developing countries, fundamentally focused on Latin America, where public agencies or the State buy raw materials from farmers directly in order to promote a fair and equitable trade mechanism for the peasantry, acting as an intermediary between bidders and applicants in most cases (Bravo, Sotomayor Echenique, and Mulder 2022; Fonseca, Vergara, and Prada 2014; Miranda 2018). Alternatively, the model proposed in developed countries, and fundamentally in Europe, is based on public sector participation in the contracting process, Public Food Procurement. This process often involves competitive bidding, with the goal of obtaining high-quality, nutritious food at a reasonable price, involving indirect market intervention based on the establishment of a regulatory framework that allows criteria to be included in the contract specifications of private companies in charge of supplying services to public institutions, such as, in the case of the food sector, the catering establishments of public institutions like school canteens, universities, residences, and so on. In 2019, the European Commission launched a working document encouraging the public sector to introduce green criteria in public procurement (European Commision EC 2019). In line with this document, the Spanish Government approved the Green Public Procurement Plan (MTERD 2019). As this is a voluntary process in terms of food supply contracts, it has had little progress so far, and neither its impact nor effectiveness are evident (Schebesta 2018).

Public Procurement represents approximately 12% of the GDP of OECD countries (OEDC 2019), the use of "green" criteria in public procurement (GPP) can be a very effective way of stimulating sustainable production through the consumption of greener products. The potential of GPP could be substantiated by guiding production and consumption trends and fostering demand for environmentally friendly products and services (Testa et al. 2016). The universalization of GPP and public contracts has been accelerated through the commitment to comply with the 2030 Agenda, to the extent that objective 12 —Promote sustainable public procurement practices – explicitly includes the promotion of GPP.

Several studies have assessed focusing on either the carbon footprint under the food product life-cycle approach (Cerutti et al. 2018) or analyses of environmental criteria in the food cycle at different scales (Neto and Gama Caldas 2018).

Focused on food sector, the extensive scientific literature review carried out by Molin, Martin, and Björklund (2021), shows that the sustainability of GPP, mainly in Western countries, has been analyzed using a limited approach restricted to one of the dimensions that make up sustainability. These studies focus on evaluating the environmental benefits of GPP by calculating the carbon footprint (quantitative data) of or production or local food consumption (Cerutti et al. 2016; Perez-Neira, Simón, and Copena 2021). Other works analyze environmental criteria in terms of the food cycle at different scales (Neto and Gama Caldas 2018) or introduce qualitative assessments of certain good practices that contribute to sustainability (Basque Goverment 2020; Pacheco-Blanco and Bastante-Ceca 2016). However, no academic studies have been found that assess the three dimensions of sustainability of PFP, since this form of contracting has been regulated more recent than other sectors. Moreover, the social aspects focus on the benefits provided by the consumption of healthy foods, their fair trade, the improvement of working conditions, or the educational aspects that GPFP entails (Andrecka 2017). Even so, Molin, Martin, and Björklund (2021 claim a holistic view of the problem, trying to capture the work carried out by the actors involved in the process as they can provide a richer empirical base.

However this form of contracting has been regulated more recent than other sectors. That is why we consider it necessary to advance further in this issue, taking a multidimensional indicator-driven approach to determine how GPFP contributes to achieving the SDGs and the Paris agreement. That is why we consider it necessary to advance further in this issue, adopting a holistic approach to design multidimensional indicators with the objective of evaluating how GPFP (Green Public Financial Policies) contribute to achieving the Sustainable Development Goals and the Paris Agreement.

The objective of this work is to explore this gap, analyzing GPFP based on the proposal of a battery of indicators to assess its contribution to sustainability in its three dimensions, including a fourth that emphasizes its contribution to improving health. The product life-cycle is taken as a reference, incorporating the different phases of the value chain from primary production to distribution and the final consumer. The indicators have been selected through the consensus reached using the Delphi method, and these have been tested in two case studies based on the contracting of school canteen services in two areas of Spain with very different agricultural and logistical contexts, i.e., the Basque Country and Catalonia.

To this end, the work has been organized as follows: the next section presents the method used to select the indicators, based on a Delphi analysis,

with a questionnaire directed to experts and agents involved directly or indirectly in the case studies; the method used to assess them in the two study areas is presented in the subsequent section; the results section shows the final assessment through the proposed sustainability and nutritional indicators; and finally, the results are discussed and the most important conclusions drawn from this comparative assessment are advanced.

Material and method

The extensive scientific literature review carried out by Molin, Martin, and Björklund (2021), shows that the sustainability of GPP, mainly in Western countries, has been analyzed using a limited approach restricted to one of the dimensions that make up sustainability. These studies focus on evaluating the environmental benefits of GPP by calculating the carbon footprint (quantitative data) of or production or local food consumption (Cerutti et al. 2016). Other works analyze environmental criteria in terms of the food cycle at different scales (Neto and Gama Caldas 2018) or introduce qualitative assessments of certain good practices that contribute to sustainability (Braicu et al. 2020; Pacheco-Blanco and Bastante-Ceca 2016). Moreover, the social aspects focus on the benefits provided by the consumption of healthy foods, their fair trade, the improvement of working conditions, or the educational aspects that GPFP entails (Andrecka 2017). Even so, the authors claim a holistic view of the problem, trying to capture the work carried out by the actors involved in the process as they can provide a richer empirical base. According to Molin, Martin, and Björklund (2021), the current scientific literature may not comprehensively depict the efforts of various stakeholders in promoting sustainable public procurement of food. As a result, the findings could be improved by incorporating additional gray literature or conducting interviews with practitioners to obtain a more extensive empirical foundation. In this regard, the study has incorporated gray literature that reflects the experience of programs implemented in the regions under investigation, supplemented by interviews with experts involved in the process both within and beyond the academic sphere. This approach has the potential to serve as a model for initiating a transformative process.

This material constitutes the framework of the method used in this work. Firstly, as a starting point, a set of indicators is proposed to evaluate GPFP in terms of sustainability and health, and reduce them so that they are more manageable and define when the process is performing well.

The Delphi method is a scientific technique used for collecting the opinions of experts and/or stakeholders for decision making purposes (Carrera and Mack 2010). In our case, a panel of experts was appointed to conduct two rounds of interviews, supplemented by in-person discussions with agents involved in GPFP. The objective was to achieve a consensus on the indicators

and assessment process. This set of consensus indicators was empirically validated based on two case studies in two pioneering Spanish regions: Catalonia and the Basque Country.

The ultimate goal was to validate this method to the extent that it could be replicated in other similar experiences, being established as a GPFP certification protocol by the institutions that finance these. The need for a battery of replicable indicators arises from the demand by the Spanish Ministry of Ecological Transition that these indicators be included as criteria in the contract specifications.

Indicators selection: the Delphi method

The main premise of this selection is that the indicators must be useful for making fair and rigorous comparisons in space and time, determining the tendencies of the process that explain the changes and their causes, and helping to guide political decision-making. Figure 1 shows the stages followed to select the indicators.

Most of the work dealing with food sustainability indicators are based on an extensive literature review of the subject, addressing a more or less ambitious meta-analysis (Cheng et al. 2018; Kumar, Mangla, and Kumar 2022). Most

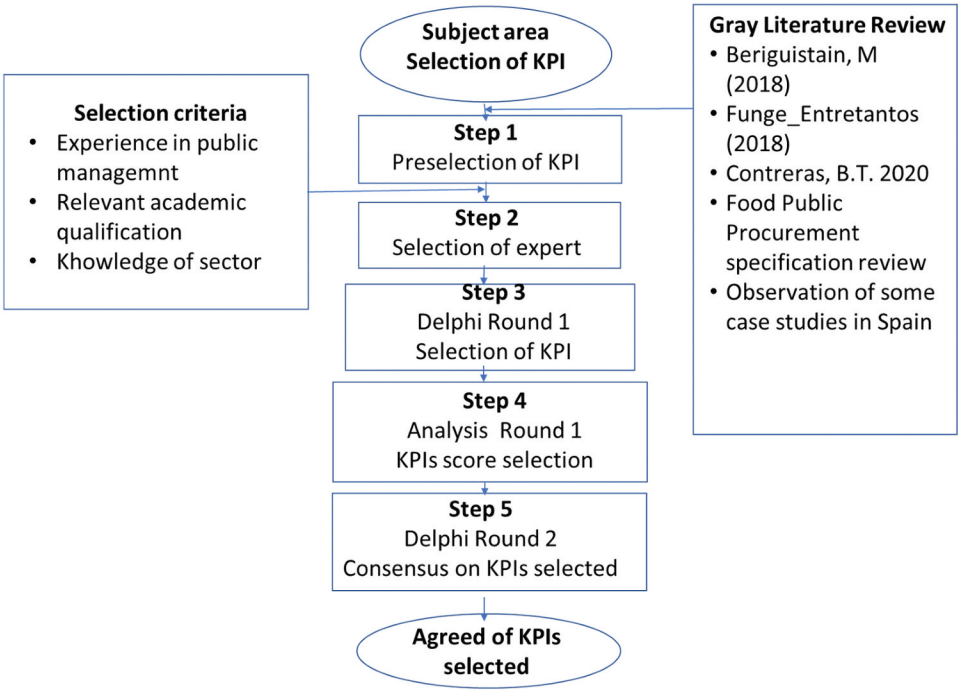

Figure 1. Flow chart for selecting key performance indicators (KPI) based on Ahmad and Wong (2019).

studies focus on proposing agreed indicators selected through a meta-analysis, in most cases involving an analysis between countries, based on data from official sources, such as the FAO or World Bank (Landert et al. 2017).

In our case, in line with the recommendations of Molin, Martin, and Björklund (2021), we chose to carry out this review based on the gray literature existing in the field of agroecology and certain other proposals for evaluating food strategies in Spain. Academic work proposing indicators in the field of GPFPs have also been consulted, but none were found to specifically focus on the food field. This is how the works of Begiristain (2018), Funge-Entretantos (2018) and Contreras (2020) have been followed. These works analyze and evaluate, in terms of sustainability, some of the pioneering initiatives launched by member municipalities of the MiIan Group that are committed to a new food model. Begiristain (2018) proposed a broad range of indicators for assessing the sustainability of agroecological production following the hierarchy of principles, criteria and objectives. Funge-Entretantos (2018), analyzed the food strategy implemented in the city of Valladolid, evaluating its contribution to global sustainability. Lastly, the work of Contreras (2020), focused explicitly on the proposal of a GPP model, establishing the regulatory framework needed to develop and promote GPFPs at the municipal level.

For this pre-selection (Rico and Gómez-Ramos 2021), a hierarchical structure of the indicators was considered according to a scheme of principles, criteria and indicators that allow each of the four proposed complex objectives (economic, environmental, social and health and nutritional sustainability) to be systematized through the calculation of parameters that can be monitored and evaluated and which serve as a basis for drawing up the final conclusions. Consequently, the hierarchical structure for monitoring each of the four dimensions or objectives would have the following levels, in decreasing order (Begiristain 2018; Gómez-Limón and Arriaza 2011): firstly, objectives are defined in line with the three dimensions of sustainability, plus nutritional; secondly the rules for achieving the sustainability of the four objectives within the framework of GPFP are defined; thirdly, the criteria are understood as the state resulting from respecting the principles and objectives of the GPFP; and finally, at the last level, the indicators are determined, understood as both quantitative and qualitative variables that allow the degree of compliance with the established criteria to be measured.

The pre-selected objectives, principles and criteria were evaluated by the group of experts for their final selection. This phase constituted round 1 of the Delplhi method, as shown in Figure 1. To select the experts who participated in the two questionnaire rounds and the subsequent focus group, we followed the work of Ahmad and Wong (2019), considering a heterogeneous group of 12 experts to be appropriate. Three were from the academic field whose research career (peer-reviewed indexed publications) demonstrates their knowledge of the field. Four administration experts were selected; these are

managers involved in real GPFP cases, either as direct managers or because they participate in the design of strategies at the municipal level. Thirdly, two stakeholders were selected to represent the group of direct beneficiaries of the GPFP model, since they are the representatives of the children who consume meals in the school canteens, although they are not part of the cases examined in this study. Lastly, was a group made up of three people who represent NGOs, who are involved in promoting and disseminating the implementation of public purchasing processes in various locations. There was also a nutritionist involved in reviewing the current food model. However, farmers and other suppliers were not included in the Delphi process, and therefore the discussion cannot be considered as a participatory process.

In the first Delphi round, a questionnaire was sent to the experts aimed at reaching a consensus on the pre-established principles and criteria and, based on these, selecting the indicators. It was a semi-structured questionnaire with questions on the suitability of the criteria and principles presented in Tables 1 to 4, with the possibility that these could be rejected or a new aspect incorporated. To agree on the battery of indicators associated with each criterion, a Likert scale was been proposed so that those which obtained a low rating (under three) were eliminated. Subsequently, the information obtained from the questionnaires was reorganized to edit the proposal of indicators. These were discussed by the same experts in a participatory debate session. After this, a second questionnaire was sent where the panel was asked to make their final selection of indicators and establish a range of values with which to test the performance of these indicators in the case studies to be analyzed.

The selection had to have: a solid analytical base; observable and measurable indicators; relevance for the sustainability and nutrition of the purchasing system analyzed; a clear, transparent and standardized method; relevance for political decision making; sensitivity to changes in time and/or space; the

Table 1. Principles, criteria and indicators linked to economic sustainability.

DIMENSIONS	PRINCIPLES	CRITERIA	INDICATORS	DEGREE OF CONSENSUS (mean and SD)
Economic sustainability	Equity and economic stability	Prices agreed by market chain agents	Prices perceived by suppliers	4.7 (0.44)
		Profitability for suppliers and producers	Farm profitability	4.5 (0.72)
		Final prices accessible to consumers	Final price of the meals	4.3 (0.82)
	Less intensive and more diverse farms	Proximity to the region and short marketing circuits	Geographical location of suppliers/ producers	4.8 (0.42)
			Use of short marketing circuit	4.8 (0.42)
		Agriculture and livestock systems connected to the region	Presence of crop diversity and mixed farms	INCLUDED *EX POST*

possibility of being transferred to various public food purchasing systems in different regions (Gómez-Limón and Arriaza 2011). The premises of Chersan et al. (2020) were also considered, that is, the possible correlation that could exist between indicators, either direct or indirect, since a minimum of correlations between indicators can suppose an overvaluation of these. In addition, following the pragmatic approach of Pannell and Glenn (2000), indicators were chosen which were reasonable in terms of the costs and time involved, in line with operational logic.

At this point, it was proposed that we should address the question of weighting the criteria associated with the indicators. The method selected to weight and aggregate the indicators introduces important subjectivity (Rowley et al. 2012). Some analysts prefer not to specify the relative importance of criteria, believing that this process introduces subjectivity. However, avoiding weighting requires the decision-maker to apply an implicit, nontransparent valuation such as assigning each criterion equal importance (Rowley et al. 2012). For Rowley et al. (2012), the weight assigned to the criterion is highly influenced by who the decision-maker is and their final role in the process. In our case, where we are assessing the sustainability of a public food procurement process using indicators, the final decision-maker is the public institution that establishes the purchase specifications when contracting a service; in this case, the scales established will be stated in the specifications for each of the ecological, social responsibility, or economic criteria. We therefore think that is not the time to assign weights to each sustainability component analyzed.

Indicator testing: key performance indicators

The proposed indicators were validated using two case studies that will be presented in the following section. To assign a value to the proposed indicators in each case, the following information sources were used:

- Contract documents for the school canteen service (CD). The contract specifications establish the minimum requirements that must be met by the bidding companies to be awarded the provision of a public service, as well as the criteria established to assess the offers submitted. Some indicators can be evaluated and assessed by analyzing the contracting criteria, to the extent that a clause is introduced requiring compliance. These could also be valued positively through the scales established to rate the offer.
- Direct interviews (I): with the managers responsible for the school canteen services who are in charge of supervising the operation, from the supply chain and its logistics to the control of the menus, both from the dietary and economic perspectives.

- Monitoring of the value chain of each case study (M). It is essential to closely control the food distribution, storage and consumption logistics model, since information on certain indicators and their value can only be obtained through this.

Cases studies

Two different agronomic and institutional contexts were considered to test the GPFP indicators. Both cases have been running for more than two years, allowing valid conclusions to be drawn based on the evidence observed.

To present the two case studies, we used a method based on the work of Braun et al. (2018), focusing on the structuration theory approach to explore the value chain according to the practices of the agents that supply food to the canteens.

The structuration theory approach analyzes, on the one hand, the behavior of the agents in the chain, in terms of their internal organization (attitudes, contracting rules, relationship with other actors, and market development) and the practices carried out linked to purchasing processes, collaboration, or marketing strategies. To present the two case studies, it was essential to understand the logistics model, from the collection of food from suppliers to its transport and distribution to the schools analyzed.

This qualitative method is not intended to make an in-depth analysis of the functioning of the case study value chains, since this is not the goal of this work; instead, it presents the value chain of each case study in terms of the behavior of the agents, as well as from an analysis of the external factors that condition the operation.

The value chain

The municipality of Urduña, in the interior of the Basque Country, a region located in the north of Spain, was selected as a case study (Figure 2). Agriculture in the area comprises small, non-specialized farms, dominated by products linked to small local producers and extensive cattle and sheep farming for milk and dairy products, as well as meat, particularly native breeds. The Basque region has a gastronomic tradition that is deeply rooted in the population, which is why its food model is strongly linked to the territory, and there is significant development of quality brands linked to the local area (Muñiz-Martínez and Florek 2021). This means that short marketing circuits are prevalent, especially in rural areas (Malagón-Zaldua, Begiristain, and Onederra-Aramendi 2018). This context determines the value chain linked to the food purchasing process based on green food

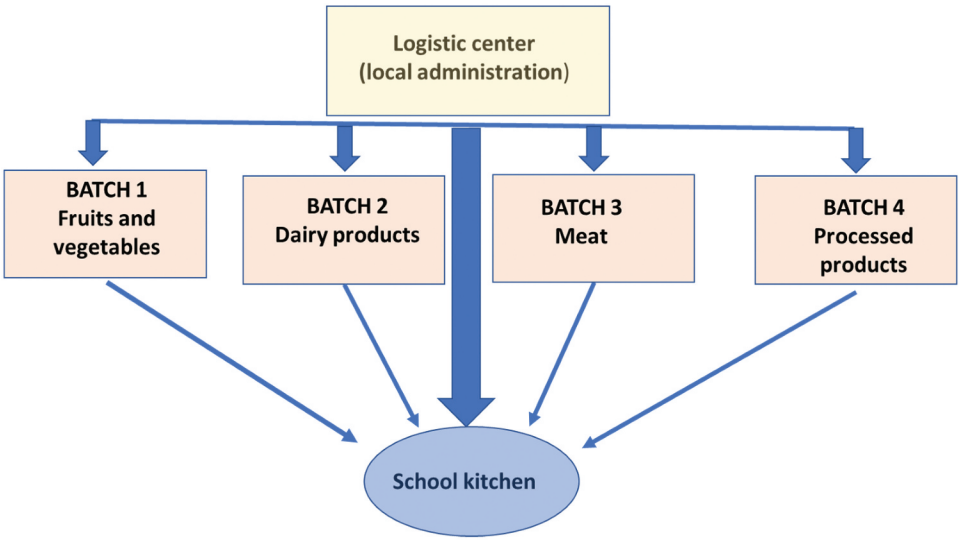

Figure 2. Flow chart of the GPFP Urduña-Biscay food value chain (Basque Country).

contracting. Figure 2 shows the flow chart that defines the value chain of school canteens in Urduña, Biscay.

The Urduña food GPFP purchasing model is centralized, and a municipal manager is in charge of directly managing the school canteen that is under municipal jurisdiction. There is a direct relationship between the manager and the suppliers who are farmers or retailers who have been contracted *ad hoc* to supply through the contracting specifications according to the established criteria. The main characteristic of this type of contracting is that specific batches of products are supplied separately, with, for example, a supplier for dairy products, another for fruit and vegetables, another for meat, and so on. In turn, the canteen manager has direct responsibilities in terms of managing the menu, controlling the raw material and its processing. The stipulations of the specifications are adapted to the criteria established by the Spanish Green Public Procurement Plan (MTERD 2019) so that the ecological criteria linked to the proposed sustainability indicators are valued highly in the scale established in the specifications. This includes aspects such as packaging (by type and size of container, valuing reusable packaging more than recyclable), type of product (organic or with a quality label), supplier location (valuing the shortest distance), supplier impact on the regional economy (assessing the type of employment generated considering quality and gender), and aspects related to distribution logistics (time and delivery capacity) and the price perceived by suppliers.

In case 1, the local administration manages a logistics center that supplies food for the menu to the kitchen. The producers are differentiated by batches, and each batch has its own specifications. Each producer supplies the food in

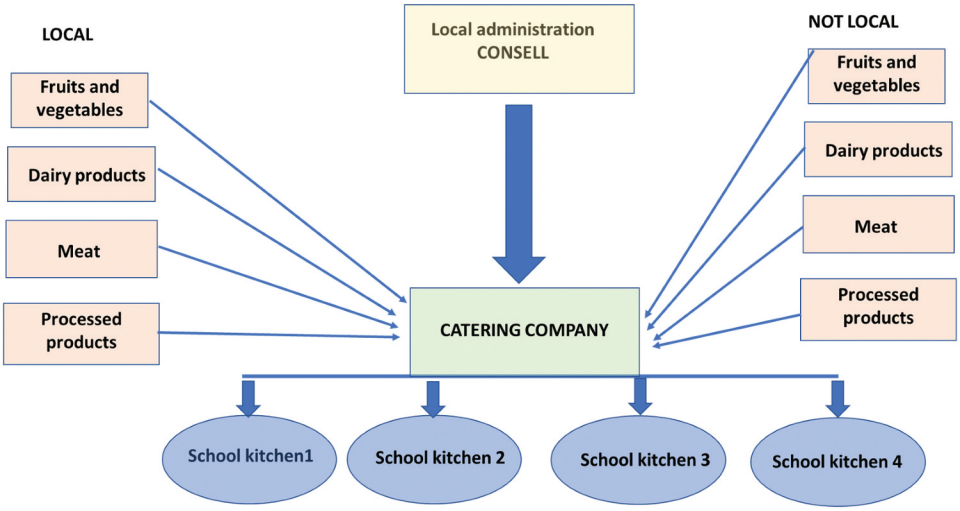

Figure 3. Flow chart for food value chain for the GPFP of Consell del Vallès (Catalonia).

a timely and proper manner, according to their specifications, which are checked by the logistics center.

The second case study is located in the Catalan region of El Vallès, in the province of Barcelona (Figure 3). El Vallès Oriental is one of the largest regions in the province of Barcelona with a total of 734.96 km^2, and is situated in the extreme northeast of the region, in the Catalan pre-coastal zone. It is an area with predominantly medium-sized and small-medium municipalities, with less than 1,000 inhabitants per municipality. Agriculture is focused on Mediterranean crops (cereals, legumes, olives, and almond trees). On irrigated land the main crops are summer vegetables (tomatoes, courgettes, aubergines) and fruit trees. Livestock is mainly porcine (intensive production) although there are also sheeps and goats in semi-intensive production.

The Catalan GPFP model is committed to outsourcing the purchasing process, in other words, there is a catering company that is responsible for preparing the meals and transporting them to the different schools. The administrative work is carried out by the Consell, (a group of municipalities that share some public services and supplies) after complying with the contract specifications by the catering companies. The specifications established in the contract reflect the main ecological criteria, prioritizing organic production, local varieties of vegetables, local production, and the location of the central kitchen. The food footprint calculation is weighted by food type. The local administration controls the quality of the meals based on the origin and quality of the main ingredients, according to the information provided by the caterer. They have no direct relationship with local suppliers and producers. The information contained in the invoices is used to verify compliance with the above specifications.

External conditioning factors and outcomes

The external aspects that define the progress in terms of sustainability in the Basque Country are highly conditioned by the advances made by the Basque Government in promoting GPP. In this sense, a specific strategy was launched (Basque Goverment 2021) to quantify the objectives for 2030. Although today GPFPs focusing on the food sector are not generalized, the new 2030 strategy is trying to change this situation. The food sector is considered strategic so it includes a specific measure to promote organic farming, which is an essential tool for protecting the natural environment and biodiversity, a priority in the environmental strategy (Basque Goverment 2021).

This favorable socio-political environment is strengthened by consumer awareness of the role of local production as an essential element for protecting regional values, which are deeply rooted in this region (Muñiz-Martínez and Florek 2021). For years, this has favored the promotion of local and organic agriculture and its commercialization through short marketing circuits. In this sense, the Basque Government has launched a Strategic Plan for Gastronomy and Food (Basque Goverment 2020), the objective of which is to include gastronomy and food as a strategic sector in the region's economy due to its capacity to generate employment and economic activity, preserve the gastronomic cultural heritage of the area, as well as the natural and landscape resources.

The external constraints of the Catalan case also favor the development of GPPs in the food field. As in the previous case, the Catalan Government has also developed a Strategic Plan to promote GPFPs by 2025 (Catalonia Government 2022), setting objectives for the number of contracts awarded and money billed in the food sector. Previously, in 2022, guidelines were published for the inclusion of ecological criteria in public procurement for school canteens. It is a detailed guide that specifies criteria for the different catering management models, e.g., sites with their own kitchen, with no kitchen, dining rooms with microwaves, and vending machines. The guidelines together with the GPP action plan favor the promotion and therefore the growth of this type of initiative, and the recommendations contained in the specifications are being included almost universally. It should be noted that these recommendations are limited to nutrition and environmental aspects related to the origin of the food. They do not cover the more transversal aspects linked to the region or social aspects.

Results and discussion

Analysis and selection of indicators

The following tables show the final sustainability and nutritional indicators selected, highlighting the degree of consensus measured through the Delphi analysis, after the second-round questionnaire.

Focusing on economic sustainability, as key dimension of sustainability, that involves ensuring the ability to maintain a level of production (be able) and consumption in the future (viable), while considering natural and human resources in an equitable manner (equity) (Ayres 2008).

The participants agreed that a less productive and finalistic agriculture would be in line with the objectives of GPFP, so the principles of diversification and low production intensity were ultimately included instead of the initially proposed concept of agrarian development. The best criterion for achieving equity and economic stability was discussed, and it was concluded that this could be achieved through prices agreed between producers and buyers with no intermediaries involved. To measure farm diversification and connection with the region, *a posteriori* it was decided that a new indicator should be included which values crop diversification and mixed agricultural-livestock farms (see Table 1). The principles and criteria that underlie the economic sustainability indicators presented in Table 1, approximate the concept of food sovereignty in that they promote the diversification of production and the development of local economic systems, such as short food supply chains, thereby strengthening the local economy and creating jobs in rural areas (Cervantes-Godoy and Martínez-Torres 2013).

When assessing the profitability of a farm, we use the economic indicator of gross margin for the crops, which is calculated as the difference between total income and total cost, direct and indirect but without including amortization of capital assets. However, when evaluating the profitability of other suppliers, we only consider the return on capital and do not include self-employment. In both cases we compared its with the average of the sector

The price of the daily menu is an indicator of equity, in that the price paid by families should be similar to the national average price, and of economic stability in that it should allow for the economic viability of the school canteen. The average price for a menu in Spain in 2021 was €4.55 per day (CEAPA 2022), so this serves as the reference for establishing the rubric presented in Table 6.

For the analysis of the environmental dimension, variable adaptation to climate change rather than mitigation was selected, by employing resource-saving practices. The importance of minimizing residues and food waste was stressed. In addition, the area under organic production was considered a key indicator, although this would not have to be certified. This aspect was the subject of heated debate between the participants as it is not linked to the concept of agroecology in its holistic dimension (see Table 2).

In terms of the principles, criteria and indicators linked to social sustainability, the consensus among the agents was important, especially in terms of the role played by public procurement in social justice. Emphasis was placed on the essential role of contract specifications in determining the elements associated with the social responsibility of purchases. All experts have

Table 2. Principles, criteria and indicators linked to environmental sustainability.

DIMENSIONS	PRINCIPLES	CRITERIA	INDICATORS	DEGREE OF CONSENSUS (mean and SD)
Environmental sustainability	Climate change adaptation	Sustainable energy model	Presence of renewable energy sources	INCLUDED *EX POST*
			Carbon footprint of marketing	4.6 (0.69)
		Sustainable water management model	Efficiency in the use of irrigation water	4.7 (0.67)
			Water footprint of marketing	4.7 (0.62)
	Waste minimization	Food waste minimization and waste reuse	Minimizing the use of packaging and food waste in the value chain	4.9 (0.67)
			Reuse of organic waste-composting	4.8 (0.42)
	Agricultural sustainability	Presenca of organic farming and seasonal products	Increase of the surface area under organic production (without having to be certified)	4.6 (0.69)
			Marketing of seasonal products	4.7 (0.68)

emphasized the significance of ensuring dignified work conditions as a key aspect of social responsibility. This factor should be monitored throughout the contract specifications and interviews with managers. The introduction of specifications that encourage the hiring of less favored collectives or females, by giving them a higher score in bidding, might be considered. An indicator related to the duration of the contracts was proposed, but the participants did not consider it pertinent as it did not benefit social sustainability (see Table 3).

The principles related to governance, decision-making processes, cooperation and social justice have a connection with the concept of social capital, which is related to the network of relationships and trust that exists between individuals and organizations in a society, and is considered a valuable resource for sustainable development. In this sense, Rodríguez-Plesa et al. (2022) links the social sustainability of GPP to the creation of an appropriate environment for generating social capital, to the extent that there is a community commitment to creating robust organizations capable of guaranteeing the principles of equity and social justice. Indicators related to the degree of direct management by decision-makers and their involvement in specification procurement, as agreed upon by consulted experts, are consistent with Rodríguez-Plesa's idea that robust institutions are more likely to respond to the community's needs through GPP. The generation of networks and specifically the figure of "the dining council" that ensures respect for the principles of the new food model are key to enhancing the necessary social capital (Mikkelsen, Rasmussen, and Young 2005).

Finally, referring to the health and nutrition dimension (see Table 4), there was a high degree of consensus in terms of the importance of incorporating the Mediterranean diet into the meals due to health benefits, and regional productive aspects as a dietary pattern characterized by high consumption of plant-based foods such as fruits, vegetables, legumes and whole grains, along

Table 3. Principles, criteria and indicators linked to social sustainability.

DIMENSIONS	PRINCIPLES	CRITERIA	INDICATORS	DEGREE OF CONSENSUS (mean and SD)
Social sustainability	Job market dynamism and labor justice	Employment creation	Jobs created	4.6 (0.51)
		Labor and gender equity	Employment created for women and other vulnerable groups	4.6 (0.51)
			Degree of dignity of the workers' conditions	4.9 (0.3)
	Governance, management and decision-making	Conflict management and resolution	Degree of direct supply management	4.6 (0.5)
			Incorporation of all the actors in the specifications	4.7 (0.45)
	Cooperation and social and business justice	Creation of networks and alliances	Local networks and associations created or activated. Existence of the Dining Council figure	4.5 (0.7)
		Management by cooperatives and small businesses	Cooperatives and small and medium enterprises (SMEs) involved	4.7 (0.48)

Table 4. Principles, criteria and indicators linked to the health and nutrition dimension.

DIMENSIONS	PRINCIPLES	CRITERIA	INDICATORS	DEGREE OF CONSENSUS (mean and SD)
Health and nutrition	Incorporation of the Mediterranean diet	Improvements in nutrition due to the Mediterranean diet	Legume consumption	5 (0)
			Fruit and vegetable consumption	4.9 (0.3)
			Consumption of saturated fats	4.7 (0.9)
			Elimination of unhealthy foods from menus	4.3 (1.3)
	Training and awareness	Training and awareness actions	Courses and information campaigns dedicated to gastronomic culture and the right to food	4.5 (1.7)
		External social assessment of the system	Assessment by the media	4.5 (0.87)

with moderate amounts of fish, dairy and wine, and low consumption of red meat and processed foods (Martínez-González, Gea, and Ruiz-Canela 2019). It was considered important to incorporate an indicator that was not only related to the presence of healthy foods, but also the absence of those that are clearly harmful to health. According to the comments of the participants, aspects related to awareness and training were also included, since it was assumed that there is a correlation between knowledge and greater awareness of the importance of healthy eating.

During the interview held with the managers and administrators in charge of the two case studies, both the data and qualitative information related to the selected indicators were collected. The infrastructure and facilities were examined on the ground, and the details of the specifications were reviewed in order to verify compliance and take these into account when assigning a value to the indicator based on the rubric detailed in Table 5.

Table 5. Key performance indicators (KPI) selected, with details of the source of the data, the agents involved, and their position in the phase of life cycle. (CD: Contract Document; I: interviews; M: Monitoring).

	KPI	UNIT	PHASE OF THE LIFE CYCLE	AGENT	SOURCE OF DATA
ECONOMIC	Prices perceived by suppliers	Deviation from sector average (%)	Agricultural phase	Suppliers	CD -M
	Farm profitability	Deviation from sector average (%)	Agricultural phase	Farmers	M
	Final price of menu	€/users	Consumption phase	Users	CD
	Geographical location of suppliers/producers	Distance to consumers (kms)	Agricultural phase and Collection phase	Farmers/ Suppliers	CD-M
	Presence short marketing circuit	Yes/Partially/No	Collection phase	Suppliers	CD-M
	Presence of mixed farms and crop diversity	Yes/Partially/No	Agricultural phase	Users	M
ENVIRONIMENTAL	Presence of renewable energy sources (% renewable energy/nonrenewable energy)	Renewable energy/ nonrenewable energy (%)	Transformation phase – Collection phase	Managers	I-CD
	Carbon footprint measurement	Yes/Partially/No	All phases	Managers	I-CD
	Water use efficiency	Reduction (%)	Transformation phase	Farmers	M
	Packaging Minimization	%	Transformation phase and Collection phase	Managers	CD-I
	Organic waste recycling	Yes/Partially/No	Transformation phase	Managers	CD-I
	Presence of organic production (not taking into account the certified area)	%	Agricultural phase	Farmers	M
	Consume of seasonal products	Yes/Partially/No	Consumption phase	Farmers/ Managers	CD-I

(*Continued*)

Table 5. (Continued).

	KPI	UNIT	PHASE OF THE LIFE CYCLE	AGENT	SOURCE OF DATA
SOCIALS	Jobs created	No.	Collection phase – Transformation phase and Consumption phase	Cooks/ monitors	I
	Employment created for women and other vulnerable groups	No.	All phases	Cooks/ monitors	I
	Degree of dignity of the workers' conditions	1–5	All phases	Cooks/ monitors	I-CD
	Degree of direct supply management	1–5	Collection phase and Transformation phase	Farmers/ Suppliers/ Managers	I-CD
	Incorporation of all the actors in the specifications	1–5	Collection phase – Transformation phase and Consumption phase	All	CD
	Local networks and associations created or activated.	No.	Collection phase – Transformation phase and Consumption phase	Farmers/ Suppliers	I-M
	Existence of the figure Dining Council (Yes/No)	Yes/No	Collection phase – Transformation phase and Consumption phase	Managers	I -CD
	Cooperatives and small and medium enterprises (SMEs) involved	No.	Collection phase – Transformation phase and consumption phase	Farmers/ Suppliers	I-M
HEALTH AND NUTRITION	Legume consumption	Presence in meals (No.)	Consumption phase	Users	CD
	Fruit and vegetable consumption	Presence in meals (No.)	Consumption phase	Users	CD
	Consumption of saturated fats	Presence in meals (%.)	Consumption phase	Users	CD
	Presence of ultra-processed foods	Presence in meals (No.)	Consumption phase	Users	CD
	Nutritional training	Yes/Partially/No	Consumption phase/Transformation phase	Users/Cooks	I-CD
	External system valuation	Yes/Partially/No	Consumption phase	Managers	I-CD

Quantification of indicators

Table 6 presents the rubric established for scoring each indicator according to its performance. As advanced in the description of the Delphi method, the range of values was established based on interviews and debate held all to gether with the group of experts, so that both the indicators to be used and the assignment of the scoring range according to the degree of performance were agreed upon As explained in the description of the Delphi method, the range of values was established through interviews and discussions held with the group of experts. Together, they agreed upon the indicators to be used and the scoring range assigned according to the degree of performance.

For the indicators that could not be quantified directly, such as the presence of short marketing circuits, an assessment was made based on the direct observation of how they operate, during an interview held *in situ* with the managers of the school.

Figure 4 shows the scores obtained from the indicators in each of the dimensions analyzed. To make the values more visual, a traffic-light classification has been applied: indicators located in the red zone are performing poorly; in the yellow the indicator is progressively being implemented; and indicators in the green have reached the objectives pursued under the principles and criteria previously agreed.

Looking at the economic indicators, it can be seen that in the case of Urduña the objectives linked to the principle of deintensification and economic diversification have been achieved, while for El Vallès the process is still ongoing. From the equity and economic stability perspectives, neither center obtains a good score, although the final price indicator of meals obtains the maximum score in both cases, indicating that the prices are very similar to those of a conventional meal and in both cases, lower than the national average price. This is due to the fact that these are political prices insofar as the cost is significantly subsidized by the public purse. The raw material supply model in the Catalan case does not allow for a high score in term of territorial development does not directly enhance food sovereignty because in many cases the food must be bought from outside the region, even outside Catalonia, either because the demand cannot be satisfied by local suppliers or because short marketing circuits are not enabled. On the contrary, the results obtained in the Urduña case are better, since there is a greater presence of short circuits to market locally products from mixed family farms. This production and consumption model approaches the concept of food sovereignty advanced by Cervantes-Godoy and Martínez-Torres (2013).

The profitability of farms is higher in the case of agricultural production in the municipality of Urduña. The reason is that the local production systems associated with short marketing circuits allow for higher profitability, as the prices received by farmers are more favorable. Farms in the Vallès area are less oriented toward local commerce and are more specialized, competing by offering lower prices in regional or national markets.

Table 6. Rubric for quantifying the key performance indicators.

		SCORE		
	KPI	Low 0–1	Medium 1–2	High 2–3
ECONOMIC	Prices perceived by suppliers (%)	0–5	5–10	>10
	Farm profitability (%)	0–5	5–10	>10
	Final price of menu (€)	7–6	6–5	5–4
	Geographical location of suppliers/producers	>90	90–30	<30
	Presence of short marketing circuits	No	Partially	Yes
	Presence of mixed farms and crop diversity	No	Partially	Yes
NUTRITIONAL	Consumption of legumes (No. times eaten per week)	0–1	1–2	2–3
	Consumption of fruit and vegetables (No. of portions per week)	2–5	5–7	>7
	Consumption of saturated fats (% present in the meals)	>20	20–15	<10
	Presence of ultra-processed foods (No. in the meals per week)	1–3	1–2	0 or on special occasions
	Nutritional training (Yes/No)	No	Partially	Yes
	External system valuation (Yes/No)	No	Partially	Yes
ENVIRONMENTAL	Presence of renewable energy sources	5–10	10–15	>15
	Carbon footprint measurement (Yes/No)	No	Partially	Yes
	Water use efficiency (% reduction)	1–5	5–10	>10
	Packaging Minimization (%)	<10	10–50	>50
	Organic waste recycling (Yes/No)	No	Partially	Yes
	Presence of ecologic production (%)	1–5	5–10	>10
	Consume of seasonal products (Yes/No)	No	Partially	Yes
SOCIALS	Jobs created (No.)	1–2	2–3	>3
	Jobs created for women and vulnerable groups (No.)	1–2	2–3	>3
	Degree of dignity of the workers' conditions (LS)	1–2	3–4	4–5
	Degree of direct supply management (LS)	1–2	3–4	4–5
	Incorporation of all actors in the specifications (LS)	1–2	3–4	4–5
	Local networks and associations created or activated. No.)	0	1–2	>2
	Existence of the figure Dining Council (Yes/No)	No	Partially	Yes
	Cooperatives and small and medium enterprises (SMEs) involved (No.)	0	1–2	>2

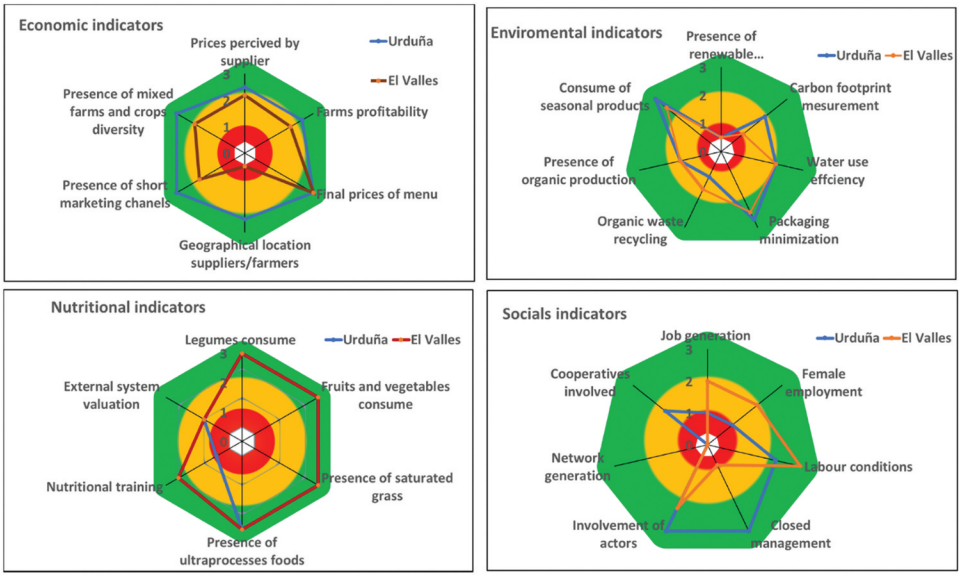

Figure 4. Radial graphs of the indicator values and their position on the traffic-light scale.

In terms of the environmental indicators, neither case achieves a favorable rating overall; they do, however, comply by including seasonal food in the meals and minimizing the use of packaging. In the Catalan case, the contract specifications explicitly establish criteria that directly assess the nature of the ingredients for the meals. The objectives linked to the environmental sustainability of the production model, including the use of water resources, organic production and composting, are not achieved in either case. They also fail to monitor the sustainability of the entire value chain by measuring the carbon footprint or using renewable energy. However, in the case of Vallès, they are beginning to consider the sustainability of the products according to the suppliers' label, valuing those that include information of the carbon footprint. Although the Catalan model is larger, making the logistical aspects more difficult to control, it is committed to reusing organic waste, involving farmers in the area. On the other hand, although the Basque model is more centralized making it easier to manage its waste, it currently does not include the reuse of its organic waste. The works of Cerutti et al (2016, 2018). emphasize the importance of the logistics system in reducing CO_2 emissions, promoting local products and short circuits as a strategy for emission reduction. It also highlights the importance of the production phase in the food value chain, as it is responsible for 23% of emissions. Additionally, the presence of an on-site kitchen is an important element in environmental sustainability. The Urduña case has a comparative advantage in terms of

environmental sustainability which aligns with the approach endorsed by Cerutti et al (2016, 2018).

Under this same approach, Neto and Gama Caldas (2018) emphasize the need to highlight the hotspots in green procurement criteria specifications, following the food supply chain, and to differentiate between which ones should be mandatory and which ones should be voluntary. This progress in the design of specifications has not been detected in the case studies, although the Vallès case leans more toward this idea.

It could be argued that the social aspects involved lead to irregular compliance in both cases. The procurement documents in the Catalan case are more explicit in terms of the inclusion of criteria linked to the working conditions of the employees, while in the Basque case, where there is more direct management, there is greater knowledge of both the employees and the type of suppliers, all of which are small companies or cooperatives.

The social capital generated by these initiatives, measured through the creation of networks and elements that unite the region, are not evident in either case, although the Basque model, having more direct management, is capable of generating cohesion and synergies with regional development. In any case, these effects are not tangible in the short term and only the passage of time will reveal tangible and positive impacts on the There is no direct evidence that in the short term, GPFPs will be able to promote the values associated with social capital in the region of influence. However, we can assert that the existence of social capital in the region can promote the proper functioning of public procurement, as assumed by Rodríguez-Plesa, Dimand, and Alkadry (2022). This is the case of the Urdunña region, where the presence of a higher number of cooperatives and different networks linked to the territory promote an environment that favors social capital. None of the analyzed cases included a figure similar to that of the School Dining Council.

With regard to nutritional indicators related to the nutritional aspects of the diet, both cases show positive results, since these aspects are expressly included in the specifications (minimum weekly consumption of legumes, fruits and vegetables), as are the inclusion of saturated fats and processed foods. These aspects are the most closely monitored in recruitment and follow-up. However, none of the institutions is certified by an external entity to verify these aspects. The most differentiated aspects between the two models are the nutritional training courses and the external variation of the system. The Basque model has not involved any nutritional training courses nor has it received an independent external assessment. They do not conduct nutritional training courses as they argue that they prefer children to learn these aspects under their own initiative, if they are interested in cooking and nutrition; however, they do not rule out running courses in the future. The Catalan model offers visual information through informative posters that reflect the benefits of the Mediterranean diet. They are working on cooking and food-

waste courses, focused on helping to create social awareness in children about the consumption of good quality healthy food.

Discussion and conclusions

GPFP has been recognized as a tool for promoting more sustainable production and consumption practices. It has been highlighted in a number of studies as an effective approach for motivating more sustainable production methods. As such, the increased demand for sustainable products and services through public purchasing is thought to orient production and consumption toward more sustainable practices (Witjes and Lozano 2016. In particular, GPFP can be considered to be an instrument of public policies with considerable potential to drive a more sustainable food system (Gaitán-Cremaschi et al. 2020; Simón-Rojo et al. 2020). This work used sustainability and nutritional indicators, agreed with the agents participating in the GPFP process, to evaluate the contribution of GPFP to changing the food system at the local level by analyzing the catering services of two schools located in rural areas in two distinct Spanish regions.

The economic viability of the GPFP is guaranteed if there are efficient short marketing circuits, with this being reflected in the procurement documents, although the system must be competitive compared to the canteen model based on the conventional food model. More profound regional roots favor less dependence on external factors not controlled by the managers, facilitating the viability of the process.

Similarly, good results in terms of environmental sustainability are closely linked to the logistics model implemented from the collection phase involving local suppliers who distribute and sell without intermediaries, as this favors proximity agriculture, which is usually more sustainable with a reduced carbon footprint. The aspects related to waste management and reuse are already internalized in the management through the specifications in the contract agreement. However, it has not been possible to incorporate renewable energies, since the energy model linked to small-scale self-consumption has not been promoted by local institutions. This aspect still has a long way to go, given the effort being made by the various governments to promote change.

The positive perception of the Mediterranean diet, rich in fruits and vegetables, olive oil and few processed foods, and its integration in Spain, favors a healthier food model at all levels of the food system throughout the country.

In summary, it can be said that the results obtained through monitoring the indicators are positive. The socio-political framework in which the two experiences were developed is favorable, since they were developed under strategies to promote this contracting model, which includes environmental and social equity criteria and a commitment to the ecological transition. This framework works as a shuttle for any initiatives in the country. However, so that this type of initiative

does not remain merely a series of well-intentioned practices, it is necessary to create a favorable environment involving close collaboration networks between the actors, rooted in the region, together with synergies with other actions.

(Gaitán-Cremaschi et al. 2022). In short, a social capital must be generated that unites the actions carried out toward an ultimate goal. Aspects related to direct management by the agents involved (self-government), the consideration of all the actors involved in the procurement documents, and the construction or activation of local networks bringing the region together with an overarching goal, are fundamental so that public procurement generates stable and lasting relationships over time, becoming regional identifying elements (De Bernardi et al. 2020). In this sense, the Basque case has a greater potential to achieve good results. The principles of food sovereignty and regional identity are better established, due to the physical and sociological conditions. The Catalan case is further from this, since the agrarian and regional models have less cohesion with the region's identity.

Having consensus-based indicators in an open process involving stakeholders who are directly or indirectly involved in GPFP, would open the door to having universal indicators designed on a scientific basis that could be incorporated into procurement specifications. In this way, the objectivity of the introduced sustainability criteria would favor transparency and efficiency of the process. Furthermore, this type of initiative promotes a favorable and necessary context for introducing sustainability labels linked to food, as is already being promoted by the European Union.

The incorporation of agroecology principles into the indicators that certify the sustainability of the food model proposed here, can be a driving force for change toward another paradigm of economic development and adaptation to climate change. However, scaling up poses a major challenge to be faced in this process of change that has not yet found an adaptation response to the current context of economic and social development.

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