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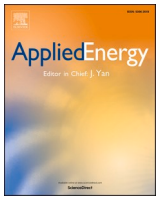

Tackling new research questions in energy transition: The system of provision approach

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HIGHLIGHTS

- The System of Provision (SoP) approach integrates vertical and horizontal perspectives in energy systems.
- The SoP approach bridges system with consumption-oriented approaches.
- The SoP approach links consumption to broader economic structures and practices.
- The SoP approach connects micro-level behaviours with macro-level socio-economic systems.
- We systematised knowledge about SoP to promote new research questions and enquiries within the energy community.

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ABSTRACT

Investigating the transition toward more sustainable socio-technical systems in the energy sector is challenging, requiring the integration of political economy and ecology perspectives, along with social power dynamics. Nevertheless, these elements are often studied in isolation, and not integrated into transition research theoretical frameworks, hampering the development of a more nuanced understanding of sustainable transition in the energy sector. This paper provides a systematic literature review and thematic analysis to provide a critical overview of the System of Provision (SoP) approach as a complementary theoretical approach for energy researchers. The SoP approach connects social practices, cultural norms, and consumer agency with broader economic structures, recognising energy consumption as an integral part of daily life rather than an isolated activity. Bridging micro-level behaviours with macro-level policies, the SoP offers a bottom-up framework to understand the roles of agents and systemic factors in sustainable energy transitions. The SoP approach paves the way for novel research inquiries into consumption behaviours and social relations, particularly those that encompass emergent modalities of practice, cognitive frameworks, and organisational structures in the provisioning of energy. The paper concludes by offering practical insights for applying the SoP approach in empirical studies, highlighting key elements like agents, structures, processes, relations and material cultures, outlining geographical contexts, provisioning systems, and methodological options for both detached and engaged research, and discussing the main critiques and weaknesses of the approach, offering alternatives to move forward research in the energy sector.

1. Introduction

Energy transition has emerged as a critical topic due to growing concerns about climate change, resource depletion, and energy security [1–3]. The shift from centralised fossil fuel-based energy systems to more sustainable alternatives is essential for mitigating environmental impacts and ensuring long-term energy sustainability [4,5]. This transition involves complex socio-technical changes that require a comprehensive understanding of the underlying processes and dynamics [6]. Indeed, relevant empirical issues stem from unsustainable consumption

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and production patterns across socio-technical systems (ST-systems) [7], such as energy, housing, transportation, and food ST-systems [8,9]. These issues cannot be addressed only through small incremental changes or technocratic solutions, as they demand fundamental shifts toward sustainable ST-systems [1,10]. As a result, ongoing scientific conversation on sustainable transitions includes topics of political economy and political ecology [11]. Yet, even contemporary conversations on transition research treat social power dynamics and behaviours superficially without investigating the nuances of how they integrate with structural and production dynamics that shape ST-systems [11–14].

In this research domain, scholars adopt several theoretical frameworks and approaches, both system-oriented and consumer-oriented, to investigate energy transitions. However, on the one hand, systemic frameworks (e.g., Muli-Level Perspective, Technological Innovation System) often adopt a macro-level, top-down perspective that emphasises large-scale systemic changes and institutional dynamics, overlooking the significant role that individuals, communities, and grassroots initiatives play in driving and shaping energy transitions from the bottom up [8]. On the other hand, consumer-oriented approaches, such as behavioural economics (e.g., nudge theory, ABC) and social practice theory, tend to focus on micro-level behaviours or routines. While insightful, they often lack explanatory power for structural or systemic change, underestimating institutional constraints, infrastructural lock-ins, and the political economy shaping consumption patterns and agency [15,16]. However, as consumers move from being passive recipients to active participants in energy systems, their role in reconfiguring supply structures and ST-systems becomes increasingly important [17]. Accordingly, addressing the integration of social practices, power relations and the agency of consumers together with ST-systems' structures and configurations in shaping transition processes becomes fundamental [8,16,18]. An illustrative example is the adoption of photovoltaic panel technology, where the decision-making process is influenced not only by incentives and policies but also by supply chain structures, material culture surrounding home ownership, and established household consumption patterns, as well as the willingness to change and adapt these patterns to energy production ones.

To move the discussion forward by providing a more comprehensive approach, we discuss the "System of Provision" (SoP) approach [19–21] as a complementary theoretical approach for existing frameworks investigating energy transitions. Developed by Fine and Leopold [21], the SoP approach provides a framework for analysing the production, distribution, and consumption of goods and services. In the context of energy research, the SoP approach can overcome the limitations of existing frameworks by explicitly linking production and consumption processes and emphasising the social and cultural dimensions of energy systems, along with the power dynamics between the agents involved, in particular, the consumers and producers [22].

The SoP approach conceptualises energy provision as a vertically integrated chain of activities, from resource extraction to end-use consumption [23]. It emphasises the interconnections between different stages of the energy system and the social, economic, and cultural factors that shape energy practices and consumption patterns [24]. The SoP approach allows for a critical investigation of *"new economic principles (including postgrowth) and new organisational forms of energy production, exchange and consumption needed to achieve a full transition to renewable energy"* ([25], p. 10). By focusing on the role of consumers as active agents of the provisioning system, this approach can provide a more comprehensive understanding of the complexities and challenges involved in energy transitions.

The SoP approach has an untapped potential for energy transition scholars. While the approach has been successfully applied and gained momentum in other domains, such as food and water provision [26,27], its potential contributions to energy transition research still remain underdeveloped. The knowledge and "know-how" about the SoP approach are scattered across epistemological communities and published in various outlets, including scientific papers, books and book chapters. Therefore, this paper aims to present an overview of the SoP approach by leveraging a systematic literature review, detailing its key characteristics, applications, and potential for informing energy transition scholars about why and how the SoP approach should be used in energy research. The rest of the paper is structured as follows. Section 2 details the method adopted. Section 3 presents and discusses the findings, illustrating why to adopt the SoP approach, while section 4 illustrates how to adopt the SoP approach. Section 5 discusses the weaknesses of the SoP approach and examples of moving forward. Section 6 concludes the paper.

2. Methodology

This study adopts a systematic literature review [28,29]. Researchers leverage systematic literature reviews to collect and consolidate evidence in a certain body of knowledge to inform policy and practice within a discipline [29]. We leveraged a systematic literature review to examine the body of knowledge on the SoP approach, investigating both the theoretical debates and its application in empirical studies. Several organised phases, as outlined by Hina et al. [30] and Kaur et al. [31], characterise the methodology adopted in this study. We pinpointed relevant studies from the existing literature and adhered to predetermined research protocols to identify and select pertinent studies while filtering out unrelated ones. We collected and incorporated information from the relevant studies identified and then presented our findings.

2.1. Planning the review and screening criteria

To conduct an inclusive search, we decided to conduct our systematic search in Scopus due to the scientific merit of the indexed literature, as in previous studies [32–35]. The string "System* of Provision*" OR "SoP approach*" was formulated to preserve a broad perspective encompassing any document using the terms introduced by Fine and Leopold [21] in their initial work and by Bayliss and Fine [19] in the evolution of the SoP approach.

We formulated and applied the following inclusion and exclusion criteria for the filtering phases:

- *Inclusion criteria:* studies published in English, studies that refer to the SoP approach as the theoretical approach introduced by Fine and Leopold [21] and developed further by Fine [36] and Bayliss and Fine [19].

- *Exclusion criteria:* studies that refer to the SoP approach as a synonym for concepts such as value chain, large system, and supply chain.

2.2. Data extraction and filtering phases

The systematic search (updated until October 2024), performed in Scopus and leveraging Boolean operators, collected documents containing "System* of Provision*" OR "SoP approach*" in the title, abstract, or keywords, limiting the search to documents in English. This search led to 250 documents, including 189 articles, 26 book chapters, 15 conference papers, 12 reviews, 5 books, 2 short surveys, and 1 editorial.

The screening process of the 250 documents included two filtering phases. First, we selected the documents by reading the title, abstract and keywords and applying the aforementioned inclusion and exclusion criteria. Regarding books and reports, we examined the table of contents and introductory chapter to apply the inclusion and exclusion criteria.

After the first filtering phase, 128 documents (51 %) were excluded, leaving 121 documents to be further examined. Based on the inclusion and exclusion criteria adopted in the first phase, at least one author read all the documents in full in the second filtering phase. We implemented the second filtering phase based on the inclusion and exclusion criteria adopted in the first phase. During the second phase, the documents were

labelled as "relevant" if they were included, "not relevant" if they were excluded, and "undecided" if the author had doubts about the relevance of the document. A second author read the "undecided" documents in full, ultimately reaching a decision based on inclusion and exclusion criteria. The second filtering phase excluded 79 documents (65 %), leaving 42 documents to be reviewed. Simultaneously with the full-text reading, we performed an iterative snowballing. In this phase, we added 8 documents to our sample, resulting in a final sample of 50 documents, within which 4 books. Fig. 1 summarises the main steps of the selection process.

2.3. Research profiling

Fig. 2 presents the final retrieved documents per year. From its theorisation in 1993 [21], the SoP approach was rarely adopted or discussed until the 2010s.

The European project "Financialisation Economy Society and Sustainable Development" (FESSUD) in 2016 triggered a relatively more frequent adoption of the SoP approach. FESSUD was a multidisciplinary and pluralistic initiative to foster collaborations across various social science disciplines. A key project objective was to explore how finance could be optimised to effectively address economic, social, and environmental requirements [37]. In this vein, the SoP approach was proposed as a holistic approach that simultaneously contributes to theory, empirics, and policy [38], investigating different sectors of commodity production and characterising relevant contributions.

The studies adopting the SoP approach remain scattered in different fields and journals, as summarised in Table 1. On the one hand, this fragmentation across diverse epistemological communities has prevented the SoP approach emerged as a unified paradigm. On the other hand, it shows the flexibility and versatility of this approach. Indeed, the selected 46 articles are distributed among 35 journals, which differ in scope, methodologies and audience. However, most documents adopting or discussing the SoP approach are characterised by a first author with UK affiliation, representing the limited diffusion of the approach in geographical terms, as shown in Fig. 3.

2.4. Thematic analysis

Similarly to Arun et al., [39] and Sadraei et al., [40], we performed a thematic analysis of the 46 retrieved articles. The remaining 4 books [19–21,36] were fully read and used to inform the research.

Thematic analysis is a method for *"identifying, analyzing and reporting patterns (themes) within data"* ([41], p. 79). In conducting a thematic analysis, different from content analysis, the frequency of a theme is not related to its relevance [42]. Considering the relatively low quantity of information about the SoP approach and the fact that the SoP approach incorporates insights from numerous disciplines, we conducted a thematic analysis to avoid missing potentially relevant themes and codes. In conducting the thematic analysis, we first followed the six-step process suggested by Braun and Clarke [41]: data familiarisation, generating initial code, searching for themes across the data, reviewing themes, defining themes, and producing the report. The analysis was conducted abductively [43]; for this reason, the aforementioned six-step guide was complemented by the creation of a codebook [43]. We used the software "Atlas.ti" to facilitate the coding process [40].

3. Why to adopt the SoP approach

3.1. Theoretical background and new directions

The SoP approach departs from the reductionist and individualistic theories characterising mainstream economics under a neoclassical perspective. Bayliss and Fine [19] and Fine et al. [20] criticises the wide range of horizontal theories bound in specific disciplines, identifying the impossibility of generating a comprehensive understanding of consumption behaviours by integrating these theories. According to Bayliss and Fine [19], to answer the question "Who gets what, how and why?", horizontal intra-disciplinary theories developed in sociology, anthropology and psychology are insufficient. Therefore, while recognising the relevance of horizontal factors that can characterise different provisioning systems, it is necessary to include a vertical perspective. Fine and Leopold [21] identify the vertical structure underlying the consumption analysis as "*the chain of activities that connects production to consumption (and even disposal) across the life of the commodity*". The agents involved

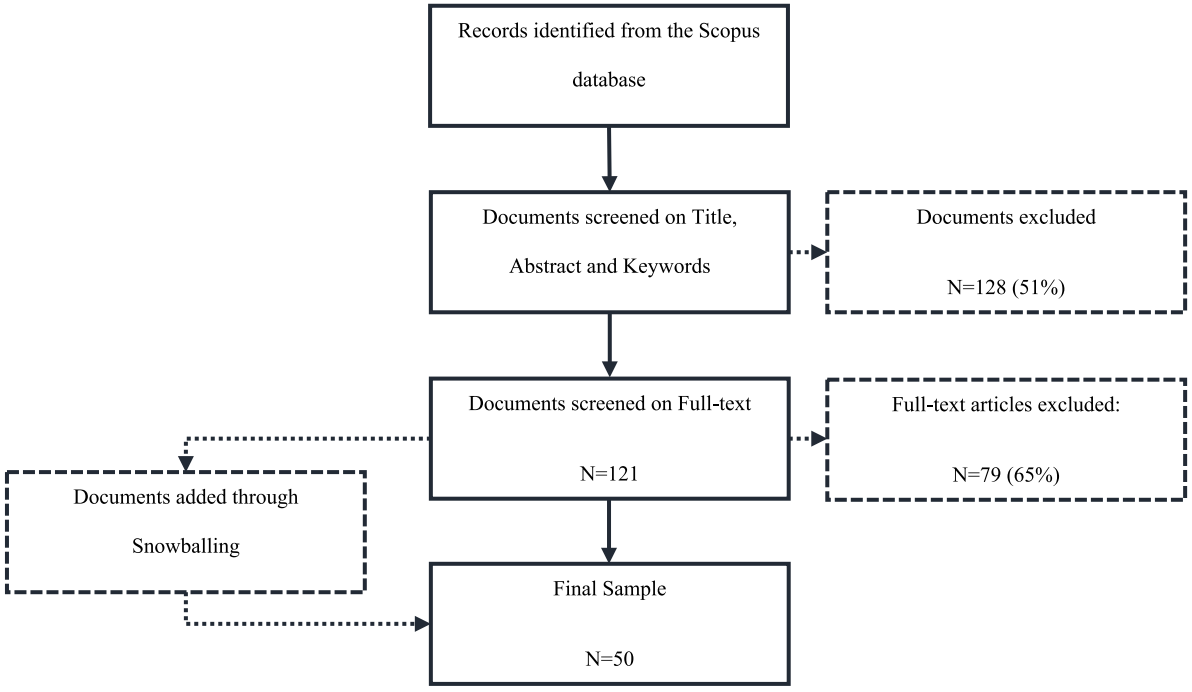

Fig. 1. Data extraction and filtering phase.

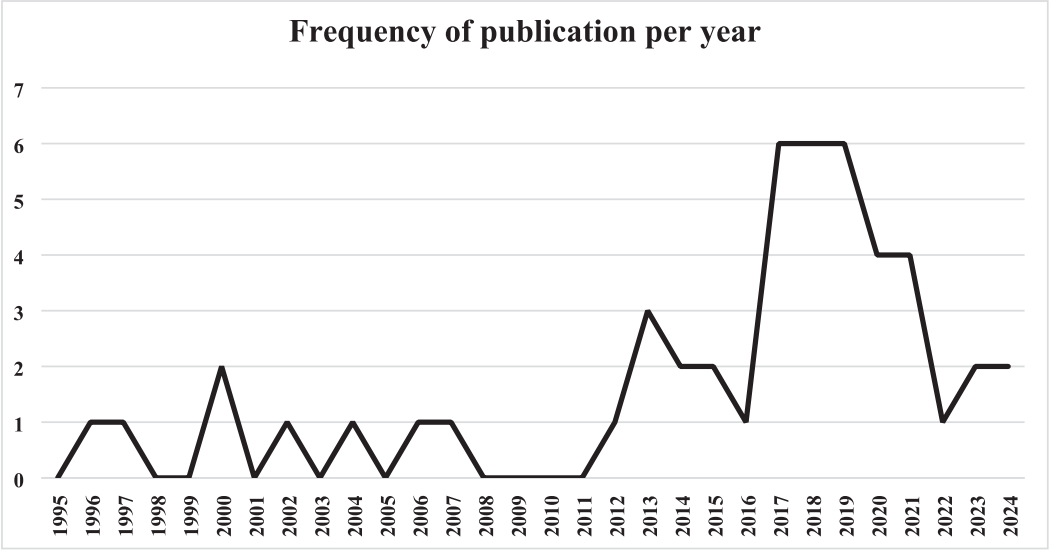

Fig. 2. Yearly distribution of SoP approach-related studies collected.

Table 1
Journal-wise distribution of SoP approach-related studies.

Frequency	Journal Title
5	New Political Economy
3	Energy Research and Social Science; Journal of Consumer Culture
2	Energy Policy; Geoforum; Sociologia Ruralis
1	Australasian Journal of Environmental Management; British Journal of Sociology; Competition and Change; Cultural Sociology; Current Sociology; Ecological Economics; Environment and Planning E: Nature and Space; Environmental Politics; Ephemera; European Journal of Development Research; Food, Culture and Society; GeoJournal; International Journal of Sustainability in Higher Education; Journal of Cleaner Production; Journal of Economic Issues; Journal of Macromarketing; Journal of Rural Studies; Journal of Sustainable Tourism; Proceedings ACEEE Summer Study on Energy Efficiency in Buildings; Regional Studies, Regional Science; Resources, Conservation and Recycling; Review of International Political Economy; Scandinavian Journal of History; Sustainability Research Institute; Technology Analysis & Strategic Management; The Geographical Journal; The Review of Social & Economic Studies; Transportation Research Part F: Traffic Psychology and Behaviour; World Development

in the supply chain of commodities, as well as the specific characteristics of goods and services produced or provided, how they are supplied, and the consumers that are targeted, are different according to the typology of the commodity. Each commodity is characterised by its own distinctive system of interconnected structures, relations, processes, and agents [19]. Therefore, it is possible to examine consumption behaviours only as both shaped by the vertical system linking production to consumption and the horizontal characteristics such as gender, status, and income level. The SoP approach, for instance, rejects the idea that consumers are entirely rational agents in the regime of perfect information, thereby operating according to supply/demand curves. This is particularly relevant in the energy sector, where the SoP approach allows for a more situated understanding of decisions such as household energy retrofitting, PV installation or purchase and adoption of electric vehicles. Rather than reducing decisions to isolated choices, the SoP approach foregrounds how they are shaped by shared social practices, cultural meanings, and isomorphism. In this sense, the SoP approach shares with behavioural economics an interest in the contextual and non/bounded-rational dimensions of decision-making [44] while aligning with social practice theory in its attention to the routinised and embodied nature of consumption [45]. In doing so, the SoP approach critiques purely individualistic, utility-maximising models of consumer

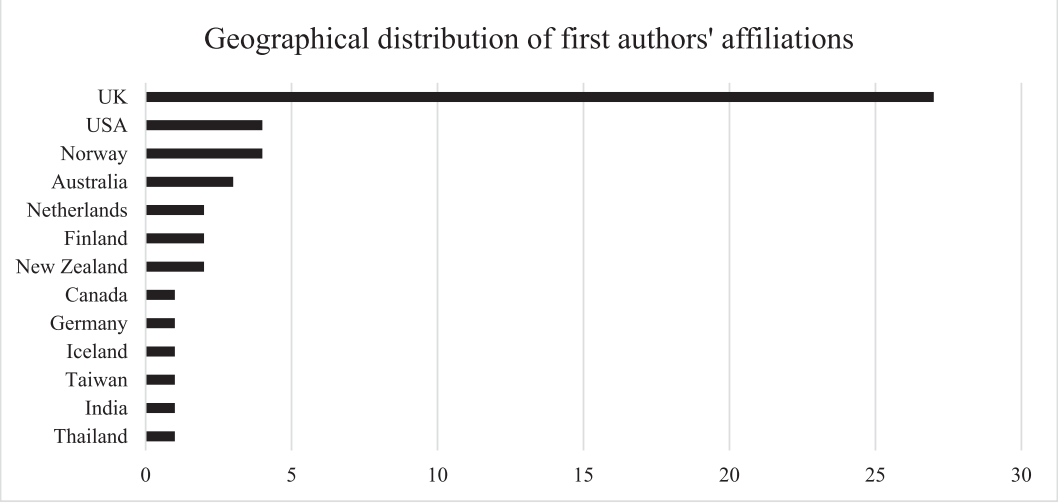

Fig. 3. Geographical distribution of SoP approach-related studies.

behaviour, opening up space for more integrative, socially embedded understandings of change in the energy domain. Yet, the SoP approach itself has not been exempt from criticism for presenting limitations in the operational investigation of consumers, as further detailed in Section 5 (*Addressing Weaknesses of the SoP Approach*).

Fine [46] highlights how the SoP approach can partially trace its origins back to the Marxist theory of value. Considering traditional forms or organising, the SoP approach shares with this theory the fundamental concept that a commodity cannot reveal the relationships, processes, structures, and agents behind the act of sale. When purchasing the commodity in a market predominantly characterised by impersonal relations, the consumer is blind to the chain that connects production, distribution, consumption, and disposal. For instance, most consumers do not know how petrol is produced for their cars, and therefore see it as a commodity filling up the car where and when it is more convenient, following well-established consumption patterns contributing to fossil fuel-based car-dependent transport systems.

Yet, this idea of consumer blindness and passivity in the vertical structure is challenged by new forms of organising that emerged in the last decades, especially from an energy transition perspective. Indeed, the tendency toward decentralised systems [47] with distributed generation [48] radically changes the system configuration in terms of relations, structures, and, above all, the role of the agents. From this perspective, moving away from the Marxist theory of value, the SoP approach embraces this organisational evolution by considering each commodity's specificity and incorporating consumers' active role in the vertical structure. This means, recalling the aforementioned example of the car, that if consumers shift to electric vehicles and self-produce electricity from PVs on their roofs, their new active role in electricity production and consumption (or accumulation) drives a shift toward different consumption patterns aligned with renewables variability. This growing availability of distributed energy resources (e.g., PV) led to the emergence of new roles, such as "prosumers" as "*agents that both consume and produce electricity*" ([49], p. 1; [50]). This shift has disrupted traditional electricity supply and demand patterns, creating new challenges for balancing the grid and increasing the demand for flexible, on-site energy management solutions [47]. The emergence of energy communities (ECs), for instance, is strongly impacted by prosumers' consumption patterns adaptation [51], as well as by the integration of distributed energy resources [52], peer-to-peer energy trading models [53], and the fair allocation of costs and benefits within the community [54], which collectively influence the profitability, self-consumption ratios, and overall sustainability of ECs. This shift empowers consumers to take on new roles as energy producers, decision-makers in energy exchanges, and stakeholders in community governance. As they engage in peer-to-peer trading and flexible energy management, they actively shape the market and contribute to the resilience and adaptability of energy systems, moving away from passive consumption to a dynamic and participatory configuration within energy provisioning systems [55].

While these new forms of organising challenge the theoretical background of the SoP approach, they also shed light on its flexibility of adoption in terms of provisioning system dimensions and configurations. On the one hand, scholars such as Bayliss and Pollen [23] position consumers as passive recipients within systems driven by privatisation and profit, with little agency in how services are provided. This is the case, for example, of the privatisation of energy services in the UK, where Bayliss et al. [56] emphasise how consumers, particularly those from lower-income groups, are treated passively within the new privatised system, having little control or influence over the services they receive. Similarly, Bayliss and Pollen [23] highlight how privatisation and market-oriented reforms in Zambia led to infrastructure deficiencies, leaving many consumers in a passive role. In this context, consumers depend on external decisions by the government and private investors, with limited ability to influence electricity provision or engage actively in the system's operations. On the other hand, some adoptions of the SoP approach devote more investigations to the changing paradigms around the consumers' role, focusing on different levels of engagement, involvement and participation. For instance, Chappells and Shove [57] argue that energy systems are increasingly characterised by blurred roles between consumers and providers, with both groups being interdependent through systems of co-provision, the aforementioned case of PV on roofs being a clear example. Chappells and Shove [57] emphasise the importance of understanding the provisioning system that shapes energy consumption, including household technologies and infrastructures, and call for more nuanced approaches to energy management that account for the diverse structures and relations involved. A similar study by Gill et al. [58], focusing on solar hot water technology, highlights that while these technologies can reduce household energy use, their effectiveness is often compromised by poor integration into daily routines and a lack of post-installation support. They argue that successful energy savings require not only installation incentives but also guidance on the system use, better installation practices, and more significant consideration of how household behaviours and consumption patterns are interconnected to the provisioning system, emphasising consumers' proactive role. For example, households relying on PV technologies must adapt their consumption patterns to align with peak production periods, such as running energy-intensive appliances during daylight hours when solar output is highest. This shift may also require changes in lifestyle and planning, like scheduling laundry, dishwashing, and charging electric vehicles during the day, thus maximising the use of self-generated energy and reducing reliance on the grid during low-production periods.

The flexibility that characterises the SoP approach, along with the strong emphasis on consumption as a starting point, aligns with the call for further investigation into consumers' roles across entire transitions, which must account for social differences as well as variations in technologies, contexts, and cultural settings [8]. The SoP approach's strength lies in its ability to bridge micro-level practices with macro-level systems, offering a more nuanced understanding of how transitions unfold in different contexts [59,60]. The SoP approach offers unique insights into the complex interplay between consumption practices and broader ST-systems. For example, Mathai et al. [60] point out how the SoP approach enables the investigation of micro (e.g., commodity or value chains), *meso* (e.g., production networks), and macro levels (e.g., entire economic sectors). Iacovidou et al. [59] illustrate how micro-level practices, such as energy efficiency measures, can have macro-level consequences, including increased economic growth and sustainable energy use. Moreover, Wheeler [61] shows how moral economies are shaped by interactions across micro, meso, and macro levels, highlighting the significance of state regulations, collective customs, and individual reflections.

In addition to bridging consumption with broader ST-systems, a key insight provided by the SoP approach is its recognition of how structural and productivistic dynamics in ST-systems can constrain individual choices, a concept known as the "lock-in effect" [62]. Macro-level factors often limit the available options for consumers, effectively "locking" individuals into specific unsustainable consumption patterns and social practices. Institutional commitments (e.g., political, economic, and infrastructural) intensify this lock-in effect by embedding technology systems within power dynamics that resist change, even when more sustainable alternatives are available [63]. As Hall [62] points out, overlooking the structural and institutional factors of ST-systems increases the risk of being locked into unsustainable practices, as individuals and communities may find it difficult to break away from established habits. Additionally, the SoP approach captures how unsustainable practices are maintained through the co-evolution of technologies and social norms [64], where practices, once embedded in daily routines and supported by dominant structures and technologies, continue to shape consumption in ways that may not align with sustainability goals [65].

Unlike other popular approaches (e.g., MLP), the SoP approach

recognizes that consumers play multifaceted roles in transitions, allowing for a deeper exploration of how they simultaneously adapt to changing systems with passive roles and shape and interact with them with active roles. As such, the SoP approach recognizes that while macro-level policies and technological advancements play crucial roles, the energy transition's success strongly depends on how individual consumers' behaviours and actions are integrated into the decision-making process. However, this perspective acknowledges that consumers' active roles can take various forms, with differing levels of involvement. For example, in cases of indirect involvement, such as nuclear power plants, experiences in Austria and Italy, where public referendum led to the halting of plant projects, demonstrate that citizens, as both consumers and voters, hold significant agency. Vice versa, moving toward a more direct role, a remarkable example is Schelly [66] presenting a comparative analysis of renewable energy portfolio standards in Colorado and Wisconsin, focusing on policies designed to encourage residential solar technology adoption. By examining the unintended consequences of specific policies, Schelly [66] suggests that incentive structures need to be carefully considered and tailored to promote both the adoption of renewable technologies and the long-term reconfiguration of consumption patterns leading to a reduction of energy use. Feed-in tariffs in Wisconsin, for example, facilitated the adoption of solar technologies and encouraged ongoing energy conservation, providing homeowners with a financial incentive to reduce their energy consumption over time. Conversely, Colorado's policies, which limit economic incentives, inadvertently promoted greater energy consumption and discouraged installing larger, more efficient solar systems.

The SoP approach suggests that researchers can design more effective strategies to accelerate the energy transition by analysing how consumption is interconnected to structures and production dynamics, ultimately suggesting relevant actions to policymakers. Furthermore, a consumers-oriented focus facilitates the exploration of potential feedback loops between individual actions and broader systemic changes, providing a more holistic understanding of the energy transition dynamics. As such, the SoP approach explores dynamics internal to ST-systems, detecting key processes, relations or structures that perpetuate unsustainable practices, such as car dependence and carbon lock-in [67]. In particular, this approach enables the localisation and isolation of elements that shape the key characteristics of provisioning systems, thus allowing for precise and targeted selection of policy interventions necessary for a transition toward sustainable ST-systems.

3.2. The SoP as an alternative or complementary approach

The SoP approach has already gained recognition across various epistemological communities, including resource management [59], sustainable behaviour analysis [62], transport planning [67], and food supply chain management [64]. Iacovidou et al., [59] show how adopting the SoP approach overcomes the limits of traditional environmental assessment methods by including social, political and institutional factors in analysing resource recovery from waste and circular economy initiatives. Hall [62] proposes the SoP approach as an alternative to the utilitarian and social/psychological approaches, emphasising the interactions between technology and social perception, thereby providing a more comprehensive understanding of sustainable tourism behaviours. Serrano and Brooks [68] propose the SoP approach in studying food production and consumption as an alternative to commodity systems analysis and global value chain approaches.

Yet, the SoP is not leveraged in energy transition, although it could overcome four main limitations of theoretical approaches commonly adopted.

First, unlike some transition theoretical frameworks (e.g., Technological Innovation System) that focus primarily on technological innovation, the SoP approach also considers the role of social practices and cultural norms in shaping energy consumption patterns [69]. Shove and Walker [70] critique the dominant frameworks for energy research, which focus primarily on resource management, efficiency, and technological innovation without considering the social practices that drive energy demand. According to the authors, these frameworks treat energy as an isolated topic, detaching it from the social practices that determine how and why it is consumed. Vice versa, following the SoP approach, energy consumption is not an independent phenomenon but is interwoven with the practices that define daily life, such as eating [64], cooking [69] and commuting [67]. Consequently, energy should be understood as part of social practices' material arrangements.

Second, following the point above, Köhler et al. [8] advocate for better integration of "*practice theory approaches to consumption*" in transition research. According to Köhler et al. [8], even if practice theory approaches have significantly influenced the study of sustainable consumption, i) its impact has been primarily limited in the sustainability transitions research network community; ii) often treated everyday practices in isolation, without considering their connection to the broader ST-systems that support them. Vice versa, practice theory is the most common theoretical lens adopted with the SoP approach [71–73], moving away from the desires of individuals toward the established norms of collective culture [74]. Moreover, Wahn [72] shows how integrating practice theory with the SoP approach links everyday consumption practices to broader economic structures, addressing practice theory's limitations in accounting for production and distribution. Wahn [72] reveals how economic systems shape practices, emphasising moral discourses and material conditions that influence consumption. Similarly, Wheeler [75] integrates practice theory with the SoP approach to show how the interactions of institutional frameworks, market regulations, and everyday consumer practices shape moral consumption economies. This combination helps explain how broader economic systems and social norms influence consumer behaviour while allowing room for individual decision-making. According to Williams et al. [73], practice theory emphasises the performance of everyday actions, while the SoP approach addresses the broader structures that shape and support these practices. Combining these approaches enables a more comprehensive analysis of how material, social, and economic factors interact, offering more profound insights into consumption patterns and sustainability transitions. Other studies leverage practice theory and the SoP approach together. Hansen [76], for example, investigates meat consumption in Vietnam, identifying a change in the location of consumption (i.e., eating away from home) as a critical factor leading to increased meat consumption. Similarly, Thongplew et al. [77] explore plate waste in university canteens in Thailand, identifying that shared practices (e.g., leaving food on the plate to feed stray dogs), along with other characteristics of the provisioning system (e.g., size of the canteen, quality of food, price), impede to reach the goal of zero waste. In the energy sector, the integration of the SoP approach and practice theory can explain, for instance, how the availability of smart meters might influence how people monitor and adjust their energy use or how changing practices around working from home could impact energy demand patterns, potentially affecting grid management strategies.

The third limitation that the SoP approach can overcome deals with "agency". Coming back to (Shove and Walker [70], the detachment of "energy" and "*social practices on which energy demand depends*" is even more relevant today, as new forms of organisation, such as energy communities, impact energy supply. This is evident in the study of Moss et al. [78], who investigate agency in shaping Germany's energy transition (Energiewende) at the local and regional levels. Moss et al. [78] discuss how different actors strategically influence the direction of the transition. The agency of local actors is critical in developing new forms of energy governance which aim to regain control over energy systems and align them with local interests. In line with this, focusing on what Köhler et al. [8] refer to as "*non-traditional actors in transitions*" and in particular "users", (Schot et al. [17] identify five categories of "*user participation in transitions: user-producers, user-legitimators, user-intermediaries, user-citizens and user-consumers*". The possibility of users playing several roles simultaneously [17] is enabled by advancements in

electricity generation and storage technologies, as well as decreasing costs and complexity of installation [49]. This shift is driven by decentralisation in energy systems and increased access to renewable energy technologies like solar panels. Consumers are now more active participants, co-managing energy through "co-provision" systems where they generate energy, manage consumption, and sometimes feed surplus energy back into the grid [57]. The SoP approach captures the growing agency of consumers as they transition into the role of prosumers within energy systems shaping existing structures and production dynamics [57]. These roles blur the traditional boundaries between consumers and providers, involving energy production, storage, and demand management, thus contributing to more sustainable energy systems. For this reason, the provisioning systems should "*not be analysed from a top-down, productivist orientation but also from a consumer-oriented perspective*" ([79], p. 58). This is why the investigation of provisioning systems should involve, first of all, the identification of agents and relations in the system (see Sections 4.1.1 and 4.1.2). Understanding power dynamics becomes fundamental as "*who exercises power, and how, and with what purpose*" is central to the SoP approach in tracing the backward linkages of consumption into the ST-system investigation ([19], p. 41).

The fourth limitation the SoP approach can overcome is the *"need for detailed micro-level investigations of underlying actors, technologies, infrastructures and institutional contexts"* ([8], p. 18). As previously mentioned, one of the strengths of the SoP approach lies in its capacity to connect micro-level practices with macro-level systems, providing a more detailed understanding of how transitions occur across various contexts [59]. The interactions between agents within provisioning systems have rendered the SoP approach increasingly valuable for refining the relationship between macro-level structures and micro-level practices, as well as between broader social dynamics and specific instances of provision [19]. The SoP approach connects the broader socio-economic structures [56], institutional policies [11], and market dynamics [71] with everyday practices [58] and consumption patterns [76]. As an example, Brown and Robertson [80] demonstrate the potential of the SoP approach in bridging macro policies regarding financing UK infrastructure and provisioning systems with the micro activities of producers and consumers.

3.3. Boundaries setting

The flexibility of the SoP approach in bridging between micro-level practices and macro-level policies, however, implies a significant challenge: the definition of the boundaries of the system under investigation.

The SoP literature lacks a precise approach to defining the system's boundaries. Bayliss and Fine [19] state that the system's boundaries under investigation cannot be set indiscriminately based on the peculiar characteristics of contextual factors. Consequently, researchers adopted different boundaries according to the purpose of their study. Indeed, to set the boundaries, it is necessary to focus on the elements of the provisioning system that are particularly interesting for the issue under consideration [19]. This "freedom" in boundary setting has two main implications.

On the one hand, the SoP approach presents high flexibility and adaptability to context-specific circumstances and peculiar cases. On the other hand, the subjective identification of the ontological object to be investigated represents a shortcoming of the SoP approach, hindering replicability and cross-comparisons across studies, as clearly shown in the following three articles:

- Chappells and Shove [57] examine the organisational framework associated with the delivery of sustainable small-scale projects for domestic energy. The authors highlight the importance of engaging consumers in the strategic design of energy provisioning systems. The authors set the boundaries focusing on the active role of consumers in the consumption and co-provisioning of energy services and their relationships with technologies.

- Gill et al. [58] examine the challenges faced by households in harmonising water consumption with solar hot water systems. The authors suggest policy and practice actions to improve the adoption and operational efficiency of solar hot water systems, such as including unbiased pre-purchase consultation, high installation standards, and comprehensive guidelines for system operation. The authors set the boundaries by limiting the focus on the role played by households and their cultural understanding of solar hot water systems toward adopting sustainable technologies.

- Bayliss et al., [56] investigate the effects of the deregulation and privatisation of water, energy, and transport provision in the UK. They reveal that reconfiguring these provisioning systems favoured producers and investors over consumers. The authors set the boundaries of their analysis by circumscribing it to the process of privatisation and the relations between the state, market regulator, utilities, and consumers.

In the aforementioned three studies, the process of setting the system's boundaries is arbitrary. Indeed, researchers study "provision" at different levels of the vertical and horizontal structures. Moreover, the authors provide a different degree of accuracy in describing the boundaries and the reasons behind their choices.

The detailed explanation of boundary definitions gives the reader a better understanding of the link between the research and context-specific dynamics. For example, Mattioli et al. [67] explicitly state three principles of the SoP approach they followed in the boundaries-setting process: i) the "vertical" analysis framework as presented by Fine et al. [81] – i.e., the *"idea that consumption (needs) to be understood more closely in relation to its attachment to production"*; ii) the attention to historical developments to understand the evolution of material and cultural aspects of provision; and iii) the inductive selection of the key elements of the system. Moreover, Mattioli et al. [67] specify that their study is not focused on any specific spatial and temporal context. Also, the authors explicitly draw the boundaries of the system, stating: *"here we focus mostly on vehicle manufacturers, given their key position in the structure of the industry, both in strategic and economic terms"* ([67], p. 4); and "*the paper does not address directly the political economy of the oil industry even though cars and oil have a symbiotic relationship that can be traced back to early twentieth-century US"* ([67], p. 2). An accurate description of the boundaries better collocates the research in the broad ST-system of transport in Mattioli et al. [67], allowing for a better understanding of the research's implication and comparability with other studies.

We recommend that scholars adopt a similar boundary definition process when investigating entire ST-systems or more localised provisioning systems. To facilitate the boundary-setting process, the following section illustrates some of the most recurring elements of provisioning systems that scholars considered when adopting the SoP approach.

4. How to adopt the SoP approach

4.1. Five themes of the SoP approach

To grasp different configurations in different provisioning systems, the SoP approach consolidates complex factors driving consumption into five broad, interrelated themes: agents, relations, structures, processes, and material culture. It is crucial to recognise that these themes are interconnected, with blurred boundaries, and that they might be "*grand and global or highly specific and local in content*" ([19], p. 38). In other words, these themes represent a starting point for analysing both entire ST-systems and smaller localised provisioning systems. Scholars can leverage this operationalisation of the SoP approach as a "compass" to navigate the realm of ST-systems toward sustainable transitions. The following sections detail the five themes following the empirical adoptions of the SoP approach in the collected literature.

4.1.1. Agents

Agents are the participants in the provisioning system [19]. This

category includes producers, distributors, consumers, prosumers, trade unions, consumer groups, the government, and everyone influencing the provisioning system. Each agent has a unique perspective on the system. We categorised agents into five groups: public entities, production, distribution, consumption, and others.

- Public entities include individuals or organisations with a public role in society (e.g., government, local administration). They can cover any role but are usually policymakers, regulators, or financers [26,82,83]. Public entities help shape the framework within which resources are allocated and services delivered, with their involvement differing according to each region's specific needs and developmental stage [21].
- Producers include individuals and organisations that contribute to producing goods or providing services. They can be more or less connected with the subsequent steps of provisioning (e.g., distribution, consumption) based on the characteristics of goods and services [57,84]. Generally, producers of goods (e.g., food) are far from the point of consumption [23], while service providers (e.g., healthcare) are near the point where the service is consumed [85].
- Distributors refer to organisations and individuals that create a bridge between production and consumption. Freight companies [76] and utilities [66] are standard distributors in the provisioning systems described in the SoP-related literature.
- Consumers can be individuals, small groups of individuals (e.g., families), and big companies (seen as a single entity), and their sensibility toward sustainable behaviour can be radically different [23,76]. As outlined by a few studies [57,58], consumers can overlap with producers and distributors in specific settings (e.g., energy communities, microgrids).
- "Others" refers to all the agents identified that do not belong to the other four groups. Financial institutions [86], local communities [73], interest groups [87] and NGOs [85] belong to this group.

Despite this categorisation that emerges from the empirical studies analysed (see Table 2), we underline how specific agents (e.g., local communities), despite being categorised as "others", could play relevant roles across all the stages of the vertical structure. As previously discussed, considering the ongoing energy transition and the emerging forms of organising, consumers start to play active roles as prosumers, and the boundaries between these categories tend to blur.

4.1.2. Relations

The relations represent the connections between the agents of a provisioning system. Due to the agents' possible conflicting goals and priorities, the system is mainly shaped by the power dynamics between agents [36]. In particular, who has the power, in which form, and how the power is exercised shape the system. We categorised the identified relations into three main groups: structural, social, and financial (Table 3).

- Structural relations emphasise the arrangement, organisation, and connectivity of agents within a system. Relations can exist between agents [26] and the surrounding environment (e.g., natural resources) [64].
- Social relations focus on the interactions and power dynamics between individuals or groups in the social context, emphasising the human element [90,91].
- Financial relations refer to any relation between individuals, organisations, or entities that involves financial transactions [56], agreements [83], or exchanges of value in monetary terms [57].

4.1.3. Structures

Structures include the diverse systems that create the context for social, economic, technological, historical, cultural and political activities and interactions. Structures include organisational, institutional, and social arrangements that influence individuals' and organisations' decisions, behaviours, and relations in the provisioning system [19]. These structures shape how goods are produced, distributed and consumed. We categorised the identified structures into three distinct but interrelated domains: organisational, institutional, and social structures (Table 4).

- Organisational structures concern the internal configurations and functional arrangements within specific entities such as corporations, government agencies, or non-profit organisations [23]. They include hierarchies, rules, roles, and relationships that govern operations and decision-making processes within these entities [83].
- Institutional structures extend beyond the boundaries of individual organisations. They encompass the broader regulatory frameworks [26], norms [85], and conventions [72] that shape the behaviour and interactions of multiple agents within a provisioning system.
- Social structures refer to the intricate net of relationships and cultural norms that shape human interactions within society. These structures can influence how organisations and institutions are structured at the system level [79].

4.1.4. Processes

Processes refer to sequences of activities that shape and influence how things are done in a social context. As Bayliss and Fine [19] clarify, the *"processes can be understood both in systemic and abstract terms such as globalization and privatization, as well as in specific activities within the SoP (the labour process, advertising, and so on) and around the SoP (gendering, etc)"*. Specific processes primarily manifest at the local and micro levels, often involving individuals and groups of individuals [61,62]. Systemic processes operate at a macro level and are often characterised by a reconfiguration at the institutional or organisational level [68,95]. SoP scholars predominantly investigated systemic processes due to their far-

Table 2
Agents mapped in the Thematic analysis.

Agents	**Public entities**	Government [73], Political party [56], Ministry (e.g., ministry of energy, ministry of infrastructure) ([82]; [23]), Public organisations [85], Public utilities [57], Regulator [26], Local authorities [83]
	Production	Public power producers [23], Independent power producers [23], Suppliers of technology [82], General suppliers [84], Installers [57], Maintainers [57], Operators [56]
	Distribution	Traders [88], Utility companies [66], Transport companies [76]
	Consumption	Energy-intensive companies (e.g., mines) [23], Households [57], Industries [76]
	Others	Banks [86], Private financiers [83], Public financiers [82], Local community [73], IMF [23], Landowners [89], Interest groups [87], Non-profit organisations [85]

Table 3
Relations mapped in the Thematic analysis.

Relations	**Structural relations**	Direct control (e.g., Holding on a subsidiary) [26], Market dynamics (e.g., controlled by large players) [76], Agreements (e.g., government with housing associations) [82], Policy impositions [23], Natural resources dependence [64], Health standards [61]
	Social relations	Class relations [64], Generational relations ([84], p. 22), Race relations [91], Property relations (e.g., slavery) [91], Family relations [90], Class Relations [72], Income relations [87]
	Financial relations	Financial control (e.g., financial actors over shareholders) [56], Repayment schemes (e.g., pensions) [83], Exchanges (e.g., supply chain participation, price making) ([57]; [67]), Credit relations [92]

Table 4
Structures mapped in the Thematic analysis.

Structures	**Organisational Structures**	Ownership [26], Consortium [23], Control through shares [83]
	Institutional Structures	Vertical integration [93], Subsidizing [85], Regulatory arrangements [26], Alternative economic systems (e.g., direct exchange between organic farmers and consumers) [72], Governance structures [62], Deregulation of the market [85], Legal structures [82], Trade [71]
	Social Structures	Social Practices [79], Rules and resources [79], Family arrangements [58], Household appliances [94], Community structures [89]

reaching implications for the overall system. As per Table 5, our review highlights an interplay between specific and systemic processes, showing that systemic processes tend to exert a destabilising influence on specific processes.

4.1.5. Material culture

The material culture represents the relationship between the material/physical part of the system and the culture that interacts with it. In other words, material culture is the meaning that every agent of the system assigns to certain goods and services. Meanings can be flexible and transient, which explains why advertising significantly influences the material culture of consumption ([96], 2004; [62]). On this matter, Fine [46] identifies 10 categories, i.e., the 10Cs in Table 6, representing the cultural systems attached to goods and services. The purpose of the 10Cs is to provide a guide for gaining a comprehensive understanding of consumer cultures by identifying ten shared characteristics present in all these cultures. For instance, Fine [99] utilises the 10Cs to show the pathways that led the Foucauldian governance of the financialisation of everyday life to prevail. As can be seen from its application to public provision and social policy, the ethics of economics, and legal expertise, the 10Cs approach has been adopted as a general approach to material culture [46,100].

4.2. Contexts

To provide further guidance for energy transition scholars on the empirical application of the SoP approach, this section investigates the contexts, both in terms of geographical areas and sectors (thus referring to the underlying socio-technical systems or localised provisioning systems) where the SoP approach has been adopted in the literature we have reviewed. We also outline instances when the SoP approach was applied, specifically to analyse which types of changes are within a provisioning system. To conclude, from a methodological perspective, we provide exemplar vignettes of detached and engaged research that can be conducted using the SoP approach.

4.2.1. Locations

"Locations" refers to the geographical areas of the empirical setting of the study. As Table 7 shows, the UK is the most studied geographical area [69,87], followed by Vietnam [76,84,94], Australia [58,85], Thailand [77,94], and others. Therefore, the SoP approach can be leveraged to investigate:

- goods and services' provisions in developed (e.g., UK, USA) and developing (e.g., Zambia, Thailand) countries.
- provisioning systems characterised by different geographical extensions. In fact, there are studies at the regional (EU) level [11], at the country level [85], at the micro-state level [95] and at the city level [71].

Table 5
Processes mapped in the thematic analysis.

Processes	**Specific processes**	Caring [61], Working [91], Studying [91], Lending [91], Gifting [91], Travelling ([62]; [73]), Advertising ([46,96,97]; [62]), Housekeeping [79], Marketing [98]
	Systemic processes	Globalization [95], Privatisation [56], Neoliberalism [86], Financialisation [83], Industrialisation [84], Democratisation ([83]; [67]), Digitalisation [68], Urbanisation ([76]; [94]), Migration [91]

4.2.2. Provisioning systems

Table 8 shows that the provisioning systems that represent the most are energy, food, water, transport, household and healthcare. The SoP approach has significant potential for analysing goods and services of varying natures due to its capacity to account for the specific socio-technical and economic structures that underpin each provisioning system [21]. By focusing on the unique modes of provision, the SoP approach enables a deeper understanding of the relationships between producers, consumers, and intermediaries within each sector [19]. Moreover, these results align with the scattered nature of the scientific literature across different epistemological communities.

4.2.3. Detached vs engaged research

Scholars adopting the SoP approach conducted either a detached analysis based on scientific literature, industrial literature, and interviews [66,81,82,86] or an engaged analysis through long-term fieldwork, observations, and direct consumption of the good or service under investigation [71,76,77,84]. To provide some examples, de Feijter et al. [82] investigated governance structures for housing retrofitting in China and the Netherlands, leveraging a detached analysis based on semi-structured interviews with local government officials, housing association officials, construction companies, and private developers. In contrast, Hansen [84] analysed the ST-system of food in Vietnam through ethnographic research. The author lived in Hanoi and experienced places such as markets and restaurants.

Whether through detached or engaged analysis, the SoP approach allows researchers to capture the complexities of provisioning systems, providing valuable insights into how governance structures, practices, and everyday experiences shape the provision and consumption of goods and services. This is beneficial for researchers because the SoP approach allows them to tailor their methodology to the specific context and nature of the provisioning system under investigation and to the availability of sources and data.

5. Criticisms of the SoP approach

As we saw, the SoP approach offers an integrated approach for linking consumption to production and broader socio-economic structures. However, the SoP approach adoption has not been without critique, particularly in the years immediately after its conceptualisation and especially regarding its capacity to effectively capture subjective consumption and its relationship with the vertical structure of production [87,102]. While the SoP approach aims to support researchers in transcending culturalist and individualist explanations by embedding consumption within institutional and economic structures, critics argue that it ultimately places excessive emphasis on structural and productive dynamics, sidelining consumer agency [103]. One of the most frequently voiced concerns is its tendency to conceptualise consumption primarily through backward linkages, analysing how consumption is shaped by production and distribution processes rather than addressing consumption as an autonomous sphere of social practice [102,104,105]. Watts [103] contends that while the SoP approach provides valuable insights into the material and institutional conditions that shape demand, it does not offer sufficient analytical tools for understanding consumer behaviour, decision-making, and the meanings individuals attach to goods. Similarly, Dixon [104] argues that the structuralist

Table 6
Material Culture destructured into the 10C's.

Material culture					
Framework	10C's ([46,96]; [86]; [26]; [92]; [99]; [19])				
Characteristics	**Constructed** (influenced by material practices and agents)	**Construed** (internalisation, interpretation and understanding of a meaning)	**Conforming** (tendency to follow a dominating narrative and common sense)	**Commodified** (shift of thinking around how a good or service is produced, distributed and consumed)	**Contextual** (association of the meaning of goods and services to context-specific factors)
	Contradictory (clash of meanings in the cultural system, e.g., we promote simultaneously both spending and saving)	**Closed** (power of shaping culture is not equally distributed)	**Contested** (incompatible cultural interests of agents)	**Collective** (cultures are shared by communities of people)	**Chaotic** (practices and cultures condition one another)

Table 7
Location of empirical studies.

Location	**Document(s)**
UK	([57]; [87]; [26]; [73]; [69]; [56]; [101])
Vietnam	([71,76]; [94]; [84]; [27])
USA	[66]
Zambia	[23]
Australia	([58]; [85])
China	([82]; [72])
Netherlands	[82]
Thailand	([94]; [77])
Iceland	[89]
Colombia	[68]
Portugal	[83]
Malta	[95]
EU	[11]

Table 8
Sectors investigated in empirical studies.

Sector	**Document(s)**
Energy	([57]; [66]; [58]; [94]; [69]; [56]; [23]; [11])
Food	([95]; [87]; [76]; [69]; [94]; [68]; [72]; [77]; [84]; [27]; [98])
Healthcare	[85]
Transport	([71]; [73]; [56]; [101])
Water	([58]; [26]; [83]; [69]; [56])
Household	([83]; [82]; [89]; [101])

orientation of the SoP approach neglects the diversity of consumption experiences across different socio-economic contexts, leading to an under-theorization of consumer practices. Also, Friedmann [106] suggests that the SoP approach overlooks the heterogeneity of consumption experiences and the role of subjectivity in shaping consumer practices and Goodman and Redclift [107] and Guthman [102] argue that its structuralist orientation limits its ability to analyse how consumers construct meanings around goods and how these meanings, in turn, shape their choices.

These critiques can be relevant in investigating the energy sector since energy consumption is deeply embedded in everyday practices that vary widely across socio-economic groups, regions, and cultural contexts. Energy-saving behaviours, for example, are not merely responses to price signals or infrastructural constraints but are shaped by complex negotiations around comfort, care, and social identity [108]. Practices like limiting heating to one room, using alternative forms of lighting, or scheduling appliance use around off-peak tariffs are informed by both material necessity and normative understandings of thrift, responsibility, or respectability. These meanings cannot be fully captured through a provisioning lens focused solely on structural dynamics such as tariffs or grid access [108].

Fine and Leopold [21,36] explicitly argue that the SoP approach includes consumption as a core element of analysis. Fine [93] claims that the SoP approach does not exclude cultural factors but rather situates them within broader socio-economic structures. Fine [93] argues that consumption cannot be meaningfully understood in isolation from the entire provisioning systems and that a focus on economic structures does not preclude an analysis of cultural processes. Moreover, Fine [36] claims that empirical applications of the SoP approach have, at times, misrepresented its original intent by failing to account for the dialectical relationship between structure and agency. Empirical applications, in fact, often treat consumption as a manifestation of systemic structures rather than an active force in shaping provision itself.

This triggered accusations that the approach retains an implicit productivist bias, privileging the economic organisation of production and distribution while failing to adequately account for the agency of consumers in the co-creation of market dynamics [87,102]. This critique aligns with broader debates in economic sociology and cultural economy, where scholars have sought to bridge the gap between structuralist explanations of consumption and perspectives that emphasise the fluidity and negotiated nature of consumer practices [74]. Studies within these fields emphasise that consumption is not merely a passive endpoint of production systems but rather a site of social practice embedded in networks of meaning, identity, and habitual behaviour [109,110]. According to the critics, while the SoP approach acknowledges the economic and material constraints that shape access to goods, it does not fully consider how consumption practices evolve through interactions between consumers, infrastructures, and cultural norms [45,70].

The evolving literature has sought to reconcile these tensions by integrating consumer agency, symbolic meaning, and social differentiation within the structural insights provided by the SoP approach [87]. For instance, some scholars incorporated cultural economy perspectives to address how meanings are co-constructed between production and consumption [68,90,104], while others leveraged theories of practice to better capture the embodied and habitual dimensions of consumer behaviour [76,82,84]. Indeed, recently, Bayliss and Fine [19] state that the SoP approach can be seen as closely related, or even complementary, to practice theory and that their integration has been utilised to connect energy consumption changes with modern societies' growing reliance on technological systems. Bayliss and Fine [19] also agree with Hansen [111], suggesting the integration of the SoP approach and theories of practice to better capture the relevance of material culture in provisioning systems. In doing so, for instance, Rinkinen et al., [94] were able to investigate how changes in food consumption impacted the energy sector by shaping the electricity demand. Integrating the SoP approach with theories of practice, Rinkinen et al., [94] show how the expansion of cold chains in Hanoi and Bangkok, driven by changes in retail infrastructure, food logistics, and domestic refrigeration, has reshaped both provisioning systems and everyday consumption practices. These shifts have led to increased and more continuous demand for electricity, highlighting how evolving consumer habits and socio-technical arrangements co-constitute rising energy consumption in rapidly urbanising contexts. This example also illustrates that the integration of the SoP approach with more consumer-oriented approaches not only allows

a comprehensive understanding of isolated provisioning systems but also of the interconnections and dependencies between different ST-systems (e.g., food and energy).

While the critiques directed at the SoP approach have predominantly focused on its inability to properly study consumption behaviours, over the years, scholars such as de Feijter et al., [82] and Hansen [111] have compellingly demonstrated how this limitation can be effectively overcome. These researchers, integrating other theoretical approaches, have emphasized the importance of investigating consumption behaviours, practices, and social norms in relation to the provisioning structures that enable such consumption, in line with the theoretical premises initially outlined by Fine and Leopold [21].

Nevertheless, the need to integrate the SoP approach with other system-oriented or consumer-oriented frameworks, approaches, or theories is strongly dependent on the specific research question being addressed. The SoP approach has indeed proven to be highly flexible and adaptable in its integration with other perspectives; however, such integration must always remain consistent with the overarching research objectives. In this regard, the SoP approach can be employed either as a standalone framework or as a conceptual bridge between system-oriented and consumer-oriented approaches, enabling a comprehensive understanding of dynamics within ST-systems.

For this reason, considering the ongoing restructuring of provisioning systems and the emergence of new power dynamics in energy systems, we argue that the SoP approach offers a valuable tool for researchers to contribute in diverse and substantively meaningful ways to the investigation of a wide range of underexplored research questions in the energy sector.

6. Conclusions

Developed in the 1990s, the SoP approach is receiving increasing scholarly attention because of its explanatory power when dealing with complex phenomena that neoclassical economic theories, with their reductionist approach, cannot explain. The SoP approach highlights the necessity of incorporating a vertical perspective (i.e., the chain of activities connecting production to consumption) to complement horizontal structures (i.e., socio-economic variables) to address the question "Who gets what, how and why?". Answering this question is critical for investigating the mechanisms reinforcing unsustainable consumption and production patterns across provisioning systems.

Leveraging a systematic literature review, this paper provided an overview of the SoP approach, detailing its key characteristics, applications, and potential, tailored for energy transition scholars.

This paper critically examined how the SoP approach bridges the gap between macro-level system-oriented frameworks and micro-level consumer-oriented approaches in investigating energy transitions. The SoP approach recognizes that addressing social practices, power relations, and the agency of consumers is key for investigating the dynamics of bottom-up initiatives in shaping transition processes. The increasing availability of distributed energy resources and the shift toward decentralised systems with distributed generation radically transform system configurations in terms of relationships, structures, and, most notably, the roles of the agents involved. As consumers shift from passive recipients to active participants in energy systems, their influence on reshaping supply structures and ST-systems becomes increasingly important. To properly investigate such bottom-up initiatives, this paper suggests the SoP approach as complementary to existing theoretical frameworks in energy transitions.

First, the SoP approach recognizes that energy consumption is closely tied to rather than isolated from daily-life activities. The SoP approach recognizes that, for example, reducing energy for transport is not just about efficient vehicles but also about rethinking daily practices (e.g., work locations and commuting norms), showing that sustainable energy use also depends on changing social routines and not solely on technological upgrades. Similarly, investigating the willingness to install PV on the roof requires not only the assessment of economic returns and incentives but also an understanding of how households can shape their everyday practices accordingly.

Second, the SoP approach brings the backward linkages of consumption into the ST-system investigation, with two major implications. On the one hand, many scholars debate and critique the ability of the SoP approach to study consumers, proposing the integration of the approach with more horizontal theories (e.g., practice theory and behavioural economics) for a more nuanced investigation. On the other hand, as consumers take on active roles as prosumers managing energy through decentralised systems, they can be integrated into dominant structures and production dynamics shaping ST-systems. This becomes evident in energy communities that foster collective energy autonomy, shifting control from central utilities to local members and enhancing sustainability through shared decision-making and decentralised energy governance.

Finally, the SoP approach connects micro-level practices with macro-level systems, bridging everyday behaviours with broader socio-economic structures. For example, the SoP approach enables researchers to link renewable energy subsidies to local solar panel adoption, illustrating how macro policies shape individual installation choices. This micro-level insight can reveal the influence of broader socio-economic structures on everyday energy practices within local communities.

The SoP approach thus provides an inclusive framework for examining how diverse agents, power dynamics, and structural contexts influence energy transitions and sustainable consumption. As such, the SoP approach allows energy scholars to navigate the realm of ST-systems or localised provisioning systems, tackling new and relevant questions.

CRediT authorship contribution statement

Giacomo Dei: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Benito Mignacca:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Conceptualization. **Giorgio Locatelli:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. **Paolo Trucco:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

Data will be made available on request.

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