The PSICHE framework for sustainable consumption and future research directions

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Abstract

Purpose – Considering the relevance of understanding what influences environmentally sustainable consumer choices, the present study aims to examine and synthesize the key determinants factors from literature and outline a new conceptual framework for explaining green purchasing behaviors (GPBs).

Design/methodology/approach – A bibliometric analysis was conducted on 161 articles extracted from Web of Science and Scopus databases, which were systematically evaluated and reviewed, and represent the current GPB knowledge base. Content analysis, science mapping and bibliometric analysis techniques were applied to uncover the major theories and constructs from the state-of-the-art.

Findings – The evolving debate between altruistic and self-interest consumer motivations reveals challenges for rational-based theories, as most empirical applications are not focused on buying behaviors, but instead either on pro-environmental (non-buying) activities or on buying intentions. From the subset of leading contributions and emerging topics, nine thematic clusters are unveiled in this investigation, which were combined to create the new PSICHE framework with the purpose of predicting GPB: (P)roduct-related factors, (S)ocial influences, (I)ndividual factors, (C)oncerns about the environment, (H)abits and (E)motions.

Practical implications – By uncovering the multiple intervening factors in GPB decision processes, this study will assist practitioners and academics to move forward on how to foster more sustainable consumer behaviors.

Originality/value – The present study provides readers a summary of an unprecedentedly broad collection of papers, from which the key themes are categorized, the domain's intellectual structure is captured and an actionable framework for enhancing the understanding GPB is proposed. Four new thrust areas and a set of future research questions are included.

Keywords Pro-environmental behavior, Green purchase behavior, Sustainable consumer behavior, Bibliometric analysis, Science mapping, Content analysis

Paper type Conceptual paper

1. Introduction

Environmental sustainability is one of mankind's greatest challenges and most urgent concerns. As a result of the ecosystems' over-exploitation and human activity (IPCC, 2018), the world faces severe consequences, including climate crisis, migrations, wildlife extinction, greenhouse effects, air, soil and water pollution (Barbarossa and de Pelsmacker, 2016; Liobikienė *et al.*, 2016; Rausch and Kopplin, 2021). United Nations has put forward the

renewed Sustainable Development Goals for the next decade (Spencer, 2021), where change into more sustainable consumption habits constitutes a fundamental opportunity for reducing impacts, but also for economic growth, as the increased public environmental consciousness creates demand for green product innovations (Han *et al.*, 2017; Olson, 2013).

Pro-environmental behaviors (PEBs) are a complex phenomenon with multiple mental, social and affective processes at play (Beatson *et al.*, 2020; Gleim and Lawson, 2014), which attracts wide attention from scholars. Some meta-analytical studies explore the motives behind this phenomenon (Bamberg and Möser, 2007; Klöckner, 2013), with evidence pointing towards a gap between individuals' environmental orientations (e.g. *values, beliefs, concerns, attitudes*) and behaviors. Others examine the theory of planned behavior or TPB (Rivis *et al.*, 2009; Sheppard *et al.*, 1988), the most popular framework for addressing pro-social behaviors such as PEBs, and report a limited ability to predict actual behavior, leaving a substantial amount of unexplained variance. However, neither of these studies cover the latest contributions or investigate green purchasing behaviors (GPBs) in specific, which is a sub-type of PEB and sustainable consumer behaviors in general (Peattie, 2004; Stern, 2000).

More recently, three related review papers emerged (Groening *et al.*, 2018; Li *et al.*, 2019; Sharma, 2021), but either do not deploy a systematic search and selection protocol or do not explore both leading databases – ISI Web of Science (WOS) and Scopus – which is the recommended approach in recent review studies (Chistov *et al.*, 2021; Loureiro and Nascimento, 2021; Palmaccio *et al.*, 2021). Moreover, the only bibliometric study available (Marvi *et al.*, 2020) is limited to a single search term and a narrow scope of analysis dedicated only to TPB, thus identifying a limited number of sources and publications. Overall, concerns can be raised about the validity of these studies to represent the domain's state-of-the-art, as they (1) do not provide replicable details on search and selection procedures; (2) do not use a comprehensive, structured approach; (3) do not employ a broad scope of search terms; (4) do not analyze the inter-connectedness of main topics for producing a future research agenda and (5) do not offer an actionable framework for both academics and marketers.

The present study is motivated by the need to provide readers with a comprehensive review of main contributions and shortcomings from literature on sustainable consumer behaviors, with the purpose of outlining a conceptual framework that integrates GPB key determinants factors. The following research questions (RQs) are investigated:

RQ1. What are the current publication and collaboration trends in the sustainable consumer behaviors' field?

RQ2. Who are the leading contributors and contributions in this domain?

RQ3. Which theories, contexts and methods prevail in the core set of publications?

RQ4. Which themes emerge as the most influential?

RQ5. What are the major research fronts observed for the future?

This paper differs from others in fourfold: (1) the state of the art in sustainable consumption literature is discussed, through identification, selection and examination of an unprecedentedly thorough collection of articles from both WOS and Scopus databases; (2) the present study is the first (to the best of the authors' knowledge) to combine a systematic literature review, bibliometric analysis and science mapping techniques, to capture the domain's intellectual structure; (3) several thrust areas and a set of research questions are provided for theory development and academic researchers; (4) the major topics influencing GPB are discussed and categorized into the new PSICHE integrative framework, offering an actionable resource for green practitioners and marketers to improve the efficacy of green marketing efforts.

Policymakers, business and marketing managers can benefit from this study. Policymakers can use the insights from this study to promote green norms and to better

educate the public on the importance of sustainable consumption. Business and marketing managers can take the advantage of the PSICHE integrative framework to implement successful green marketing and communication initiatives, able to resonate with their target audiences, and tackle perceived barriers and consumer skepticism.

The remaining paper is structured as follows. Next, core definitions are clarified which inform the data search strategy. Then, search protocol, literature selection and data analysis procedures are briefly presented. Thereafter, findings are provided and critically discussed, followed by an overview of directions for future research. Finally, the present study's implications and limitations are summarized.

2. Theoretical background

2.1 Towards a definition of green purchasing behaviors (GPBs)

Multiple theoretical perspectives on sustainable consumer behaviors are stablished, advancing distinct terms, which are employed interchangeably. A brief clarification on their background and conceptual boundaries follows.

First, the concepts of *environmentalism* or *environmentally significant behaviors* (ESBs) were coined by Paul Stern. In the late 1990s, these were defined by the impact of one's actions, but later, as environmental protection gained relevance in decision-making, the definition became focused on one's purpose or motivations instead (Stern, 2000). Stern's (2000) work introduced an important breakthrough by acknowledging the multidimensionality of ESBs – which was mainly regarded as an undifferentiated class until then – distinguishing between "environmental activism", "public" and "private-sphere" actions. The latter encompasses *purchasing* activities as a sub-dimension, such as *green consumerism* (e.g. consuming organic foods or recycled goods) and the purchase of household goods with *environmentally significant impacts* (e.g. cars, energy systems or tourism categories).

Second, work streams about *sustainable consumption* shed light into the academic debate, more dedicated to organizational topics, such as corporate social responsibility, environmental policies and reporting. In part, these contributions were triggered by the popularity of 3BL – triple bottom line – which encompasses the environmental, social and economic areas of sustainability (Norman and MacDonald, 2004). From the mid-1990s, the distinction was made between the environmental and social dimensions of sustainable consumption (Robèrt, 2000), inspiring a more consumer-oriented, holistic characterization of sustainable behaviors and lifestyles. It was the rise of environmental psychology (Vlek, 2000), addressing the aggregate effects of human activities in both social and environmental perspectives. The conversation became centered around pro-social and *eco-friendly* activities, as a sub-field of consumer ethics (Chowdhury, 2017). The definition of *sustainable consumer behaviors* emphasizes the decrease of negative impacts to the environment, such as reducing the use of natural resources across the lifecycle of products or services (White *et al.*, 2019).

Third, PEBs caught the attention of a growing community of researchers. In line with Stern's theory of environmentally significant behavior, the concept of PEB was initially grounded on the impacts of the behavior, e.g. *actions that contribute to sustainable use of natural resources* (Peattie, 2004), but eventually started to stress the environmental consciousness driving consumer action (Kollmuss and Agyeman, 2002), with other adjacent expressions gaining popularity since then. By instance, "green/sustainable marketing" addresses the business management processes and satisfaction of organizational goals, as well as the needs of customers and natural eco-systems; while the topic of "green consumers" segments individuals based on the products they tend to choose or avoid (Barbarossa and de Pelsmacker, 2016; Peattie, 2004), even though most consumers do make both "green" and "non-green" choices (Beatson *et al.*, 2020), depending on the context and category under evaluation.

Fundamentally, three common elements are captured in the definitions of *PEB, environmentally significant* and *sustainable behaviors*. These are described as actions which

(1) intend to (or result in) altering the environmental dynamics; (2) seek to minimize negative environmental impacts; (3) contribute towards the sustainable use of resources. Finally, these concepts converged (Figure 1), from which *GPBs* now accepted as a sub-type (Dong *et al.*, 2020; Hosta and Zabkar, 2021; Lee *et al.*, 2014; López-Mosquera *et al.*, 2015; Paswan *et al.*, 2017). GPB reflects private sphere, buying and consumption activities (Ertz *et al.*, 2016; Stern, 2000), capturing in its definition both the *aim* of improving the environmental consequences (Moser, 2016) and the *outcome* of acquiring/consuming recyclable or eco-friendly products with minimal environmental impacts (Peattie, 2004; Sheng *et al.*, 2019).

In sum, GPB can be described as *a purposeful choice of products and services, intending to (or which may result in) reduced negative environmental impacts during the buying, usage, consumption and/or disposal stages*. Frequently used synonymous (*eco-friendly, green, ecological*) were also included in the search protocol – presented in Section 3.1. – as well as the main overarching behavior classes (*PEB, environmentally significant, ecological/sustainable consumption*). A summary table of pertinent definitions is available in Appendix 1.

2.2 Determinant factors of GPB

Three major types of determinant factors frequently associated to GPB are observed in literature and will inform the GPB-related search queries.
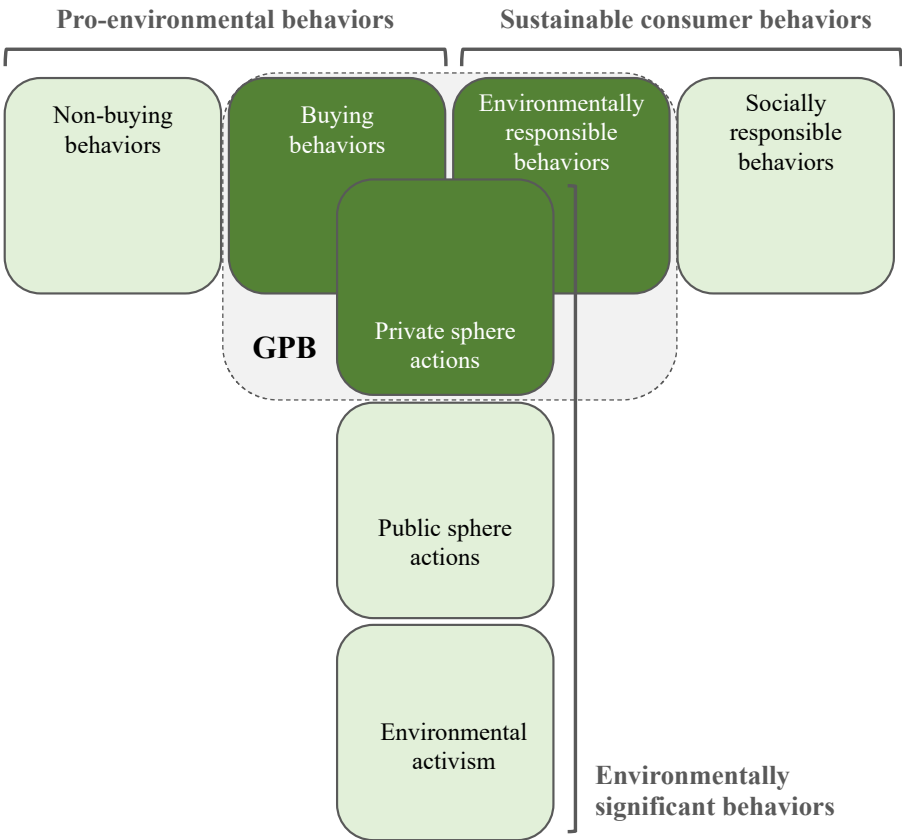

Figure 1.
The cross-related domains of pro-environmental, environmentally significant and sustainable consumer behaviors

(1) *Cognitive*, related to the evaluation of products and purchase outcomes (Hamzah and Tanwir, 2021; Rausch and Kopplin, 2021), which often provides rational justifications for choosing or not choosing green products (Liu *et al.*, 2017; Olson, 2013), enhancing the predictive power of attitudinal models in recent literature (Roh *et al.*, 2022; Wang *et al.*, 2022).

(2) *Normative*, which are considered a motivational basis for pro-environmental intent and action (Ajzen, 1991; Schwartz, 1977; Stern, 2000), and constitute core constructs in both self-oriented and pro-social behavioral theories. Some scholars examine the moral foundations and formation of green moral obligations of personal nature (Culiberg *et al.*, 2022; Gao *et al.*, 2022), whereas others dedicate attention to the impacts of social perceived pressures (Barbera and Ajzen, 2020). The interplay between personal norms and social influence is one of the main conversation topics in literature to the present day (Eid *et al.*, 2021; Han *et al.*, 2021).

(3) *Emotions* and *affects* drive pro-social behaviors (Spielmann, 2021) and can either spur or inhibit action on a variety of contexts and facets of consumer behavior (Chowdhury, 2017; Han *et al.*, 2018; Liang *et al.*, 2019). Evidence from the neuroscience field (Bechara *et al.*, 2000) points out that individuals make judgments based on the emotional quality of outcomes, which can capture a larger portion of behavioral variance (Perugini and Bagozzi, 2001; Rivis *et al.*, 2009; Teng *et al.*, 2015).

3. Methodology
Literature on GPB and the related domains of PEB and sustainable consumer behaviors was systematically evaluated and examined, and then explored using bibliometric analysis techniques. Data were categorized for descriptive information, theory, characteristics (themes), context and methodologies, according to a pre-defined protocol (Christofi *et al.*, 2017; Vrontis and Christofi, 2021), following the steps from formulation of research questions to synthesizing, categorizing and analyzing data (Crous *et al.*, 2021; Saeed *et al.*, 2021), in order to increase the validity and replicability of the review of GPB state-of-the-art papers.

3.1 Search protocol and data collection
The meta-data were retrieved on August 2021 from WOS and Scopus databases, to ensure a comprehensive coverage of any suitable business, social or environmental scientific sources (Rosado-Pinto and Loureiro, 2020). The selection was applied to articles in English language, excluding non-related subject areas or categories, and applying the same search terms to WOS and Scopus (see Table 1), according to the rationale explained in the Background section. Meta-data extracted from both databases were afterward revised, with all fields coded homogeneously to avoid data entry mistakes. The search yielded a set of 1,457 articles after merging both databases and eliminating duplicates.

For content analysis and identifying future directions, only higher-tier academic journals were considered, in line with reference studies (Donthu *et al.*, 2021; el Samad *et al.*, 2022; Ren *et al.*, 2019). Selection was limited to papers published in journals ranked, at least, 2 in ABS 2021 list or Q1 in Scimago Journal Rank, reducing the set to 777 articles (Table 2), which were then evaluated by title screening, abstract and full-text review, resulting in a final set of 161 articles. Article selection criteria were adapted from literature (Loureiro *et al.*, 2021), and the procedure was cross-checked by two independent researchers, for an unbiased scoping able to represent appropriately the field's state-of-the-art:

(1) Fit with the research goals.

(2) Robust use and development of theory within present literature.

Search terms [title + abstract + keywords]	Green purchasing behaviors *(sustainab* OR proenvironmental OR ecolog* OR environmental OR environmentalism OR "environmentally significant" OR green OR "eco-friendly") AND (behavio* OR consumption OR purchas* OR buying) AND* Determinant factors *(motivat* OR cognitive OR emotion* OR "affective beliefs" OR "anticipated affect" OR norm* OR "moral obligation")*
Categories/subject areas	WOS: Business; Management; Social Sciences, Interdisciplinary; Environmental Sciences Scopus: Business, Management and Accounting; Social Sciences; Environmental Sciences
Inclusion criteria	Peer-reviewed articles, examining the determinants of PEB or GPB, with individual consumers as units of analysis
Exclusion criteria	Other document types, other units of analysis or contexts Out-of-scope subject areas or categories (e.g. educational studies; HR and career management; city planning and environmental engineering; public policies; accounting and finance; supply chain and procurement)

Table 1.
Search strings and filtering criteria

Articles used for bibliometric performance analysis	Articles screened (title and abstract review)	Articles examined (full-text review)	Articles selected for content analysis
1.457	777	181	161

Table 2.
Article selection phases

(3) Logical theory-methods-data flow.

(4) Relevance of practical and theoretical contributions.

3.2 Data analysis
Bibliometric analysis refers to the application of quantitative tools to analyze bibliographic data and scientific activity (Broadus, 1987), which became a legitimate method extensively used across a wide variety of subjects (Candeias Fernandes and Franco, 2021; Pereira and Bamel, 2021). With the ability to handle large volumes of data, reveal implicit connections and identify influential topics or contributions, researchers can generate impactful illustrations of a current publications' network and future trends of broad academic fields (Donthu *et al.*, 2021; Kent Baker *et al.*, 2020). The development of bibliometric software makes viable to explore large datasets efficiently, with tools such as Gelphi, VOSviewer, Pajek, Bibexcel, SciMat, Sci2, UCINET and Bibliometrix "R" package (Donthu *et al.*, 2021; Kent Baker *et al.*, 2020). VOSviewer was selected for the current study, as it is an intuitive, open-source application, widespread among scholars, specifically designed for generating bibliometric maps and possesses an advanced clustering algorithm (van Eck and Waltman, 2010).

The study aim and scope were defined first, bibliometric analysis techniques were selected next, followed by data collection, database preparation, analysis and discussion of findings (Donthu *et al.*, 2021). The analysis itself was conducted in three steps: performance analysis, content analysis and science mapping. While the first is descriptive in nature and constitutes the standard practice found in most bibliographic studies; the latter takes scientific knowledge as the research object, and applies text mining, data processing, knowledge measurement and visualization tools to display the evolution trends and bibliographic relationships. When used together, these methods enable scholars to examine the intellectual interactions between research constituents (e.g. authors, countries, journals, institutions or documents) and are complemented by enrichment techniques, such as network metrics and thematic clustering.

The performance analysis started by determining the distribution of the dataset, in terms of time, source title, author(s), first author's affiliation and country, for the field's descriptive overview. Drawing on reference studies (Donthu *et al.*, 2021; Hosseini *et al.*, 2021), citation, co-citation, co-authorship and co-word analysis were used to examine relationships among research constituents (full counting method). In a citation network, nodes are papers, links are citations and a node's centrality derives from the total summation of direct links connected to it. Used to address RQ2, citation analysis determines a constituent's popularity, by counting the number of times it is cited by other network members (Chakraborty *et al.*, 2021). On the other hand, co-authorship analysis evaluates the levels of collaboration among scholars.

Keyword co-occurrence (or co-word analysis) is an effective technique for mapping interactions in literature, based on the associations of terms shared among documents (Cobo *et al.*, 2011) and was instrumental to determine the prevalent themes (RQ4). As authors use keywords to express their thematic priorities, co-word analysis is built on the assumption that the appearance of a same topic in different documents suggests a conceptual relationship. Thus, by using bibliometric algorithms, terms' relatedness is computed from co-occurrence measures, placing each one in a cluster until the modularity function is maximized (van Eck and Waltman, 2017), providing a clear picture on a field's intellectual structure.

Afterward, bibliographic coupling was employed to answer RQ5, in which publications sharing a high number of references are linked to each other, and considered similar in content, to project major work fronts for the future. Compared to other science mapping techniques, coupling focusses on the present status of a research field, instead of past contributions (Donthu *et al.*, 2021) and covers a wider spectrum of publications, by improving cluster allocation through external references. Moreover, the accuracy can outperform direct citation and co-citation methods (Boyack and Klavans, 2013; Chistov *et al.*, 2021), and it is the most suitable when examining recent publication fields (Candeias Fernandes and Franco, 2021).

4. Findings and discussion

4.1 Publication and collaboration trends
The bibliometric meta-data and performance indicators were collated from the full dataset of 1,457 papers. With regards to RQ1, the publication time span ranges from 1992 to 2021, and titles were published 3.8 years, on average, before extraction. The volume of publication bears a clear growth trend (Figure 2) with a peak in 2015–2016, from when 92% of all documents were published, characteristics of a recent but dynamic body of literature.
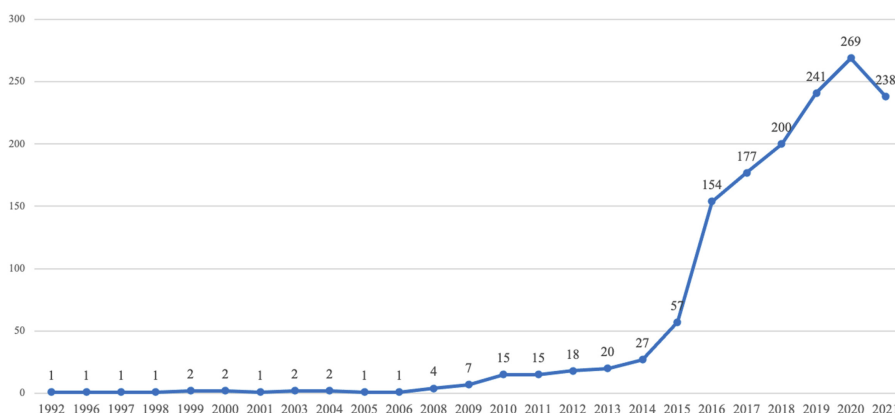
Year-wise publications
in the sustainable
consumer
behavior field

Co-authorship is a formal way of intellectual collaboration (Donthu *et al.*, 2021), which demonstrates how contributors relate to each other. By filtering the collaboration network to a minimum of three articles, 93 authors, 59 countries and 30 institutions are considered. The research community reveals some levels of co-authorship collaboration but developed among a few isolated units working in a closed network. Limited interaction appears to exist between organizations from distinct universities or countries. Although a wide number of connections are visualized possessing with three links or more (Figure 3), only the Australia–China–USA–S. Korea connections are retained at a threshold of 10 links, with USA and China unifying the most distant nodes. In the institutional collaboration network, the nodes with higher link strength are ISCTE Business School (BRU-IUL, Portugal; Total Publications: 12; Degree of Centrality: 44), Institute of FTZ Supply Chain (Shanghai Maritime University, China; TP: 7; DC: 21), Fogelman College of Business and Economics (University of Memphis, USA; TP: 6; DC: 19). Analyzing the extent of scholars' collaboration, the most prominent are H. Han (TP: 29; DC: 38) and W. Kim (TP: 13; DC: 26).

4.2 Performance analysis

Concerning RQ2, the sustainable consumption field attracts considerable attention with contributions from 160 nations, 2,508 organizations and 3,334 authors. Considering the first author's affiliation, findings indicate that 59 countries have contributed with three or more papers, with China (214 papers), USA (203), Australia (100), UK (92), India (70), Malaysia (64) and South Korea (59) as the most productive nations (Figure 4). From the latter comes the two most cited organizations: College of Hospitality and Tourism Management (Sejong University, Seoul) which is the most influential and productive (TP: 22; Total Citations: 504), followed by Busan's Dong-A University (Department of International Tourism, TP: 12; TC: 403).

Although 194 journals are represented in the dataset, only 43 are retained by applying a threshold of five papers. *Journal of Cleaner Production* is the most productive (TP: 468;
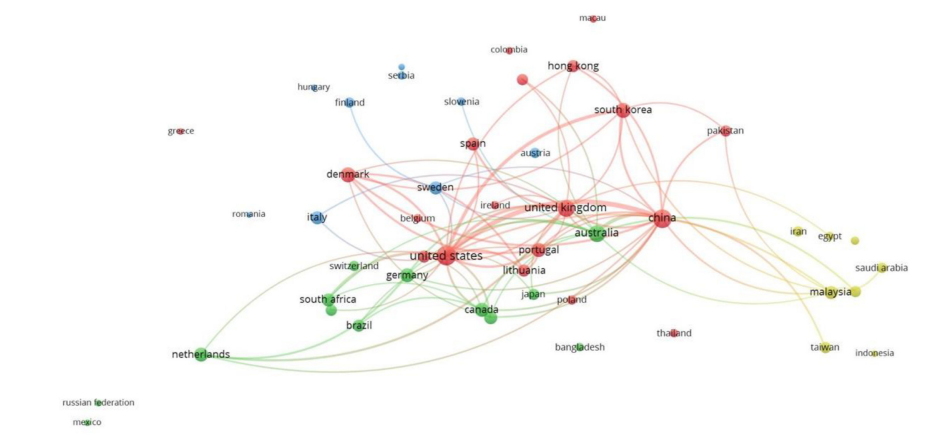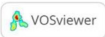

Figure 3.
Most influential countries of origin in the co-authorship network

Note(s): Circle size represents total link strength. Only connections with strength of 3 or higher are displayed
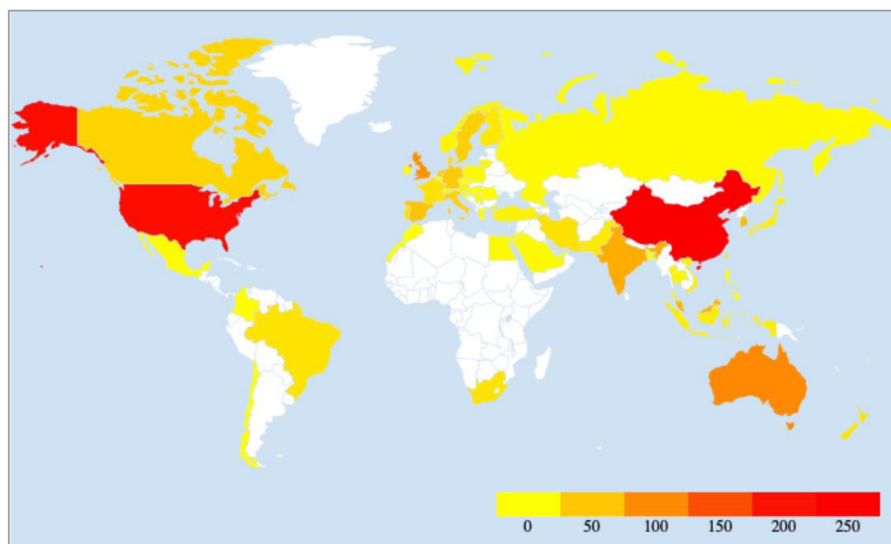
Citations per Publication: 23.3), followed by *Journal of Business Ethics* (TP: 117; CP: 34.9), *Journal of Sustainable Tourism* (TP: 83; CP: 30.3), *Business Strategy and the Environment* (TP: 58; CP: 26.3), *Journal of Business Research* (TP: 34; CP: 16.1), and *Journal of Retailing and Consumer Services* (TP: 21; CP: 64.5).

Results show that articles in this field have an average of 21.7 citations and 2.3 authors each. The most popular is a review study by Passafaro (2020), investigating the role of attitudes on tourists' sustainable choices, cited 25 times in the network, while the most cited externally is "*Predicting green product consumption using Theory of Planned Behavior and Reasoned Action*" (Paul *et al.*, 2016). Heesup Han is the leading and most connected author (TP: 29; TC: 1.164), with 93 authors publishing more than twice in this area. Only 189 papers cited other articles in the network, and connections are scattered across many thematic areas, suggesting that this domain is not yet fully developed. Therefore, content analysis was applied to a subset of documents, for examining and integrating the most pertinent frameworks and concepts.

4.3 Content analysis

After the bibliometric overview of the publication network, the selection of a more refined group of papers ensured a more robust fit with the research problem and higher-quality scoping, for conducing the content analysis and science mapping. In this subset, the majority (157 from 161) are empirical papers, most of which quantitative (142). In comparison, qualitative and mixed-method represent only, respectively, 4 and 11 cases.

4.3.1 Theories, contexts and methods. Concerning the major theoretical frameworks (RQ3), the most influential theories are TPB, value–belief–norm (VBN) and NAM (norm-activation model), which account for 64% of articles (Figure 5). TPB is the leading framework, which is based on the notion that intention reflects individuals' motivation to act (Ajzen, 1991), formed through a combined action of three predictors: *attitudes* (towards a specific object or event), *subjective/social norms* (e.g. perceived social pressure or normative expectation of others, to perform/not perform the behavior) and *perceived behavioral control*. Followers of TPB argue that self-interested acts are guided by a rational evaluation of outcomes and that achievement
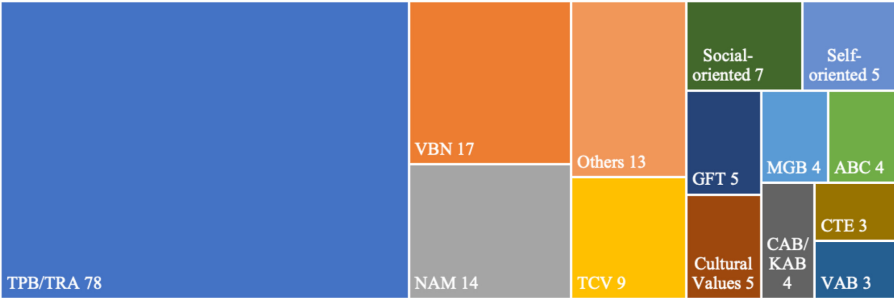
Note(s): Here, ABC: Affective-Behavior-Cognitive, CAB/KAB: Cognitive-Affective or Knowledge-Attitude-Behavior, CTE: Cognitive Theory of Emotions, GFT: Goal-Framing Theory, MGB: Model of Goal-directed Behavior, NAM: Norm Activation Model, TCV: Theory of Consumption Values, TPB/TRA: Theory of Planned Behavior / Reasoned Action, VAB: Value-Attitude-Behavior, VBN: Value-Belief-Norm. Here and according to the coding protocol, social-oriented includes Perceived Marketplace Influence, Social Identity/Exchange/Influence, and Social Cognitive theories. Self-oriented includes Self-Completion/Congruence, Self-Protection, and Cognitive Learning theories

Figure 5.
Most influential theories

depends jointly on ability and intention, which would be the immediate antecedents of behavior.

NAM was originally developed within the pro-social domain (Schwartz, 1977) and has been used extensively since then to explore ESBs (Han *et al.*, 2015; He and Zhan, 2018; Kim and Seock, 2019; Shin *et al.*, 2018). In the norm activation process, *personal norms* is the key variable determining the intent to act or behavior, which is activated when consumers become aware of the negative impacts of the outcome (*awareness of adverse consequences*) and of actions that they could initiate to avert such consequences (*ascription of responsibility to self*). A sizeable amount of evidence has been accumulated supporting the applicability of Schwartz's NAM in the context of pro-environmental studies. However, conflicting views exist on how to interpret NAM: if comprising a mediated, sequential process or as a moderated model instead (Han *et al.*, 2017). Following this debate, the VBN theory has been developed by broadening NAM's sequential mediator framework, with the inclusion of antecedents in the form of value orientations and environmental beliefs (e.g. *ecological worldview* or *NEP*). VBN was developed to achieve more robust predictions of PEB, in particular (Stern, 2000), and has been applied successfully to a variety of behavioral categories (Choi *et al.*, 2015; Hartmann *et al.*, 2018; Liobikiene and Juknys, 2016). It stipulates a causal chain of five variables driving behavior, where the sense of obligation to act (*personal/moral norms*) also a central role, as in the NAM: *personal values* (e.g. altruistic, biospheric, egoistic) – *beliefs* (e.g. NEP, awareness of consequences, ascription of responsibility) – *personal norms* – *PEB*.

Other popular theoretical frameworks in this domain include, per example, the theory of consumption values (TCV), the goal-framing theory (GFT) and the model of goal-directed behavior (MGB) as summarized in Table 3. In order to examine the focus of prevalent theories in terms of dependent variables, cases with, at least, four empirical studies in the dataset were coded based on being either PEB–GPB or intention–behavior, as displayed (Figure 6), respectively, in the matrix's horizontal and vertical axis. The lack of studies addressing GPB is thus confirmed (top-right quadrant), which serves to illustrate why such a relevant phenomenon is not yet fully understood in academic literature.

| Theories	N	Key antecedents and determinants	Theoretical assumptions	Main empirical studies
Theory of planned behavior (TPB)	78	Attitude towards the behavior (AtB), subjective norms (SN), perceived behavior control (PBC)	In TPB, intentions are assumed to predict actions, to the extent that the individual is capable of performing the behavior. By broadening the original TRA with the inclusion of PBC, the TPB accumulated a substantial amount of evidence supporting its prediction of intention through the combined effect of a positive evaluation (AtB) towards the target entity, perceived social pressures (SN), and ability to perform the behavior (PBC). Although scholars over the years have recognized how TPB offers a parsimonious account of purposive behavior, the model's sufficiency is often challenged, with multiple attempts to extend it. The role of SN is questioned by some, as it tends to have a relatively weak or nonsignificant predictive power. Meta-analyses also reveal that, despite the significant amount of Intentions' variance explained, a more modest success is reported with concerns to bridging the intention–behavior gap	Ahmad *et al.* (2020), Chen and Tung (2014), Elhoushy (2020), Hosta and Zabkar (2021), Kim and Han (2010), Kim *et al.* (2013), Lee *et al.* (2015), Liu *et al.* (2020), Minton *et al.* (2018), Moon (2021)
Value-belief-norm (VBN)	17	Values (e.g. *biospheric, altruistic, egoistic*), new ecological paradigm (NEP), awareness of consequences (AC), ascription of responsibility (AR), personal norms (PN)	VBN theory is characterized by a causal chain of variables moving from the more general and stable values, to more specific beliefs (about the consequences and causes of environmental problems and the individual's personal responsibility for such issues). It postulates that AC and AR beliefs are shaped by general environmental values (assessed by the NEP measure) and implies that particular beliefs (AC, AR) mediate the influence of values on "pro-environmental" PN, shaping one's willingness to act	Choi *et al.* (2015), Eid *et al.* (2021), González-Rodríguez *et al.* (2020), Hartmann *et al.* (2018)
Norm activation model (NAM)	14	Awareness of Consequences, Ascription of Responsibility, Personal Norms	NAM theorizes that one's intention or behavior is influenced by personal (or moral) norms; and the level of problem awareness and ascribed responsibility contribute to initiating the process. The moral obligation to perform (or refrain from) specific actions is argued as the decisive and most proximal variable of pro-social intention within the framework. However, the relationships among the NAM variables are unclear to some authors, which propose alternative sequences of effects. Nevertheless, a large number of studies offers empirical support for its core premises in pro-social contexts	Han *et al.* (2015, 2021), He and Zhan (2018), Kim and Seock (2019), Shin *et al.* (2018)

(continued)

Table 3.
Overview of major theories observed in the GPB domain

Table 3.

Theories	N	Key antecedents and determinants	Theoretical assumptions	Main empirical studies
Theory of consumption values (TCV)	9	Perceived consumption value (e.g. *functional, social, emotional, conditional, epistemic value*)	The theory focuses on values that explain why consumers choose to buy or not to buy (or use/not use) a specific product, and why consumers choose one product type over another. Three fundamental propositions are retained: (a) that consumer behavior is a function of various consumption values, (b) that these values have different contributions in any purchase situation, and (c) that all values are independent from each other. Evidence points out a multidimensional conceptualization of such values, with strong predictive ability in the context of buying green products/services	Biswas and Roy (2015a, b), Gonçalves *et al.* (2016), Khan and Mohsin (2017), Kim and Park (2017), Suki (2016), Zhang *et al.* (2020)
Affective–behavior–cognitive (ABC), cognitive–affective–behavior (CAB)	7	Knowledge or attitude (e.g. *cognitive component, environmental attitude*), affective beliefs	The ABC theory states that behavior (B) results from a combination of attitudinal variables (A) and contextual factors (C). While exploring the intricate interactions between situation/domain-specific (contextual) and psychological factors, for extending the understanding on pro-environmental consumer choices, rational-based models are integrated with ABC constructs (or CAB variations) to explain more variance than the traditional, unaugmented versions	Goh and Balaji (2016), Hage *et al.* (2009), Hansmann *et al.* (2020), Yadav *et al.* (2019)
Goal-framing theory (GFT)	5	Consumption goals and motivations (e.g. *gain, hedonic, normative goals*)	Grounded on the concept of values as guiding principles of life (which help to shape the judgments consumers make about the world around them), GFT studies in this domain focus on the impact of values on environmentally-friendly actions, relating the value orientation to guiding goals (or motivations) that determine "green" behaviors. For that effect, GFT examines three different types of goals that govern PEBs in a given situation: hedonic, gain, and normative. Thus, values reflect self-relevant overarching goals that may motivate consumers, influenced by situational cues	Barbopoulos and Johansson (2016), Liobikiene and Juknys (2016), Miao and Wei (2013), Shin and Kang (2021)
Model of goal-directed behavior (MGB)	4	Attitudes, subjective norms, perceived behavior control, positive and negative anticipated emotions, desires, frequency and recency of past behavior (FPB, RPB)	Based on the assumption that desires provide a direct motivational impetus for behaviors, MGB reinterprets the TPB premises by successfully adding additional constructs. Emotions are included as a major antecedent, desires as the integrative mediator variable, and FPB/RPB capture additional variance to the rational and attitudinal-based TPB determinants. The affective/emotional part of the decision process is argued as key for activating the motivational desire to pursue goal-seeking actions	Escadas *et al.* (2019), Han and Yoon (2015), Hwang *et al.* (2019), Odou and Schill (2020)

Note(s): Here, N = number of papers. TRA (theory of reasoned action) studies are included in TPB section. Due to the wide amount of papers reviewed in this investigation, in some cases only a selected subset is mentioned
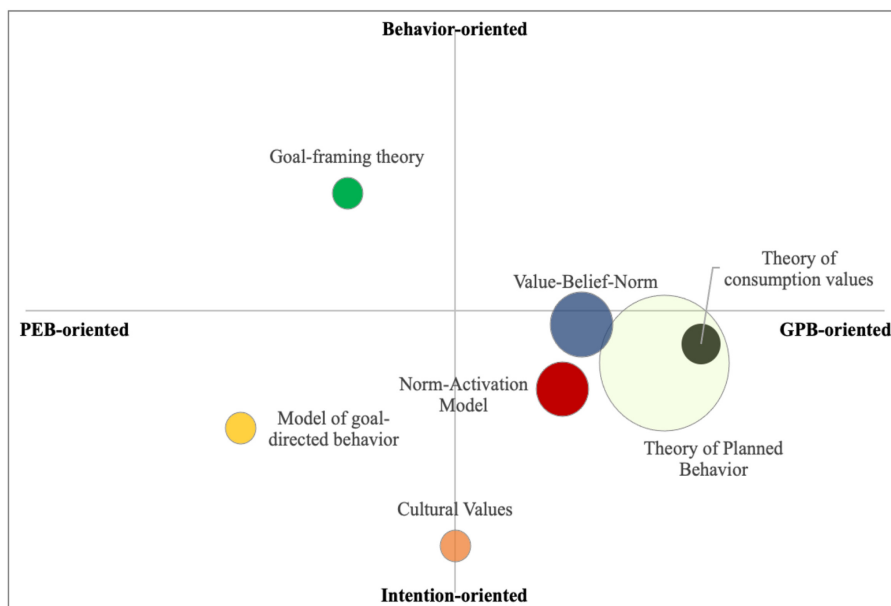
Continuing to address RQ3 on the prevailing contexts and methods, hospitality and tourism is the most popular context for gaining knowledge on sustainable consumer behaviors (25% of papers), followed by *unspecified green purchase categories* (21%) and *pro-environmental/ethical* (non-purchasing) *habits* (20%). Two other emerging categories are observed since 2018: the *automotive* industry (9% of papers, focused on the adoption of hybrid/electric cars in China and Europe) and *sustainable fashion* (6%, mainly based on web surveys to US consumers). Examples of the most frequently examined constructs, in relation to each of major behavioral type and sub-type, are offered in Appendix 2.

The most popular methods are surveys (89% of papers) and structural equation modeling (68%), followed by regressions (19%). A lack of multi-method studies is observed, which could contribute to improve understanding on consumer motivations to adopt (or not) green products. With regards to data collection, non-probabilistic sampling prevails (82% of papers). Faculty campus (15%) is the most common place of convenience to gain access to samples, which can raise concerns about the validity of findings. Online survey platforms' use is growing (14%), especially in the tourism and fashion sectors, followed by "intercept surveys" at public events or areas (13%), and in shopping outlets (11%). Consumer panels (11%) are also used, for instance, to study the purchase of household supplies and eco-tourism traveling intentions.

4.3.2 Thematic focus. A total of 134 keywords appear at least three times in the dataset, forming a network of 2.096 connections. Terms with difficult interpretation were excluded, such as (1) vague (e.g. *green, model*) and transversal terms (e.g. *sustainability, empirical*) used in multiple contexts; (2) repeated terms (e.g. *attitudes/attitude*), in which case the term with higher link strength was retained. The most central topics are *planned behavior, attitudes, pro-environmental behavior, intentions, sustainable consumption, products, environmental concern* and *knowledge*, which reflects the predominance of attitudinal and cognitive frameworks. Nine topical groups are formed (Figure 7), when applying a resolution of 1.5 and minimum cluster size of six. The evolution shifted initially from *attitudes* to *environmental*
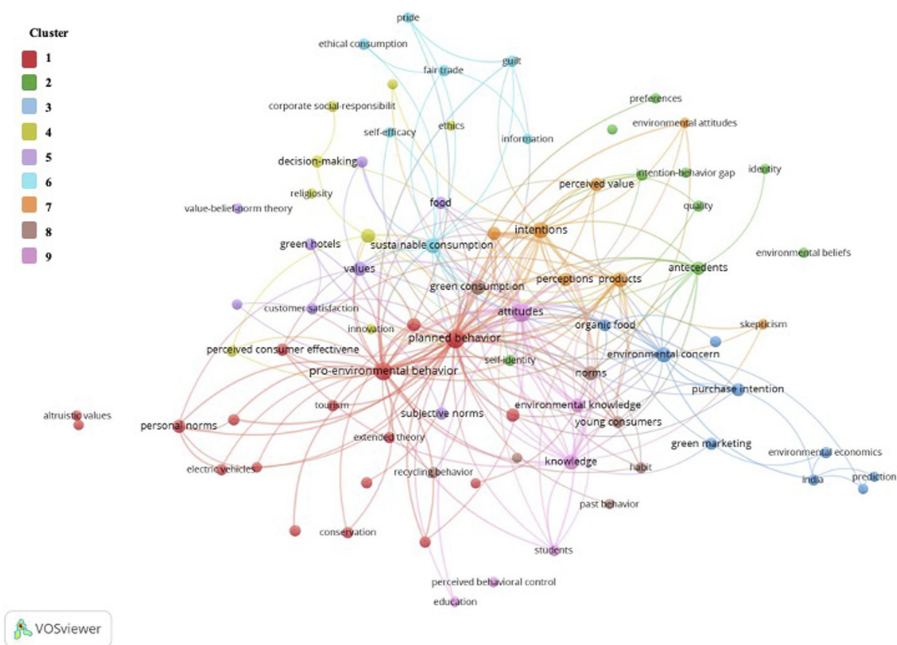
Figure 7.
Co-word network with
a minimum frequency
of 3 (*N* = 79)

Note(s): Here, size of each node reflects the number of publications in which that term is
found, and distance between nodes indicates their co-occurrence relatedness

concerns, and later, towards the impact of *values* and *beliefs* on behavioral intentions. Since
2019, topics such as *organic foods, China, tourism* and *moral norms* are reinforcing their role.
Extended models are increasingly employed for evaluating the *spillover* of pro-environmental
household routines, such as energy-saving, into more sustainable traveling and shopping
habits. The most frequent keywords and their respective cluster allocation are exhibited in
Table 4.

For structuring the research field thematically, topical groups were subsequently
positioned in a strategic map, which are two-dimensional illustrations of a theme's status and
development, derived from Callon's *centrality* and *density* indicators. These constitute
measures of, respectively, a theme's importance (e.g. *degree of interaction with other groups
across the network*) and internal coherence (e.g. *connectedness within a group*). Although
interpretations of centrality and density are widely available in literature, in some cases,
calculation formulas are absent or inconsistent (Chakraborty *et al.*, 2021; Cobo *et al.*, 2011;
Hosseini *et al.*, 2021; Pereira and Bamel, 2021). Therefore, the original definition was used
(Courtial and Callon, 1991), with mean values computed for each node's internal links (*density*)
and strength of external links (*centrality*).

When mapping the sub-fields in a 2 × 2 matrix, four quadrants are represented. *Motor*
themes (upper right quadrant) possess high centrality and density, and are well-developed
topics; *basic/transversal* themes (lower-right) are characterized by high centrality/low density,
constitute core fields, but with weakly developed internal ties; *underdeveloped/peripheral*
themes (lower-left) have both low centrality and density, showing a weak level of maturity,
usually with emerging or declining status; and finally *developed, but peripheral* themes
(upper-left) exhibit low centrality/high density, which stands for developed internal (but not
external) links. The size of each sphere represents the frequency of occurrences within a topic.

Keyword	Cluster	TO	DC	TLS
Planned behavior	1	40	63	180
Attitudes	9	41	60	173
Pro-environmental behavior	1	33	52	134
Intentions	7	20	43	90
Sustainable consumption	6	16	40	72
Products	7	15	39	79
Environmental concern	3	17	37	65
Knowledge	9	14	32	74
Norms	8	11	31	48
Values	5	11	30	49
Perceptions	7	8	29	37
Beliefs	4	12	28	43
Willingness-to-pay	7	10	28	48
Purchase intention	3	9	28	40
Environmental knowledge	9	11	24	44
Perceived consumer effectiveness	1	6	24	30
Antecedents	2	9	23	45
Young consumers	8	6	23	34
Self-identity	2	5	23	28
Green consumption	8	14	21	32

Note(s): Here, TO: Total occurrences; DC: Degree centrality; TLS: Total link strength

4.3.2.1 Motor quadrant. Two fully developed themes are placed in the motor quadrant (Figure 8): *WTP* (willingness-to-pay) *and product perceptions*, and *Attitudes and cognitions*, constituted of, respectively, seven and six keywords. Both have a high degree of both centrality and density, containing together 24% of links, and 17% of all terms in the network.
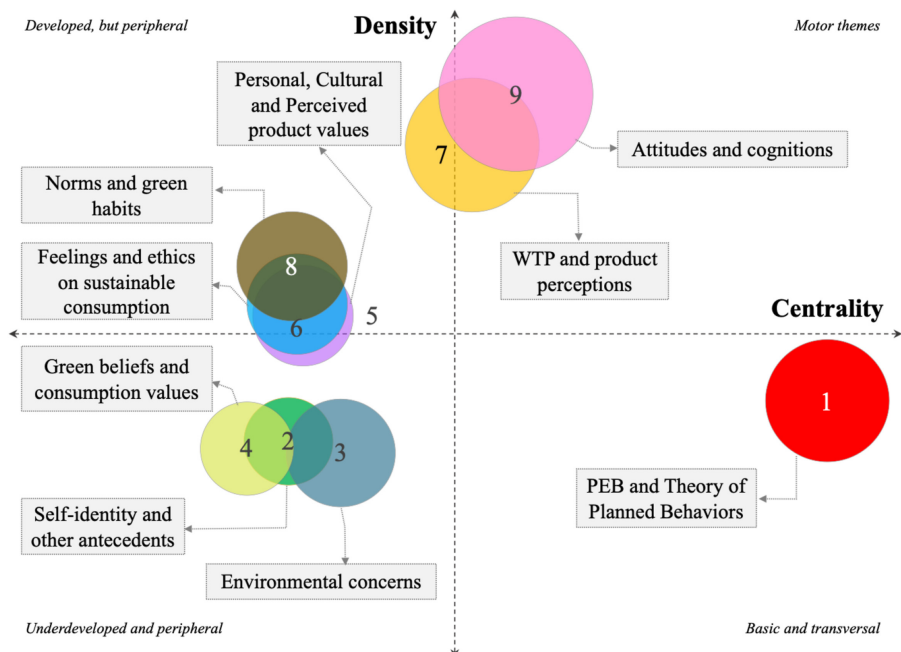
WTP and product perceptions addresses the effect of perceived value on purchase consideration and/or willingness to a pay a premium price for green products, such as energy-saving home appliances or sustainable apparel (de Medeiros *et al.*, 2016; Kumar *et al.*, 2021; Zhang *et al.*, 2020). *Attitudes and cognitions* account for the network's largest volume of publications, drawing from TPB/TRA to examine barriers in the attitude–intention bridge and cognitive antecedents (e.g. knowledge about environmental issues), namely when observing the sustainable practices of rural residents, university students and eco-tourists (Gruber and Schlegelmilch, 2014; Vicente-Molina *et al.*, 2013; Wang *et al.*, 2020; Wang *et al.*, 2014).

The two themes in this quadrant reflect the prevalence of self-oriented and attitudinal models to explain purchase outcomes, mainly through TPB and its many augmented versions. This line of research shows the importance of evaluative beliefs and judgments about buying/using green products – based on cognitions about those products and social norms – to explain the formation of consumer intentions, such as intention to buy and willingness to pay.

4.3.2.2 Base quadrant. PEB and theory of planned behaviors is placed in the base quadrant, contributing largely to the core foundation and legitimacy of the research field. Earlier publications focus on the new ecological paradigm and perceived consumer effectiveness, evolving towards extended TPB versions with personal normative and altruistic antecedents, dedicated to sustainable citizenship behaviors. With a broad thematic scope (24% of links, 23% of terms), findings spread across diverse contexts, such as pro-environmental shopping, traveling and domestic habits (Nguyen *et al.*, 2017b; Park *et al.*, 2018; Setiawan *et al.*, 2020; Wang *et al.*, 2021).

In this area, TPB theory is mostly used for predicting (non-buying) pro-environmental attitudes, intentions or actions, instead of addressing pure consumption contexts. Authors employ similar frameworks as presented in the *WTP and product perceptions*, and *attitudes and cognitions* themes, but highlighting the effects on more generic PEB outcomes – e.g. recycling, environmental activism, saving water or energy, using public transportations. For that reason, studies from both themes in the motor quadrant are frequently cited in *PEB and TPB* and vice-versa. Most empirical findings reveal the necessity to broaden or extend TPB frameworks with additional variables, namely related with environmental awareness and other psychological factors.

4.3.2.3 Developed, but peripheral quadrant. Personal, cultural and perceived product values, feelings and ethics on sustainable consumption, and *norms and green habits* are three well-developed but peripheral themes, so more attention could be suggested here.

The first establishes the implications from different types of personal, cultural and consumption values, further advancing the empirical knowledge about motivations to consume organic foods, per example. The core frameworks are VBN, TCV and Schwartz' theory of values (Nguyen *et al.*, 2017a; Razzaq *et al.*, 2018). These theories postulate that values act as guiding principles for consumer decision processes and are often employed as either antecedents (Ahmad *et al.*, 2020; Cheng *et al.*, 2020; Filimonau *et al.*, 2018; Hartmann *et al.*, 2018; Yin *et al.*, 2018) or moderators (Felix and Braunsberger, 2016; Khan and Mohsin, 2017) of pro-environmental behavior. When examining the role of values in the sustainable consumption area, two main discussion topics prevail among authors: (1) to examine which personal or cultural value types are able to drive environmental-related beliefs, norms and willingness to act (e.g. *VBN and cultural values frameworks*); and (2) to connect consumption values to constructs derived from pro-social frameworks (e.g. *TCV*).

Feelings and ethics on sustainable consumption includes *guilt* and *pride* keywords, measured in the form of anticipated affects, as examined in studies about fair trade and ethical consumption, addressing moral and pro-social choices in broader contexts (Antonetti and Maklan, 2014; Davies and Gutsche, 2016). Although such frameworks are not so strongly

linked with the PEB/GPB attitudinal models, the affective mechanisms explored by scholars here can add clarity to explaining green consumer behaviors.

Norms and green habits address the role of norms – of social and personal nature – in the formation of new habits, in which recycling (Aboelmaged, 2021; Hage *et al.*, 2009) and cross-cultural contrasts (Minton *et al.*, 2018) are frequent topics of attention. The argument presented is the following: when consumers are already engaged in some pro-environmental practices (e.g. recycling at home), they would be more likely to adopt GPB. When considering the key determinants, the influence and interplay between social/subjective and personal/moral norms are highlighted by most authors in this theme.

4.3.2.4 *Underdeveloped and peripheral quadrant.* This quadrant includes three themes: *self-identity and other antecedents, environmental concerns,* and *green beliefs and consumption values*, with scattered publication timelines. The latter began to develop from 2014, with *CSR* and *innovation* topics quite central to studies until 2017. Nowadays, it became a disappearing theme, occupying the network's least central position. The topical focus gravitates around individual's beliefs, relating concepts like *ethical beliefs* and *emotional intelligence* (Chowdhury, 2017), or *consumption values* and *environmental beliefs* (Biswas and Roy, 2015a). Conversely, research dedicated to the impact of *environmental concerns* starts in 2017 and evolves through emerging sub-themes, namely organic foods and environmental economics, stablishing connections to value-attitude hierarchy and TPB studies (Laureti and Benedetti, 2018; Rahman and Reynolds, 2019; Yadav and Pathak, 2016). Consumer self-image is one of main topics in the *self-identity and other antecedents* theme, elaborating on the differences between "green" and "non-green" profiles (Barbarossa and de Pelsmacker, 2016). Positive spillover effects and concepts like *virtue* (Spielmann, 2021), *extended self-identity* (Han *et al.*, 2021) and product/service perceived quality are tested. Although all three themes need further exploration to attain a higher maturity level, it is observed that *spillover, self-identity* and *environmental concerns* are well-connected terms within their own groups and may become more influential concepts in the future. Our data indicate the lack of focus on environmental awareness and self-image topics. Although these concepts are included in some empirical studies, they are usually added as stand-alone variables, without a holistic, theoretical contribution on how such motivations can exert a combined effect with the main constructs used in the most influential frameworks.

4.4 Towards a new conceptual framework (PSICHE)
Six high-level dimensions were categorized and included in the new proposed framework (Figure 9), as a result of the thematic groups captured in the domain's intellectual structure. The acronym "PSICHE" represents the diversity and complexity of intervening factors driving GPB decision-making processes, as described next and in Table 5.

4.4.1 *(P)roduct-related factors.* A long trail of researchers has stablished the efficiency of attitudes towards behavior and product evaluative beliefs (e.g. TPB – (Yadav *et al.*, 2019; Zhang *et al.*, 2018) and TCV – (Biswas and Roy, 2015b; Khan and Mohsin, 2017)) to predict the willingness to buy or pay for green products and services. However, our review indicates a scarce number of studies describing how to fully integrate such evaluations with moral normative frameworks and with other affective and high-level psychological factors. Evidence of the role of brand perceptions and category are also scarce (Amatulli *et al.*, 2019; Cerri *et al.*, 2018; Luchs and Kumar, 2017), which would allow a better comprehension of how the green consumers evaluate purchase decisions.

4.4.2 *(S)ocial influences.* Considering the contradictory findings with regards to the impacts of social/subjective norms (Barbera and Ajzen, 2020), theory development should address *when* – under *what circumstances* – instead of only elaborating on *if*, compliance with "green social norms" becomes a significant GPB determinant. Moderation and multi-group
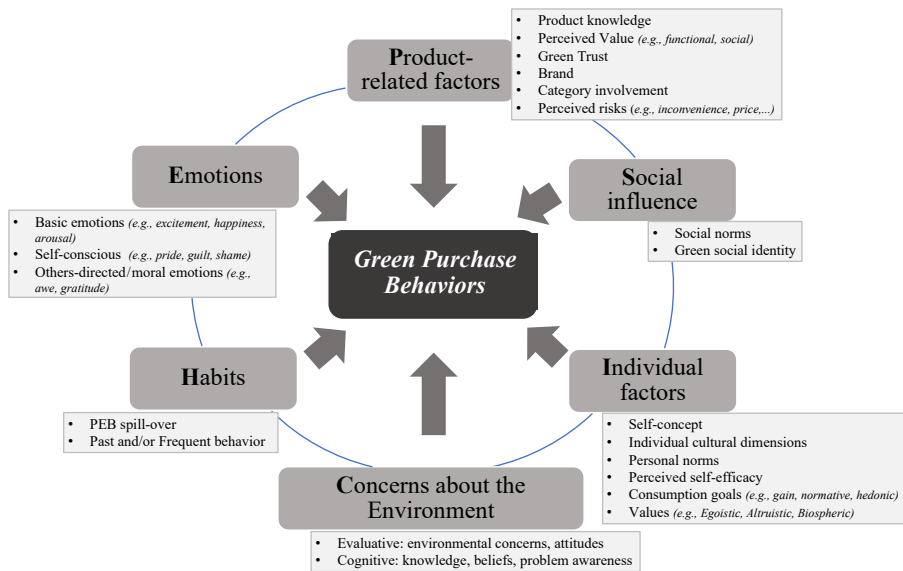
Figure 9.
The PSICHE framework developed by the present study's authors, informed by literature on GPB

analysis can be suggested to investigate possible moderating effects of enduring psychological – e.g. *related with personal values, concerns and/or personality traits* (Felix and Braunsberger, 2016; Lee *et al.*, 2015) – and contextual factors – e.g. *connecting to specific GPB enablers and barriers* (Fan *et al.*, 2019; He and Zhan, 2018; Wu *et al.*, 2016) – which could strengthen the significance of social influences. As the vast majority of consumer behavior literature is concerned only with the compliance with social (perceived) pressures, other social mechanisms – such as self-expressive benefits (Hwang *et al.*, 2019) – also deserve more attention.

4.4.3 (I)ndividual factors. Drawing on pro-social theories, the debate around internal/psychological factors is fruitful, particular with regard to how moral normative factors activate the motivation to buy green products or engage in a pro-environmental action. One of the recurring topics of discussion is whether NAM should be interpreted in a mediated, moderated or sequential model (Onwezen *et al.*, 2013).

Literature also reveals rival explanations related to which personal or cultural values add value to explaining GPB, as inspired by VBN framework: environmental values (Hartmann *et al.*, 2018), self-transcendence/self-enhancement continuum (Ahmad *et al.*, 2020), collectivism-individualism and man-nature orientation (Filimonau *et al.*, 2018; Yin *et al.*, 2018) are the most common approaches, but the role of spiritualism, religion and moral foundations are also suggested.

Besides values, some authors often employ *self-efficacy* in rational-based models, both in combination with, or as replacement of, perceived behavioral control (al Mamun *et al.*, 2018; Hosta and Zabkar, 2021), arguing that the self-perceived "ability to complete the task" directly influences GPB decision-making. Conversely, evidence from other studies supports the view that beliefs about *outcome expectancies* are a more fundamental factor, focusing on the actual environmental impacts of buying/using green products (Sreen *et al.*, 2021). Finally, with regards to demographic factors, gender, education and income are suggested by authors such as (Odou and Schill, 2020) as the most promising confounding variables affecting PEB/GPB.

Dimensions	Description	Key constructs	Related thematic clusters	Main empirical studies
Product-related factors	Attitude towards GPB or the product is widely examined as it is often reported as the most significant predictor of purchase intentions. Product-related attitudes can be linked to its value dimensions and related beliefs, with the effect of brand, category and situational factors (e.g. purchasing barriers) still playing a somewhat unexplored role, in the consumer decision process	Product knowledge, green trust, brand, product category (e.g. type/role, involvement), perceptions on consumption value (e.g. functional/quality, emotional, social) and risks/barriers (e.g. social risks, price, inconveniences)	4, 5, 7, 9	Ahmad and Zhang (2020), Biswas and Roy (2015a, b), Cerri et al. (2018), González-Rodríguez et al. (2020), Khan and Mohsin (2017), Kim and Park (2017), Luchs and Kumar (2017), McLeay et al. (2018), Park and Lin (2020), Rausch and Kopplin (2021), Singh and Verma (2017), Suki (2016), Vicente-Molina et al. (2013), Yadav et al. (2019), Zhang et al. (2020)
Social influence	The social context is, for a large community of scholars, the main route for influencing sustainable behaviors, as consumers are continuously impacted by others' attitudes and expectations. The social context mirrors one's social self-identity, so the perceived pressure to comply with social rules of conduct is the most frequently examined influencing factor for PEB and GPB	Social/subjective norms (e.g. descriptive, injunctive, normative goals), green social identity	1, 8	Hansmann et al. (2020), Jansson et al. (2017), Kim and Seock (2019), Laureti and Benedetti (2018), Lee et al. (2015), Liobikienė et al. (2017), Minton et al. (2018), Moon (2021), Olya et al. (2019), Untaru et al. (2016)
Individual factors	Factors linked to the individual self can exert a powerful influence over sustainable consumption outcomes, with antecedent, mediating and moderator roles. Personal and cultural values provide guiding principles influencing how people process (and react to) social stimuli and situational cues, by instance, while personal norms are play a key role in driving behaviors, according to both NAM and VBN frameworks	Personal values (e.g. environmental/biospheric, altruistic, egoistic), green self-identity/self-concept, cultural dimensions (individual-level), personal moral norms, perceived self-efficacy, consumption gain goals	1, 2, 5	Ahmad et al. (2020), al Mamun et al. (2018), Barbarossa and de Pelsmacker (2016), Choi et al. (2015), Chowdhury (2017), Eid et al. (2021), Felix and Braunsberger (2016), Filimonau et al. (2018), Hartmann et al. (2018), Hosta and Zabkar (2021), Yin et al. (2018)
Concerns about the environment	The extent to which consumers are aware and care about environmental issues, as well as feel responsible towards solving them is shown to affect significantly GPB in multiple behavioral categories	Awareness of consequences, environmental knowledge/beliefs, attitudes and concerns	3, 4, 9	Chen and Tung (2014), Goh and Balaji (2016), González-Rodríguez et al. (2020), Jaiswal and Kant (2018), Kanchanapibul et al. (2014), Kim and Han (2010), Kumar et al. (2017, 2021), Ritter et al. (2015), Shin et al. (2018), Sun et al. (2019), Yadav and Pathak (2016)

Table 5.

Dimensions	Description	Key constructs	Related thematic clusters	Main empirical studies
Habits	Evidence suggests that the existence of PEB habits in a given context, may increase the perceived self-efficacy, ability and willingness to perform green choices in other contexts. The gap between household routines and out-of-home/ hedonic habits is of particular concern for services and sustainable tourism settings	Cross-category spill over (e.g. from private to public sphere, from domestic to traveling context), past behavior, recent behavior	8	Aboelmaged (2021), Han and Yoon (2015)
Emotions	Anticipated affects are under-studied construct in the context of green products but have been shown to play a determinant role in the contexts of green services and ethical consumption investigations, according to MGB, NAM and other theoretical frameworks. Consumer feelings may be a basic response to stimuli, or involve some sort of mental processing related, per example, with the projected self-image or the moral evaluation of an entity's environmental practices	Positive and negative anticipated emotions or affective beliefs, environmental concerns and sensitivity	6	Amatulli et al. (2019), Antonetti and Maklan (2014), Han et al. (2017), Hwang et al. (2019), Kim et al. (2013), Liang et al. (2019), Odou and Schill (2020), Spielmann (2021)

4.4.4 (C)oncerns about the environment. Considering the results from this systematic review, a comprehensive clarification on definitions and measurements should precede further empirical studies focused on environmental motivators. A more detailed examination identifies that a wide variety of different terms are employed to indicate the same concept, and in other cases, the same concept is defined or operationalized in multiple different ways. This lack of consistency affects the way that concepts, such as (1) environmental-related cognitions *(e.g. problem awareness, environmental knowledge)*; (2) attitudinal and affective factors *(e.g. environmental attitudes, concerns, care for environmental issues, environmental awareness and sensitivity)* (3) sense of responsibility to act *(e.g. ascription of responsibility, environmental responsibility, environmental consciousness),* have evolved. Notwithstanding, environmental cognitions and concerns are among the most influential factors overall in PEB/GPB empirical papers (Chen and Tung, 2014; González-Rodríguez *et al.*, 2020; Shin *et al.*, 2018).

4.4.5 (H)abits and (E)motions. These concepts are often used in separate lines of research peripheral to the GPB domain. However, evidence supports the view that recent/past habits (Aboelmaged, 2021) and affective beliefs (Antonetti and Maklan, 2014; Kim *et al.*, 2013; Spielmann, 2021) can successfully augment the variance captured by the seminal self-oriented and pro-social theories. A clear example relies in MGB (yet rarely used in the GPB context), which broadens and extends the original TPB, and posits that anticipated emotions and past behavior, combined with norms, attitudes and behavioral beliefs, shape consumers' desire to buy (Perugini and Bagozzi, 2001).

The debate on how to link emotions with personal norms should be further pursued, with inconclusive findings about how to extend VBN/NAM frameworks: personal norms determine emotions or the other way around (Han *et al.*, 2017, 2021). Psychology and ethical consumption literature provide a meaningful contribution, by distinguishing and operationalizing different sub-types of emotions (Bagozzi, 2020; Liang *et al.*, 2019; Xie *et al.*, 2015), such as basic, self-oriented and moral emotions.

5. Research fronts for the future
Bibliographic coupling is suitable for representing a field's composition (Donthu *et al.*, 2021) and allow authors to uncover upcoming work streams, through relations between publications that cite the same documents (van Eck and Waltman, 2017). Addressing RQ5, four major research fronts are unveiled in the GPB domain (Table 6), which are used to propose future avenues of research, connected with the thematic groups found in literature.

5.1 Research front #1: predicting GPB through TPB and attitudinal models
With 84 publications (52% of the core set), this front represents the largest – and most strongly connected – community, mainly dedicated to augmented versions of the TPB model. Recently developed (average publication year: 2018), builds on contributions from *PEB and TPB; personal, cultural and perceived product values; attitudes and cognitions* thematic groups. Despite TPB's sufficiency in many social and behavioral fields (Barbera and Ajzen, 2020; Bosnjak *et al.*, 2020; Sheppard *et al.*, 1988), the ability to bridge the intent–behavior gap and capture the complex GPB decision process is widely challenged (Groening *et al.*, 2018; Klöckner, 2013; Rivis *et al.*, 2009; Schwenk and Möser, 2009), reason why scholars will continue to search for evidence of additional factors adding explanatory power. For that effect, cognitive/attitudinal factors are frequently tested, with mixed empirical results so far. While some studies (Kumar *et al.*, 2017) appear to confirm environmental knowledge as moderating the relationship between attitude and buying intention, others identify product-related attitudes as the main predictor of green purchase intention, with environmental

Research front	Theories	Key topics	Future research questions
1) Predicting GPB through TPB and attitudinal models	TPB	Personal and social norms, cultural values, environmental knowledge and concerns	• How can cultural dimensions and location (e.g. rural/urban setting) affect the impact of norms, attitudes, and beliefs on GPB? • Which specific dimensions of social norms should be emphasized (e.g. descriptive/inductive; impact of media, influencers, important others)? • How to integrate extrinsic (social) and intrinsic (personal) norms? • What is the role of environmental-related cognitions and concerns, for activating personal norms and triggering the purchase decision process?
2) Expanding service determinants into green products' context	VBN, MGB	Values, anticipated emotions, spillover/past behaviors, green trust	• What is the impact of anticipated affects in the green consumer decision process? • What are the most influencing values (e.g. altruistic/egotistic) for behavioral change? • How to mitigate the gap between household habits and hedonic out-of-home settings?
3) Consumer goals and perceived value	GFT, TCV	Perceived value, willingness-to-pay, consumption goals	• Which dimensions of perceived value can determine GPB, and how do they relate with specific consumption goals (e.g. hedonic, gain, normative)? • How can factors related with brand, product category and involvement affect the green consumer decision process?
4) Social context and ethical consumption	NAM, MGB	Self-image and social identity, self-efficacy, guilt and pride, fair trade	• What are the differences between private and public-sphere sustainable behaviors, and how do they relate to the self/social-identity cognitive dissonance? • How to explore the ambivalence between the desire for environmental sustainability and social justice? • Which distinct intervening factors (e.g. values, affects) and trade-offs play a role in increasing perceived self-efficacy and willingness to act? • What is the most effective emotional framing (e.g. positive/negative) in driving GPB outcomes?

Table 6.
Suggested future avenues of research on GPB determinant factors

concerns, perceived consumer efficacy and biospheric values acting as antecedents (Jaiswal and Kant, 2018; Nguyen *et al.*, 2016; Yadav *et al.*, 2019).

Future scholars may continue to focus on *moral obligations/personal norms*, whose salient impact is assessed in pro-social contexts, such as socially responsible behaviors (Hosta and Zabkar, 2021), sustainable choices when dining out (Elhoushy, 2020; Shin *et al.*, 2018) or visiting environmentally responsible attractions (Han and Hyun, 2017). The trail of evidence suggests a more prevalent role for personal than social norms, which deserves more dedicated study, and can be amplified by environmental awareness and ascription of responsibilities. Based on evidence suggesting that the impact of social norms may depend on the type of culture (Nguyen *et al.*, 2017a; Taufique and Vaithianathan, 2018; van Tonder *et al.*, 2020), the contrast between collectivistic and individualistic cultures is also worth further investigation. Cultural values can also be assessed either influencing the effect from TPB variables on GPB or as antecedents of the perception of environmental issues and inclination to assume responsibility (Liobikiene and Juknys, 2016; Sreen *et al.*, 2018). Finally, other factors such as *price sensitivity* (Hsu *et al.*, 2017) and *perceived inconvenience* (Nguyen *et al.*, 2016) are also pointed out as affecting the impact of TPB constructs, which should be confirmed in different contexts.

5.2 Research front #2: expanding service determinants into green products' context

With 49 papers (30%), this work stream is the most cited, on average, and has the longest publication timeline (average year: 2015, tracing back since 1992). The PEB spillover from domestic to traveling settings (Miao and Wei, 2013) is a topic earning more consideration among scholars dedicated to green product contexts, reflecting on the underlying motivations in different settings (normative/hedonic, purchase/non-purchase).

The choice of destination or accommodation is examined for successfully revising some of the most recognized theoretical models with antecedent factors. MGB is augmented with environmental awareness, subjective norms and perceived effectiveness (Han and Yoon, 2015); TPB is extended with anticipated regret and altruistic values (Kim *et al.*, 2013; Teng *et al.*, 2015), and the concept of *green trust* is added into the VBN model (Choi *et al.*, 2015). However, as these findings are limited to the field of pro-environmental activities and services, mostly from hospitality and tourism contexts, further empirical work is required for observing such effects on green product purchasing scenarios.

5.3 Research front #3: consumer goals and perceived value

Front #3 aggregates 17% of documents ($N = 28$) and is losing centrality, accounting for only 10% of papers published during the last three years. Notwithstanding the high connectedness within its own community, it is the least cited of all research fronts. Attention here is given mainly to themes related to values and product perceptions, with authors exploring the multidimensionality of consumption values and motives, recurring to goal-framing and consumption values theories, with additional work recommended to clarify which value dimensions should be prioritized for predicting GPB.

Based on empirical findings, the functional valence (quality/price) is necessary, but not sufficient, for activating GPB, requiring a combination of other values (e.g. *social*, *conditional*, *emotional*). Evidence from developing economies shows how only functional and conditional values (associated with price sensitivity) have any significant impact on decisions of "non-green" consumers (Biswas and Roy, 2015a), while social value (e.g. *peer opinion, social recognition, positive word-of-mouth*) emerges as the strongest motivator of "green" consumers, which is also verified with regards to "environmental concerns expressed through GPB" (Suki, 2016). The functional-emotional combination is argued as fundamental for regulating consumers' propensity to choose green products (Gonçalves *et al.*, 2016),

maximizing eco-tourists' satisfaction and loyalty (Kim and Park, 2017). In fact, among organic food market visitors, emotional values are argued to moderate the effect of other values (Khan and Mohsin, 2017), while other authors (Hwang *et al.*, 2019) suggest emotional gratification as an outcome of self-expressive benefits and "warm glow" feelings, in the context of drone food delivery services.

The benefits resulting from consumer goal achievement are another worthwhile study area. Four goal dimensions emerge (Barbopoulos and Johansson, 2016): thrift and safety (related to *gain goals*); moral and social norms (associated to *normative goals*), but the multidimensionality of consumer motivations should be further assessed in product categories with different involvement levels. For acquiring low-involvement, green personal care goods (Ghazali *et al.*, 2017), hedonic motives are deemed as the strongest predictors of attitude change, with health, safety and environmental values also holding a significant impact. When evaluating high-involvement categories (e.g. recycled-wood furniture, hybrid/biofuel cars), the main impact is attributed to functional and environmental values (de Medeiros *et al.*, 2016). Besides category involvement, other product-related factors are worth attention to mitigate the green gap. Trust in product attributes and perceived convenience/availability can be amplified, respectively, by brand credibility and variety of distribution channels (Wang *et al.*, 2019).

5.4 Research front #4: social context and ethical consumption
Rooted on the *feelings and ethics on sustainable consumption* theme explores adjacent topics, such as circular economy and institutional perspectives. For that reason, although studies from this community tend to be highly cited, the connectedness within the GPB network is not as developed as others and is the smallest work stream in the dataset. Nevertheless, the contribution to the domain is meaningful, by exploring new empirical contexts and methods, such as experimental or qualitative designs, which enable scholars to gain a comprehensive understanding of the social-cognitive framework affecting altruistic/ethical concerns that can inspire new reflections about the ambivalences of consumer motives.

The desire to project the right image to others is more important to those that value their public self-image and social identity, reinforcing self-esteem (Johnstone and Hooper, 2016). In the privacy of their own homes, however, a different story is told, as consumers may not feel the need to adopt sustainable habits. Another ambivalent phenomenon is the contrast between ethical concerns of environmental and social nature. Regarding the former, when examining the attitude–behavior gap of organic coffee drinkers (Lee *et al.*, 2015), authors suggest a moderation effect by price sensitivity and ethics, with "ethical consumers" more likely to be driven by social and health-related causes, while others are mainly influenced by sensory attributes. Conversely, in a similar context [fair trade coffee], where consumer motivations are supposed to relate to the attainment of social justice, evidence accounts for habit formation and egotistic values *(e.g. self-satisfaction, sense of belonging)* as dominant drivers of ethical behaviors (Davies and Gutsche, 2016). Both were social occasions observed in coffee shops.

Anticipated affects/emotions is also a topic of attention when ethical-based choices or buying from social/environmental-responsible companies is under scrutiny (Amatulli *et al.*, 2019; Antonetti and Maklan, 2014; Escadas *et al.*, 2019). The mediated impact of guilt and pride is shown to activate a learning process leading to increased perceived consumer effectiveness. Consumers experiencing such emotional states are less likely to adopt neutralization techniques which would obstacle new habits. These contributions further emphasize the important – often neglected – role of emotions for future frameworks to enhance the predictive power of rational-based models.

6. Conclusion and contributions

Environmental sustainability is a hot topic for society, science and media, with major social, political and economic implications. Some meta-analytical studies (Bamberg and Möser, 2007; Klöckner, 2013; Rivis *et al.*, 2009; Sheppard *et al.*, 1988) expose the virtues and shortcomings of seminal theories used in the field of pro-environmental actions and behavioral intentions, but the latest contributions are not covered, and GPB outcomes in particular are not addressed, while more recent review studies (Groening *et al.*, 2018; Li *et al.*, 2019; Sharma, 2021) do not cover the full scope of pertinent literature or propose any actionable framework. In this vein, this article sets out to explore, categorize and examine the widest collection yet of studies on sustainable consumer behaviors, with the purpose of uncovering the main findings on GPB influencing factors and providing an actionable toolkit for researchers, policymakers, green practitioners and marketers alike.

6.1 Theoretical implications

The body of literature on sustainable consumption is broad and growing rapidly, yet most authors are concentrated on a reduced scope of theories, research designs and methods. According to our bibliometric analysis, limited co-authorship interaction across different communities and scarce integration of different theoretical frameworks is dedicated to identify the determinants of actual GPB (contrary to behavioral intentions).

For that effect, three main theoretical contributions derive from the present study: (1) a cross-field bibliometric exploration of key topics, converging into nine major thematic clusters; (2) the main determinant factors identified and categorized into a new conceptual framework (PSICHE), useable for GPB prediction; (3) four new thrust areas and a set of open research questions provided as a toolkit for gaining further knowledge on the GPB phenomena.

Considering the on-going debate in literature, two opposing – but complementary – views are identified on how to determine PEBs: self-oriented, attitudinal models (e.g. TPB, TCV, CAB/ABC) and pro-social theories (e.g. VBN, NAM). Both work streams would benefit from further examining ways to integrate their propositions and test the combined effects of (1) attitudinal/evaluative beliefs towards GPB; (2) social context, what role and sub-dimensions; (3) green moral norms, value orientations and environmental concerns.

Our review indicates how VBN/NAM can be extended by context-specific evaluations or cognitions (e.g. GPB perceived benefits and inconveniences), as well as by capturing the impact of green social norms. Conversely, TPB can be augmented by the inclusion of environmental-related factors (e.g. values, concerns, beliefs) and personal moral norms. The presence of feelings and habit formation is still rare in all the major theories reviewed. In this case, empirical evidence based on the MGB framework provides support for the role of anticipated emotions as a motivational element (via desire to buy) and for the effect of past behavior as a GPB enabler. Lastly, brand and category-related factors are under-studied in GPB context and should be further examined in future empirical studies.

6.2 Practical implications

Some of the resources offered in this study (e.g. Figures 8 and 9, Table 5) will assist industry, policymakers and organizational leaders to make better informed decisions and create successful green marketing strategies and campaigns, by asserting and categorizing the main topics influencing GPB outcomes.

For instance, green entrepreneurs and marketers will benefit from reinforcing green product benefits, including – but not limited to – its green value, both for augmenting the perceived value, and for reducing consumer skepticism or greenwashing concerns. Brand and product managers should focus on how to mitigate beliefs about GPB inconveniences (e.g. *reduced availability, difficulty in identifying green products*), to improve market performance, for

example, by improving point-of-sale/online visibility. Improving the perceived link between product attributes and benefits *(e.g. functional/quality, environmental, social, hedonic)* will also contribute to tackle the green premium perception gap. Educating the public on the consequences of unsustainable consumption and promoting pro-environmental habits as part of the solution is also of paramount importance, as demonstrated by the combined influence of outcome expectancy beliefs and environmental knowledge.

This study also stresses the effect of feelings. Based on our literature review, we support the view that merely improving one's cognitions can often be insufficient for a change of habits, unless combined with an effective emotional response. Positive and negative emotional framing can be used for increasing GPB advertising effectiveness, such as often observed in climate change awareness campaigns.

By showing the influence of social context, this paper highlights the importance of social norms on GPB decision-making processes, which can be further exploited by developing online and offline communication initiatives. In order to resonate with target audiences, we suggest that opinion leaders and iconic celebrities can be utilized to endorse sustainable lifestyles and raise the audience's environmental awareness, leveraging the potential of social media, video streaming and metaverse platforms.

6.3 Limitations and suggestions for future research

Suggestions for future research that can overcome previous impediments are (1) to examine buying behaviors as dependent variable, moving beyond the current focus on purchasing intentions, willingness to buy/pay and attitudinal outcomes; (2) to realize a fully holistic problematization, integrating the merits of self-interested and altruistic behavioral frameworks, instead of conducting only minor conceptual improvements; (3) to develop multi-method research designs, including experimental and qualitative exploratory studies, which can enhance the understanding on such complex socio-psychological phenomena; (4) to avoid over-dependency on student samples and other data sources unjustified from a theoretical point of view, which do not represent accurately the target population, limiting the generalizability of findings.

Despite contributions, this paper is not exempted from limitations. *First*, as with any analysis based on bibliographic metadata, some documents or topics might receive comparatively more attention than others, based on number of citations, co-citations or co-occurrence frequency, instead of their actual significance. *Second*, sustainable, eco-friendly, pro-environmental terms have many synonyms. The search string used employs the most frequent keywords, which expands considerably the selection from similar studies, but the list is open for improvements, which may produce alternative interpretations. Also, relevant articles not mentioning any of the selected terms explicitly may have been excluded. Other scholars are encouraged to broaden the search criteria, and watch for any new, related term emerging in the future. *Third*, as the dataset includes only peer-reviewed articles, other types of documents may be used to identify additional pertinent topics. However, it can be argued that the publications identified represent the current body of extant literature on GPB.

Concluding, we hope that this study contributes to foster new study opportunities, and that the PSICHE framework and research directions proposed can be used by those seeking to move forward on a topic which is (and will continue to be) a priority for public policy setting, academic and corporate practice.

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Appendix 1

Concept	References	Definition
Environmentalism	Stern (2000)	Propensity to take action with pro-environmental intent
Environmentally significant behaviors	Stern (2000)	Behavior that is undertaken with the intention to change (benefit) the environment
Green Buying Behaviors	Moser (2016)	[purchasing] Actions carried out with the aim of optimizing the environmental consequences to meet the needs of current and future generations
Green Consumerism	Stern (2000)	Purchasing practices that consider the environmental impacts of production processes, for example, purchasing recycled products or organically grown foods
Green Purchasing Behaviors	Peattie (2004)	Purchasing and consuming of products that have minimal impacts on the environment
Green Purchasing Behaviors	Sheng et al. (2019)	Purchase of environmentally friendly products that are recyclable and conservable, as well as beneficial for and benevolent to the natural environment
Pro-environmental behaviors	Kollmuss and Agyeman (2002)	Behavior that consciously seeks to minimize the negative impact of one's actions on the natural and built world
Pro-environmental behaviors	Peattie (2004)	Action of an individual or group that contributes to the sustainable use of natural resources
Pro-environmental purchase behavior	Nguyen et al. (2016)	Purchasing products that are environmentally beneficial
Sustainable consumer behaviors	Hosta and Zabkar (2021)	Behavior based on awareness of the long-term consequences of an individual behavior for the natural or social environment
Sustainable consumer behaviors	White et al. (2019)	Actions that result in decreases of the adverse environmental impacts, as well as decreased utilization of natural resources across the lifecycle of the product, behavior, or service
Sustainable consumption	Wu et al. (2016)	Providing services and related products to satisfy the basic needs of human and to improve people's life quality while reducing the use of natural resources and toxic materials, and minimizing the waste and pollutants generated by services and products

Table A1.
Summary of definitions for GPB and related concepts

Appendix 2

Behavioral type	Sub-type	Studies on behavior	Key constructs	Studies on intention	Key concepts	Mixed studies	Key constructs
Purchase (GPB)	Electric or hybrid cars	Jansson et al (2017)	Norms (personal, social), opinion leading and seeking	He and Zhan (2018), Zhang et al (2018)	Price perception, personal norms (PN) perceived risks and benefits		
	Organic food	Davies and Gutsche (2016)	Habits, constrained choice	Antonetti and Maklan (2014), Lee et al (2015), Yazdanpanah and Forouzani (2015)	Emotions-neutralization, price sensitivity, environmental concerns (EC), attitudes, norms, self-identity	Singh and Verma (2017)	Social norms, product knowledge, price, availability, health concerns
	Sustainable fashion	Kim and Seock (2019)	Values, PN	Legere and Kang (2020)	Moral self-identity	Park and Lin (2020), Rausch and Kopplin (2021)	Utilitarian value, social norms, attitudes, Perceived consumer efficacy (PCE) and Risks
	Energy-efficient appliances			Luchs and Kumar (2017)	Hedonic vs utilitarian value	Nguyen et al (2016)	Past behavior, self-image, perceived inconvenience, attitudes
	Eco-friendly hotel or restaurant	Sukhu and Scharff (2018)	Green trust	Han et al (2020), Peng and Chen (2019)	Volitional, cognitive, EC, perceived risk, hesitation	Eid et al (2021)	Corporate image, sense of obligation
	Unspecified eco-products	Felix and Braunsberger (2016), Gonçalves et al (2016)	Religious orientation, consumption values			Al Mamun et al (2018), Hosta and Zabkar (2021)	TPB factors, eco-literacy, PCE PN, EC, ethics

(*continued*)

Table A2.
Major constructs examined in GPB and PEB-related empirical studies, per behavioral type and sub-type

Table A2.

Behavioral type	Sub-type	Studies on behavior	Key constructs	Studies on intention	Key concepts	Mixed studies	Key constructs
Non-Purchase (PEB)	Generic behaviors	Hansmann et al. (2020), Liobikiene and Juknys (2016)	Self-transcendence value, green self-image	Odou and Schill (2020)	Anticipated emotions	Fan et al. (2019)	Motivation, context
	Recycling	Hage et al. (2009)	Economic factors, moral norms	Aboelmaged (2021), Kumar (2019)	Habits, PN		
	Eco-friendly packaging	Martinho et al. (2015)	TPB, cognitive factors	Prakash and Pathak (2017)	PN, WTP, attitudes, beliefs	Liu et al. (2020)	Daily habits
	Public or alternative transport	Miao and Wei (2013)	Hedonic vs normative motives	Untaru et al. (2016), Yin et al. (2018)	EC, daily habits, ethics, cultural and consumption values		
Mixed	GPB as sub-dimension of PEB	Lopez-Mosquera et al. (2015), Paswan et al. (2017), Vicente-Molina et al. (2013)	Environmental beliefs/sensitivity, time orientation, attitudes, PCE			Prendergast and Tsang (2019)	TPB factors

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