EXPLORING CONSUMER INTENTION AND BEHAVIOR TOWARD ENERGY SAVING PRODUCTS: A BIBLIOMETRIC ANALYSIS OF SCOPUS PUBLICATIONS

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Toan-VU Le[1], DANG Thi Thu Ha[1*], Thuy Dung LE Ngoc[1], BANH Thị Hong Lan[1]

[1]Hanoi University of Science and Technology (HUST), Hanoi, Vietnam

[*]Corresponding author: ha.dangthithu@hust.edu.vn

Abstract

The growing urgency of sustainable consumption has stimulated increasing scholarly attention to consumer intentions toward energy-saving products. Understanding the intellectual development, geographical patterns, and thematic evolution of this research domain is essential for advancing both academic and policy agendas. The objective of this study is to provide a systematic bibliometric overview of publications on consumer intentions to adopt energy-saving products, with particular emphasis on growth trajectories, influential sources, collaboration structures, and emerging conceptual directions. The analysis is based on 147 documents published between 1985 and 2024, retrieved from the Scopus database. Bibliometric techniques, including descriptive performance analysis, citation analysis, co-authorship mapping, and keyword co-occurrence analysis, were employed using VOSviewer to explore the intellectual, social, and conceptual structures of the field. The results indicate two distinct phases of development: a formative period (1985–2011) with limited scholarly activity and a transformative period (2012–2024) marked by rapid growth, averaging over ten publications per year. Keyword analysis reveals a conceptual shift from technical efficiency and environmental concerns toward behavioral frameworks, including the Theory of Planned Behavior, and more recently, organizational and systemic contexts such as households, university staff, and the circular economy.

Research purpose:
This study seeks to deliver a thorough bibliometric analysis of research regarding consumer intents to adopt energy-efficient products, emphasizing growth trends, key sources, collaborative networks, and conceptual advancements to discern present trends and prospective research avenues.

Research motivation:
The increasing global energy transition demonstrates the vital role of consumer intents and behaviors in attaining sustainable consumption; nonetheless, comprehensive understanding of the evolution of this subject remains disjointed. A comprehensive bibliometric assessment is therefore needed to map intellectual progress, identify influential contributors, and highlight emerging research frontiers with the intention of adopting energy-saving products.

Research design, approach, and method:
A bibliometric analysis was performed on 147 publications published from 1985–2024. Descriptive performance metrics, citation analysis, and co-occurrence mapping were utilized to analyze publication output, geographical distribution, authorship collaboration, prominent journals and articles, and keyword clusters.

Main findings:
Findings reveal two growth phases: a formative stage (1985–2011) with limited scholarly activity and a transformative stage (2012–2024) marked by rapid expansion, averaging over ten publications annually. Research is geographically concentrated, with China, the United States, and Malaysia as leading contributors, while Asian countries account for nearly half of global output. Influential journals include the Journal of Cleaner Production *and* Energy Policy*, and highly cited works bridge technical, behavioral, and policy perspectives. Despite the involvement of 463 authors, co-authorship networks remain fragmented. Co-word analysis indicates a shift from technical concerns (e.g., energy efficiency, carbon emissions) to behavioral frameworks (e.g., Theory of Planned Behavior, purchase intention) and emerging organizational contexts (e.g., households, university staff, circular economy).*

Practical/managerial implications:
The domain is dynamic, yet inconsistently interconnected. Future research ought to bolster international collaboration, incorporate circular economy principles, and extend to organizational and community-level implementations. The

focus on green trust and behavior underscores the necessity of integrating technological efficiency with value-oriented strategies to promote sustainable consumption.

Keywords: energy saving, Intention, behavior, energy saving products, bibliometric

1. INTRODUCTION

Environmental issues are becoming increasingly complex. Sea levels are rising to an alarming extent due to melting ice, a phenomenon caused by global warming, the greenhouse effect, and climate change, which has had serious consequences for the environment and human life. These are also emerging issues of concern in recent decades. According to the Intergovernmental Panel on Climate Change (IPCC), global warming is largely the result of human activities, particularly household consumption patterns. (Taufique & Vaithianathan, 2018). This has shown that consumer behavior plays an important role in protecting the environment and reducing CO2 emissions (Hossain et al., 2022). Environmental protection behavior is not only demonstrated through recycling and reducing electricity consumption but also through the intention to use products efficiently and economically. Energy-efficient products are those that are equipped with high energy efficiency and materials with good insulation properties that meet the standards and technical regulations prescribed by competent state agencies (M.H.T, 2023). Human intentions to use energy-efficient products are influenced and affected by various factors. Besides policies aimed at encouraging the efficient and economical use of energy, factors such as culture and environmental knowledge have a significant impact. The author "Tran P.M" used the Bayesian Mindsponge Framework to evaluate the factors influencing young people's intention to use and purchase green products. Young people who are knowledgeable about the circular economy or who value environmental protection and energy conservation have positive attitudes that influence their willingness to use green products (Tran et al., 2024). Parveen A also investigated the factors influencing consumer purchase intentions for energy-efficient products. Using the structural equation modeling (SEM) technique of partial least squares (PLS) and the collected data, the author analyzed the factors influencing people's intention to use energy-efficient products in northern India. The results also indicate that the purchasing intentions of affected people are influenced by perceived benefits and consumer attitudes ((Parveen & Chaudhary, 2022).

Policies are also being studied to assess their impact on the intention to use energy-saving products. Wang B and colleagues used real purchase data from an online sales platform to explore the impact of production brand labeling policies on consumer purchasing behavior for energy-efficient household appliances (B. Wang et al., 2021). Although there have been many studies on factors influencing the intention to use energy-saving products, they have only been conducted in small-scale areas or have only evaluated specific factors. Therefore, a comprehensive analysis of energy-efficient product intentions on a global scale is still lacking. Therefore, this study aims to fill this gap by conducting a bibliometric analysis of people's intention to use energy-saving products using data obtained from the Scopus database. Bibliometric analysis is used to create a comprehensive overview of research topics such as energy conservation, the use of energy-efficient products, energy-saving behavior, the circular economy, energy-efficient products, and energy-saving products. Bibliometric analysis helps clarify information from the energy-efficient product intention document regarding the number of articles over the long term, the geographical distribution of authors, collaboration patterns between authors, major publication sources, key authors, research topic groups, and more. Specifically, the study aims to answer research questions such as:

RQ1: What is the overall quantity, growth pattern, geographical distribution, and distribution of publications on human intention to use energy-saving products?

RQ2: What are the most important publication sources, key authors, research groups, and highly influential publications on energy-saving products?

RQ3: What is the most important topic within the theme of intention to use energy-saving products?

Numerous studies have concentrated on investigating energy-saving usage intentions, establishing a foundation for a deeper comprehension of consumer energy-saving behavior.The aforementioned three research questions establish a crucial basis for comprehending energy-saving intents and behaviors.The study elucidates the current situation, trends, and major topics in research concerning the desire to utilize energy-saving items.The bibliographic analysis approach systematically organizes the existing research landscape, offering a scientific foundation for scholars to lead and explore more profound research avenues in the future.

2. METHODOLOGY

This study utilized bibliometric analysis to carefully delineate and assess the intellectual, conceptual, and social frameworks of research concerning consumer intentions and behaviors for energy-saving items. Bibliometric techniques

have become widely acknowledged as effective means for synthesizing extensive scholarly output, finding significant trends, and designating emerging frontiers (Donthu et al., 2021; Le et al., 2022, 2025). Studies in the fields of education (Hallinger & Kovačević, 2019), entrepreneurship (Le et al., 2022), and energy forecasting (Lan et al., 2025; Le et al., 2025) also use the bibliometric analysis. By integrating descriptive statistics, citation analysis, co-authorship mapping, and co-word analysis, the present study provides a comprehensive overview of the evolution of the research domain on consumer intention and behavior toward energy-saving products between 1985 and 2024.

2.1. Data collection

The bibliographic dataset was obtained from the Scopus database because of its comprehensive coverage of peer-reviewed journals, conference proceedings, and book chapters in the fields of social sciences, business, engineering, and environmental studies. The search approach used regulated vocabulary and Boolean operators to optimize recall and precision.

The query used to extract data from the Scopus database is shown as follows:

TITLE-ABS-KEY(("Energy conservation product" OR "Low-energy product" OR "energy saving product*" OR "energy-efficient product*") AND (intention* OR trend OR orientation* OR behaviour* OR behavior*)) AND (EXCLUDE (PUBYEAR,2025)) AND (LIMIT-TO (DOCTYPE,"ar") OR LIMIT-TO (DOCTYPE,"cp") OR LIMIT-TO (DOCTYPE,"ch") OR LIMIT-TO (DOCTYPE,"bk")) AND (LIMIT-TO (LANGUAGE,"English"))

The original inquiry yielded 186 records, which were subsequently filtered for duplication, language (English-only), and pertinence to consumer intention and behavior in energy conservation scenarios. Following meticulous filtering, 147 documents were selected for study, covering the period from 1985 to 2024.

2.2. Analytical procedures

The methodological approach consisted of two main layers:

Descriptive Performance Analysis:

Quantitative metrics were utilized to assess publication output, authorship trends, collaboration patterns, and document classifications. Metrics like the annual publication count, co-authorship per document, and ratios of articles to conference papers and book chapters were computed. This stage offered insights into the developmental trajectory and cooperative essence of research in this domain.

Science Mapping and Network Analysis:

To uncover the structural dynamics of the research domain, the study utilized VOSviewer 1.6.19, a widely used software for visualizing bibliometric networks (van Eck & Waltman, 2010). Three specific mapping techniques were conducted:

- Co-authorship Analysis: Examined collaboration patterns at the author and country levels to reveal the social structure of knowledge production.
- Co-Keyword Analysis: Explored the conceptual structure of the field by clustering frequently co-occurring keywords, thereby capturing thematic evolution and emerging research hotspots.

Each network was shown with node size reflecting publication or citation volume and color gradients denoting temporal distribution, facilitating dynamic analysis of developmental phases.

The research methodology combined quantitative bibliometric methodologies with network visualization tools to systematically analyze the evolution, impact, and conceptual development of studies on energy-saving product intents. This study integrates descriptive performance metrics with sophisticated science mapping, offering a multi-faceted perspective that supports the results and discussion in the following sections. This technique records historical trajectories and emphasizes underexplored frontiers, directing future theoretical and empirical study paths.

3. RESULTS AND DISCUSSION

3.1. Research data overview

The bibliometric dataset covers the timespan 1985–2024 and encompasses a total of 147 documents sourced from 103

outlets, including journals, books, and conference proceedings, supported by 6,004 cited references. Authorship analysis reveals the contribution of 463 scholars, of whom 14 produced single-authored works. Collaboration dynamics are notable, with an average of 3.51 co-authors per document, indicating a predominantly collaborative research environment. In terms of document typology, journal articles constitute the majority (74.8%), followed by conference papers (19.7%) and book chapters (5.5%). The relatively small proportion of single-authored publications (14) further underscores the collective nature of knowledge production in this domain. Overall, the dataset reflects both the breadth of scholarly contributions and the increasing emphasis on collaborative authorship, aligning with broader trends in contemporary scientific communication.

Table 1: Research data overview

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1985:2024
Sources (Journals, Books, etc)	103
Documents	147
Authors	463
Authors of single-authored docs	14
AUTHORS COLLABORATION	
Single-authored docs	14
Co-Authors per Doc	3.51
DOCUMENT TYPES	
article	110
book chapter	8
conference paper	29

3.2 The growth phase of the number of works

Figure 1 shows that the number of articles per year is divided into two main phases: Phase 1, which began in 1985 and lasted until 2012; and Phase 2, which spanned 12 years from 2013 to 2024.

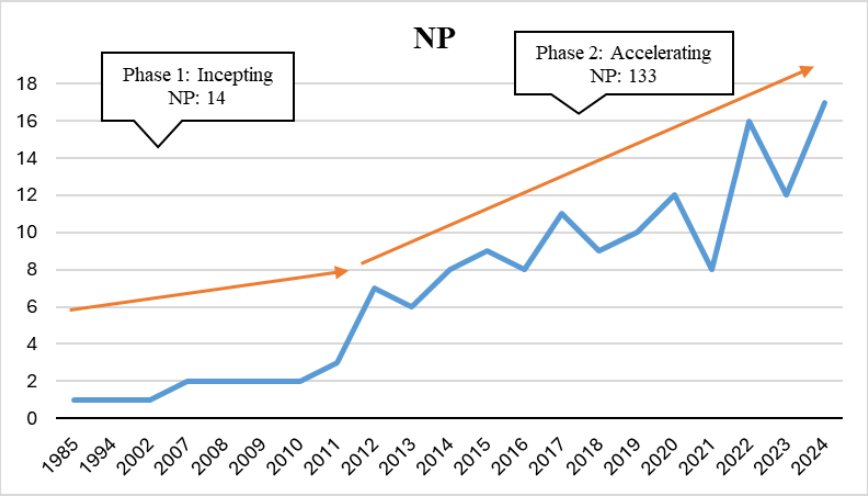


Figure 1. Annual growth in the number of articles

Phase 1 from 1985 to 2011: The number of articles in the early years was very limited, less than 2 per year. This indicates that the authors have not yet considered the topic of "energy-saving product intentions." The number of articles tended to increase slightly in 2007, from under 2 to 2 articles per year, and the number of articles remained stable until 2010. The total number of articles at this stage is very modest, with only 14 articles published in 26 years, averaging less than 1 article per year. The year with the highest number of articles was 2011, with 3 articles accounting for 21.4% of the total 14 articles. This period witnessed the financial crisis of 2008-2009. This left severe consequences for the economies of each nation in particular and for the global economy in general. Financial crises cause immense losses, and it takes a long time after that to restore production and business. Beside, this crisis also has a negative impact on energy consumption

(Santamouris et al., 2013). Energy and the economy are closely related; when the economy declines, energy consumption also becomes less efficient. Studying the relationship between socioeconomics and energy helps support the design of policies aimed at a more sustainable and competitive economy (Andreoni, 2020)

Phase 2 from 2012 to 2024: Phase 2 is a transformative period with a significant increase in the number of articles. Additionally, 2012 was a significant milestone marking the growth and interest of authors in the research topic, with an impressive number of 7 articles published. The number of articles in 2012 was 7 times the number of articles in 1985 and more than twice the total number of articles from the 3 years 1985, 1994, and 2002. In 2013, the number of articles was only 6 per year, but by 2024, the number of articles had nearly tripled to 17 per year. Although the number of articles tends to increase, there is no uniformity across the years. While there were 12 articles in 2020, just one year later in 2021, the number of articles decreased to only 8, and in the following year, the number increased to an impressive 16 works. The number of articles is expected to continue to increase after 2024. In total, 133 papers were published in Phase 2, with an average of over 10 publications per year. 2024 is the year with the largest number of articles, totaling 16.

3.2. The most influential sources on the research topic

Table 2 shows the top 10 most influential papers on consumer intentions and behaviors toward energy-saving items shows the breadth of academic contributions and the dynamic evolution of the research domain.

Table 2. Top 10 Most Influential Sources on the Intention to Use Energy-Saving Products

No	Source	Documents	Citations	PY. Start
1	journal of cleaner production	11	860	2011
2	energy policy	6	650	2007
3	sustainability (switzerland)	11	366	2017
4	journal of consumer marketing	1	296	2012
5	cirp annals - manufacturing technology	1	270	2011
6	international journal of precision engineering and manufacturing - green technology	1	107	2017
7	international journal of business innovation and research	1	83	2018
8	international journal of energy sector management	2	80	2018
9	applied energy	4	78	2014
10	energy efficiency	7	65	2015

The Journal of Cleaner Production is the most notable, with 11 documents and 860 citations since 2011. Its success shows the journal's importance in linking consumer intention to sustainable production and consumption. For policy-oriented research, Energy Policy (6 publications, 650 citations, since 2007) emphasizes the role of governance frameworks, regulatory tools, and institutional contexts in consumer uptake of energy-efficient products.

Sustainability (Switzerland) has published 11 publications and 366 citations since 2017. Although its average citation effect is small, its open-access format and vast thematic coverage speed up diffusion and accessibility. The Journal of Consumer Marketing and CIRP Annals – Manufacturing Technology have 296 and 270 citations, respectively, for notable single contributions. Marketing and manufacturing studies on consumer psychology, product design, and energy efficiency heavily influence these works.

In addition, Applied Energy (4 documents, 78 citations, since 2014) and Energy Efficiency (7 documents, 65 citations, since 2015) make constant but less concentrated contributions. Their smaller technical scope may explain their lower citation counts, but they are vital to consolidating empirical and engineering-focused information. New journals like the International Journal of Precision Engineering and Manufacturing – Green Technology (2017), International Journal of Business Innovation and Research (2018), and International Journal of Energy Sector Management (2018) demonstrate research platform diversification. These venues show rising customer interest in energy-saving products in engineering design, company innovation, and sectoral management.

The distribution of influential sources has various bibliometric implications. First, long-standing outlets like the Journal of Cleaner Production and Energy Policy show that sustainability and policy research underpin the field's conceptual structure. Second, high-impact single studies in marketing and manufacturing journals imply that disruptive ideas may

come outside the energy and environment literature, emphasizing the importance of cross-disciplinary inclusivity in bibliometric mapping. Third, modern journals, especially open-access platforms, are transforming scholarly communication, enabling speedier dissemination but requiring careful citation performance and quality criteria.

3.3. The most influential countries on the research topic

The number of works from each country is visually represented in Figure 2. Additionally, the highest number of citations for works in each country is also summarized and clarified in Table 3.

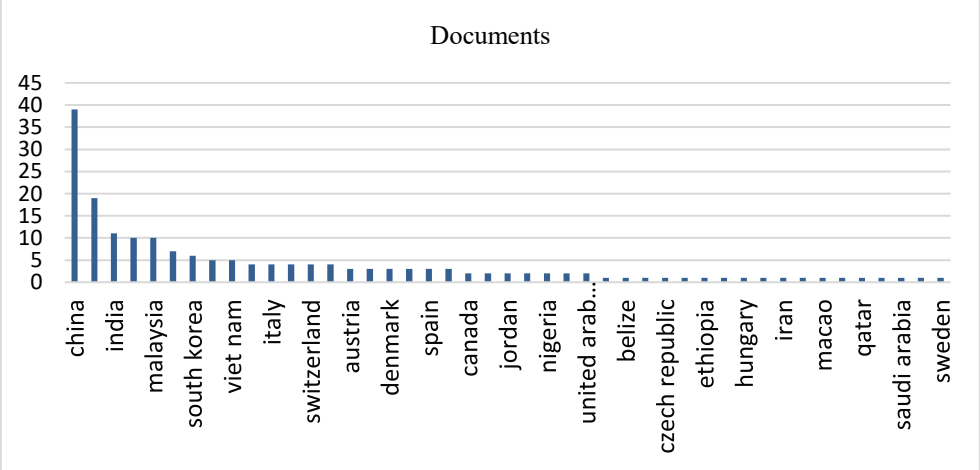


Figure 2. Documents of the country

Table 3. Top the the most effective countries

No	Country	Documents	Citations
1	china	39	1163
2	united states	19	520
3	malaysia	10	503
4	south korea	6	435
5	italy	4	386
6	spain	3	384
7	germany	10	355
8	pakistan	5	253
9	india	11	168
10	australia	4	113

The topic of energy-saving product intention has attracted the interest of many countries around the world. Table 3 shows the top 10 countries out of a total of 45 countries that have the greatest influence on the research topic. The number of documents and citations were selected to evaluate the importance of the country's ranking on the intention to use energy-saving products. The total number of articles from the top 10 most important countries is 111, accounting for 75% of the total 147 articles on the topic of Energy Saving Product Intention. Leading the way is China - the largest country in Asia with 1163 citations and 39 documents. This impressive figure shows that China has a significant level of interest in energy-saving products and the intention to use them. Following that, the United States had 520 citations with 19 documents. Malaysia is ranked 3rd with 503 citations and 10 documents. This is the only Asian country with a high level of interest ranking. This indicates that the research topic has not received attention from countries in the Asian region. The final position goes to Australia with 113 citations, corresponding to a limited number of documents, which is 4. The number of articles from countries in the Asian region is 71, accounting for 48.3% of the total 147 articles. This shows that the research topic has made a strong impression and is being studied and discussed by scholars in Asian countries.

3.4. Network of authors participating in publishing on the research topic

Figure 3 illustrates the co-authorship network about intents for energy-saving products throughout time. A total of 474 authors have contributed to this topic; however, only five authors authored three papers (0.8%), and just one author published four. This restricted productivity underscores that the topic is still underexplored and has not garnered continuous academic interest. The size of a node indicates publication output, whereas the color of a node signifies temporal activity. Darker nodes signify earlier and ongoing participation, while lighter nodes denote more recent

contributions.
The prevailing trend indicates that research on intentions about energy-saving products remains nascent and disjointed among various writers.

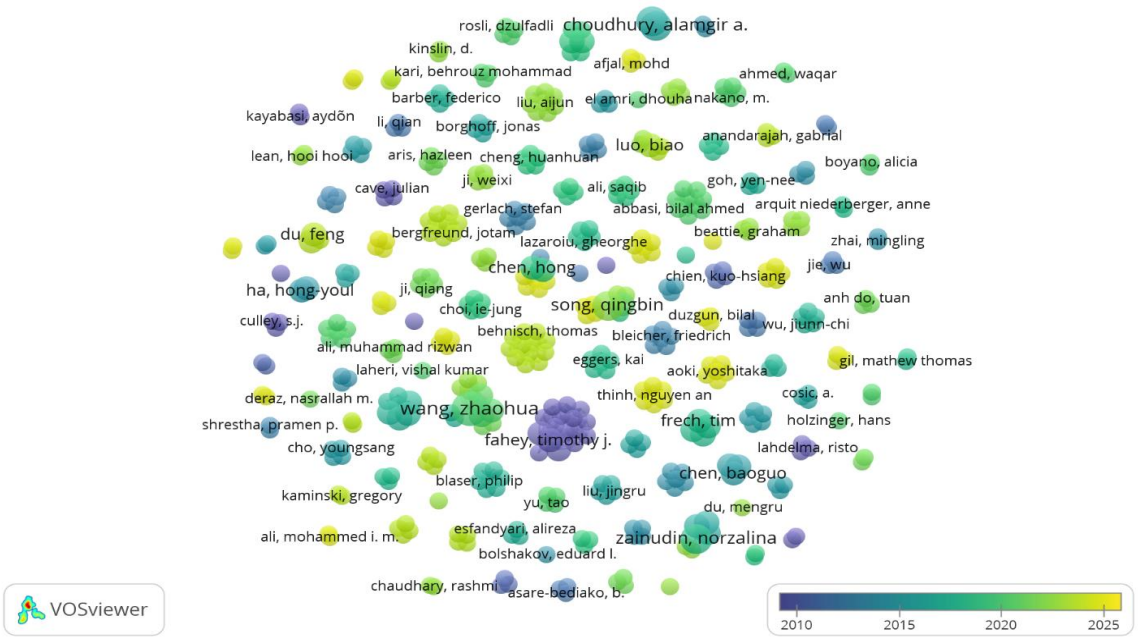


Figure 3. Collaboration of author groups over time

The data shows that the most prominent author is Wang Zhaohua, who is both the most published author (4 documents) and also received the most citations (314 citations). Wang Zhaohua also led a group of various authors publishing research in this field between 2017 and 2022. These authors investigate consumer behavior toward energy-saving products in China, with a particular emphasis on the role of government policies (Z. Wang et al., 2017), energy labels (B. Wang et al., 2021; Z. Wang et al., 2019), and online reviews (Ma et al., 2022). The findings indicate that energy labels and electronic word-of-mouth (e-WOM) serve as important shopping cues; however, their effectiveness is constrained by factors such as price, consumer trust, and non-rational decision-making labels (B. Wang et al., 2021; Z. Wang et al., 2019). In contrast, subsidy policies have not demonstrated a significant influence on purchasing behavior (Z. Wang et al., 2017). Overall, economic, psychosocial, and market information factors jointly shape consumer purchase decisions.

The temporal gradient shows that early research activity (before 2016) was dominated by a limited set of pioneering scholars, whereas the period from 2016 onward has witnessed substantial diversification, with new entrants expanding thematic and geographical boundaries. Despite this expansion, the network maintains a relatively decentralized structure, indicating a limited level of cross-cluster integration. Strengthening international collaborations could therefore enhance theoretical integration and policy relevance. Overall, the mapping underscores both the consolidation of core research groups and the emergence of new contributors, signaling a dynamic yet unevenly connected research domain.

3.5. The works have high reference value on the topic of intention to use energy-saving products.

Table 5 delineates the most significant papers about energy-efficient items and energy conservation behaviors. The data shows that in the top 10 most influential studies, the journal Energy Policy has 3/10 publications, and the Journal of Cleaner Production and Sustainability have 2 publications each.

Table 5. Top 10 the work has a profound impact on the research topic.

No	Title	Year	Source title	Cited by	Cited per year
1	Energy management based on Internet of Things: Practices and framework for adoption in production management	2015	Journal of Cleaner Production	303	33,7

2	Predicting consumer intentions to purchase energy-efficient products	2012	Journal of Consumer Marketing	296	24,7
3	A moral extension of the theory of planned behavior to predict consumers purchase intention for energy-efficient household appliances in Malaysia	2017	Energy Policy	292	41,7
4	Methodology for planning and operating energy-efficient production systems	2011	CIRP Annals - Manufacturing Technology	270	20,8
5	Factors influencing energy-saving behavior of urban households in jiangsu province	2013	Energy Policy	164	14,9
6	Policy implications of the purchasing intentions towards energy-efficient appliances among China's urban residents: Do subsidies work?	2017	Energy Policy	153	21,9
7	Antecedents of consumers' intention to purchase energy-efficient appliances: An empirical study based on the technology acceptance model and theory of planned behavior	2019	Sustainability (Switzerland)	113	22,6
8	Impact factors of household energy-saving behavior: An empirical study of Shandong Province in China	2018	Journal of Cleaner Production	108	18
9	Remanufacturing: Trends and issues	2017	International Journal of Precision Engineering and Manufacturing - Green Technology	107	15,3
10	Determinants of consumer intentions to purchase energy-saving household products in Pakistan	2019	Sustainability (Switzerland)	105	21

The extensively referenced publications exhibit both theoretical progress and actual policy significance. The paper "Energy management based on Internet of Things: Practices and framework for adoption in production management" (Shrouf & Miragliotta, 2015) is the most referenced, with 303 citations (33.7 citations per year), indicating the significant impact of digital technology on energy efficiency research. Conversely, behavioral studies like "Predicting consumer intentions to purchase energy-efficient products" (Ha & Janda, 2012) and "A moral extension of the theory of planned behavior to predict consumers purchase intention for energy-efficient household appliances in Malaysia" (Tan et al., 2017) have garnered similar attention, with 296 and 292 citations, respectively, highlighting the amalgamation of psychological theories with sustainability research.

Additional articles such as A moral extension of the theory of planned behavior to predict consumers' purchase intention for energy-efficient household appliances in Malaysia (Tan et al., 2017) and Energy management based on Internet of Things: Practices and framework for adoption in production management (Shrouf & Miragliotta, 2015) stand out, achieving both high cumulative citations and strong annual impact, confirming their foundational role in bridging behavioral theory and technological innovation.

Policy-oriented research, especially those included in Energy Policy, are highly regarded, with citation rates over 20 annually. These studies, which examine incentives and household behaviors, illustrate the increasing policy interest in promoting consumer adoption of energy-efficient equipment. Recent contributions from Sustainability (Switzerland) indicate a growing focus on theory-driven empirical research, including the Technology Acceptance Model and the Theory of Planned Behavior.

3.6. Exploring conceptual structure based on co-keyword analysis

The topic of intention to use energy-saving products appeared in 486 keywords, of which 24 keywords appeared 3 or more times. Each keyword is represented by a node; the larger the size of the nodes, the more influential that keyword is. The color of each node represents the time when the keyword first started appearing. If the node colors are dark, it indicates that the term is a traditional keyword. Increasing gradually with color intensity, if the node is light-colored, it indicates keywords that have recently emerged and are beginning to attract the attention of scholars.

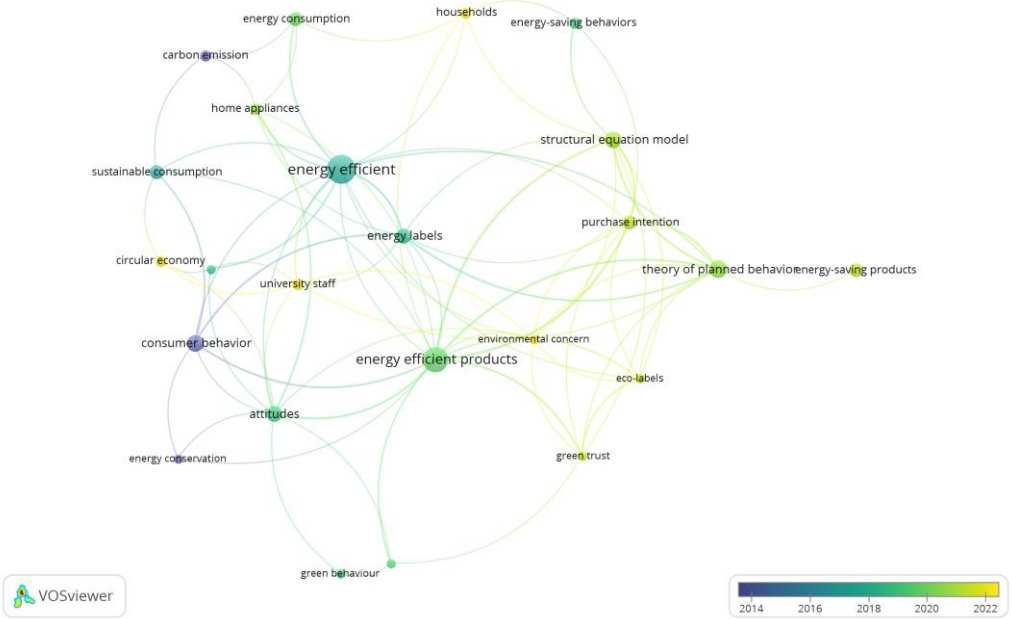


Figure 4. Scientific map of co-word analysis

Figure 5 illustrates the two most influential keywords based on citation frequency, namely "energy efficient" and "energy efficient products," which have been cited 25 and 20 times, respectively

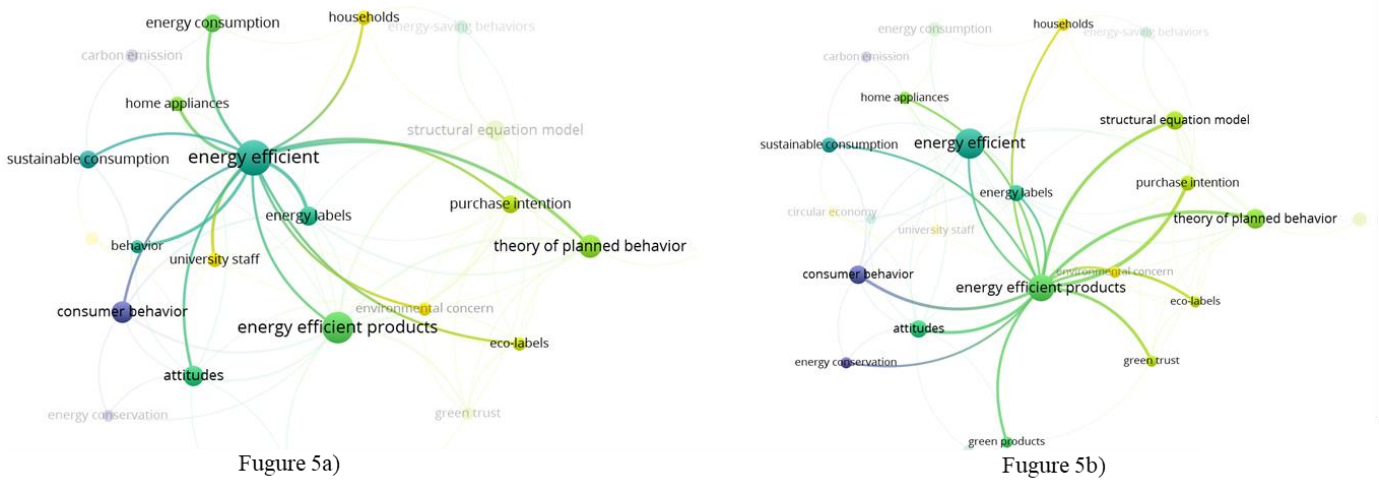


Figure 5. Analyze the two most influential keywords

Research on behavioral intentions toward the adoption of energy-saving products initially approached the topic through the lens of "energy efficiency" and subsequently shifted toward "energy efficient products" This transition from a system-level efficiency perspective to product-level applications underscores the growing recognition that the effectiveness of energy policies ultimately hinges on consumer participation. In Figure 5a, the network centered on "energy efficient" illustrates a broad thematic scope, encompassing both technical dimensions (e.g., energy consumption, carbon emissions) and socio-behavioral aspects (e.g., consumer behavior, purchase intention, sustainable consumption). The connections from "energy efficient" to light-colored keyword nodes indicate that recent research has increasingly linked this theme to specific groups such as "university staff" and "households," as well as to contextual factors like "environmental concern" and "eco-labels." By contrast, Figure 5b positions "energy efficient products" at the center, with direct connections to "purchase intention," "eco-labels," and "green products." This shift highlights consumer decision-making processes and market dynamics, particularly the ways in which labeling and perceived environmental benefits shape purchasing behavior.

Table 6 uses the average normalized citations (Avg. norm. citations) to evaluate the most overimportant words in each stage. This index compares the number of citations for the article to the average of other articles published that year. This index helps eliminate bias over time, thus providing a more accurate comparison between old and new articles (Aria & Cuccurullo, 2017). Keywords such as "green trust, green behaviour, and energy-saving behaviors" have gained considerable academic attention, while "circular economy, households, and university staff" remain relatively underexplored research directions.

Table 1. Prominent keywords in the research topic from 2014 to 2024

Label	Occurrences	Avg. pub. Year	Avg. citations	Avg. norm. citations
circular economy	4	2.024	1,75	1,42
university staff	4	2.022	10,75	0,61
Households	4	2.022	24,75	1,44
environmental concern	3	2.022	7,33	0,77
eco-labels	3	2.021	25,33	1,82
energy-saving products	6	2.021	35,17	1,99
purchase intention	6	2.021	54,33	1,41
green trust	3	2.021	49,33	2,81
structural equation model	9	2.021	47,78	1,65
theory of planned behavior	10	2.020	84,40	2,00
home appliances	4	2.020	4,00	0,78
energy consumption	6	2.020	30,83	1,35
energy efficient products	20	2.020	47,70	1,38
green products	3	2.019	54,33	2,66
energy-saving behaviors	4	2.019	70,75	2,26
green behaviour	3	2.019	61,67	3,25
Attitudes	8	2.019	52,50	1,61
energy labels	7	2.018	28,71	1,14
Behavior	3	2.018	1,33	0,32
energy efficient	25	2.018	20,52	0,63
sustainable consumption	6	2.017	15,67	0,97
consumer behavior	9	2.014	46,22	1,42
energy conservation	3	2.014	107,33	1,89
carbon emission	4	2.014	15,75	1,14

Analyzing the average time of keyword emergence reveals that during the initial phase (2014–2018), research primarily concentrated on the behavioral drivers of energy efficiency in general, including sustainable consumption, energy efficiency, energy conservation, carbon emissions, and policy pressures on energy use behavior (e.g., energy labels). In the subsequent phase (2019–2021), the emphasis shifted toward products (energy-efficient products, energy-saving products) in conjunction with consumer behavioral aspects, market dynamics, and theoretical modeling approaches (e.g., the theory of planned behavior, structural equation modeling) within the domain of green products. More recently, since 2022, research has increasingly turned toward applied directions, addressing organizational practices and policy contexts (e.g., *households*, *university staff*, *circular economy*, *environmental concern*). This progression highlights a trend of integration between behavioral science, organizational management, and sustainable consumption strategies in the context of energy transition.

In terms of scholarly influence, topics with high average citations such as energy conservation (107.33), theory of planned behavior (84.40), and energy-saving behaviors (70.75) suggest that the intellectual foundation of this field still heavily relies on classical theoretical frameworks and quantitative approaches. However, when average normalized citation scores are considered, "green" concepts such as green behaviour (3.25), green trust (2.81), and green products (2.66) emerge

more prominently. This indicates that while the number of publications on these themes remains modest, research focusing on green trust and behavior has attracted disproportionate attention within the scientific community. This trend aligns with the global context, where values and social responsibility, rather than purely technical benefits, increasingly shape consumer decisions. Conversely, newly emerging concepts such as university staff, households, and circular economy currently exhibit relatively low citation frequencies. This reflects their nascent stage of development while at the same time revealing promising avenues for future inquiry. Specific contexts such as office workers or households provide critical testing grounds for the feasibility of energy-saving policies, whereas the circular economy offers a novel conceptual framework linking micro-level consumption practices with macro-level sustainable development strategies.

These analyses yield several implications. Firstly, to enhance the applicability of policies, future research should continue to leverage the explanatory power of behavioral theories and expand into organizational and community settings. Secondly, we need to complement traditional instruments like eco-labels and energy labels with green trust mechanisms to enhance the effectiveness of behavioral change. Third, a promising research frontier lies in integrating circular economy principles with sustainable consumption behavior while incorporating real behavioral data from digital technologies to overcome the limitations of intention-based surveys.

4. CONCLUSION

This study provides a thorough bibliometric analysis of research regarding customer intentions to use energy-efficient products from 1985 to 2024.The report elucidates significant growth trends, primary contributors, and emerging themes, providing helpful details for policymakers and groups dedicated to fostering sustainable consumption.

Growth and global gistribution

The research domain has transitioned from negligible focus prior to 2012 to significant growth over the previous decade, averaging more than 10 publications each year since 2013.This increase indicates an escalating acknowledgment that consumer behavior is pivotal to energy efficiency transitions.However, geographical distribution remains concentrated: China, the United States, and Malaysia dominate, while many regions—especially in the Global South—remain underrepresented.This indicates to policymakers the necessity of enhancing research capabilities and policy experimentation across varied socio-economic circumstances, where energy-saving behaviors may manifest differently.

Influential sources and knowledge networks

Prominent journals like the Journal of Cleaner Production and Energy Policy underpin the topic, signifying that sustainability and regulatory aspects are fundamental motivators of academic discussion.However, significant contributions also arise from marketing and manufacturing, indicating that innovations frequently originate beyond conventional energy and environmental research.This underscores the importance of cross-sector collaboration for organizations: energy-saving behavioral change initiatives should integrate policy instruments with consumer psychology insights, marketing techniques, and technical innovations.

At the author level, leadership is dispersed, with only a few scholars generating numerous highly cited articles.This fragmented structure highlights the necessity of promoting international collaborations and knowledge-sharing platforms that connect disparate research centers.

Conceptual evolution and emerging topics

The conceptual framework delineates three phases of evolution: (1) an initial emphasis on the motivations for energy saving in general, (2) a subsequent phase focusing on consumer behavioral aspects towards energy-saving products, and (3) a contemporary transition towards practical organizational and societal contexts. Although research on this topic still relies on the framework of classical theories, emerging themes related to “green” concepts, such as green trust, green products, and green behavior, are increasingly gaining prominence. These subjects emphasize that sustainable consumption is increasingly connected to trust-building processes, workplace practices, and systemic approaches that relate individual behavior to pervasive sustainability initiatives.

Practical Implications

The findings underscore the necessity for policymakers to integrate regulatory instruments with behavioral strategies, such as eco-labeling and green trust mechanisms, to promote consumer adoption of energy-efficient

products.Organizations, including colleges and enterprises, should regard themselves as laboratories for sustainable practices, testing and expanding behavioral interventions among staff and communities.Integrating energy-efficient practices within circular economy models at the systemic level establishes a connection between consumer behavior and enduring sustainable development objectives.

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RESEARCH LIMITATIONS

The study limited the literature search to the Scopus database, thus possibly missing quality studies that are indexed in other databases such as WoS. Therefore, the authors recommend that future studies expand the scope of the search to other reputable scientific databases. Also related to the literature search, by focusing on keywords related to energy-saving products such as "Energy conservation product", "Low-energy product", "energy saving product", and "energy-efficient product", it may miss related studies such as "sola energy product", "green energy product", or "energy-efficient appliance". These limitations may be suggestions for further studies on this topic in the future.

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