

Please cite the Published Version

Gordon, Ross , Dibb, Sally  and Magee, Christopher (2025) Segment stability and transition between segments based on consumer perceived value towards energy efficiency: Implications for environmental management. *Journal of Environmental Management*, 390. 126405 ISSN 0301-4797

DOI: <https://doi.org/10.1016/j.jenvman.2025.126405>

Publisher: Elsevier

Version: Published Version

Downloaded from: <https://e-space.mmu.ac.uk/641484/>

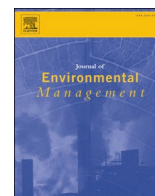
Usage rights:  [Creative Commons: Attribution 4.0](https://creativecommons.org/licenses/by/4.0/)

Additional Information: This is an open access article published in *Journal of Environmental Management*, by Elsevier.

Data Access Statement: The authors do not have permission to share data.

Enquiries:

If you have questions about this document, contact openresearch@mmu.ac.uk. Please include the URL of the record in e-space. If you believe that your, or a third party's rights have been compromised through this document please see our Take Down policy (available from <https://www.mmu.ac.uk/library/using-the-library/policies-and-guidelines>)



Research article

Segment stability and transition between segments based on consumer perceived value towards energy efficiency: Implications for environmental management

Ross Gordon^{a,*}, Sally Dibb^b, Christopher Magee^c

^a University of Technology Sydney, 15 Broadway, Ultimo, NSW, 2007, Australia

^b Coventry University, Priory Street, Coventry, West Midlands, CV1 5FB, United Kingdom

^c University of Wollongong, Northfield Avenue, Wollongong, NSW, 2522, Australia

ARTICLE INFO

Keywords:

Segmentation
Dynamic stability
Transition
Time
Latent profile analysis
Latent transition analysis
Energy efficiency

ABSTRACT

This article aims to examine segment stability and transition between segments in relation to consumer perceived value towards energy efficiency and to identify the implications for environmental management. Segmentation has been identified as a potentially useful approach for developing consumer insight and understanding pre-dispositions towards environmental behaviours to inform environmental policy, programs, and marketplace activities. However, there remains a lack of understanding regarding the stability of consumer segments over time which can impact the viability and longevity of segmentation solutions to help tackle environmental issues such as energy efficiency. This study draws on a longitudinal three wave segmentation survey study of 1444 consumers' perceived value towards energy efficiency, and a sophisticated latent profile and latent transition analysis approach, to investigate whether segments demonstrate stability over time and uncover what predicts consumer transition between value segments. The findings from this analysis are then used to discuss how these can inform environmental management to promote energy efficiency.

1. Introduction

Energy efficiency is a key issue for environmental management (Curtis et al., 2017; Gordon et al., 2018), driven by concerns about climate change, the global energy crisis, rising energy prices, fuel poverty and energy security (Crew, 2022; Department of Energy and Climate Change, 2012; Gordon et al., 2021; Simshauser et al., 2011; Yergin, 2006). Therefore, promoting domestic energy efficiency is a central pillar of policy to tackle climate change (Akhmat et al., 2014). The United Nations Environment Programme (2014) reports that improvements in energy efficiency could be responsible for up to one-fifth of the cuts countries must make to meet the Intergovernmental Panel on Climate Change's carbon budget and prevent 22–24 gigatonnes of carbon dioxide emissions between 2015 and 2030. In the context for this study in Australia, facilitating energy efficiency among consumers at all levels of the supply chain is crucial to the transition to clean energy and to a consumer-oriented low emissions economy (Australian Energy Regulator, 2021; Finkel et al., 2017).

One way to help promote energy efficiency is through consumer

segmentation studies that can identify how demographic, geographic, psychographic, and behavioural characteristics influence the performance of energy efficiency practices in the home (Poortinga and Darn-ton, 2016; Gordon et al., 2018; Barjak et al., 2022). Indeed, researchers and energy market stakeholders have called for more segmentation research to provide consumer insights and inform policy, strategy and programmes that promote energy efficiency and support a successful and equitable transition to net zero (Simkin and Dibb, 2011; Sütterlin et al., 2011; Finkel et al., 2017; Energy Consumers Australia, 2019; 2020). However, a key consideration in utilising segmentation in environmental management concerns the need to understand whether consumer segments are stable over time or subject to change, and what factors might drive transition between segments. The stability of consumer segments over time is important if segmentation is to be used effectively to guide strategy and inform long-term planning in fast-changing marketplaces (Anderson and Ritter, 2008; Blocker and Flint, 2007; Fonseca and Cardoso, 2007). In the context of promoting energy efficiency, if segments are found to be stable, cross-sectional segmentation solutions could reliably be used to inform policy,

* Corresponding author. UTS Business School, Queensland University of Technology Sydney, Ultimo, New South Wales, 2007, Australia.

E-mail address: ross.gordon@uts.edu.au (R. Gordon).

<https://doi.org/10.1016/j.jenvman.2025.126405>

Received 22 April 2024; Received in revised form 9 April 2025; Accepted 26 June 2025

Available online 28 June 2025

0301-4797/© 2025 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

business models and programmes over the long-term (Haines and Mitchell, 2014; Ritter and Pedersen, 2024). However, if this stability is lacking, then longitudinal research would be needed to track how and why people transition between segments over time and to direct environmental management efforts to address energy efficiency. This study addresses these questions through a longitudinal survey study of segment stability based on consumers' perceived value towards energy efficiency. Rather than formulating hypotheses, the paper uses an "empirics-first" approach (Golder et al., 2023), which is considered particularly suitable when advancing knowledge where progress has stalled (e.g., Mora Cortez, Clarke and Freytag, 2025). By adopting this approach, the paper offers valuable new insights into segment stability over time, an issue that has long been prioritized but remains underexplored.

Creating and promoting perceived consumer value in using energy efficiently has potential to inform segmentation solutions and to support the clean energy transition (Gordon et al., 2018). The value concept, developed within research in marketing, can be understood as the regard, importance, worth or usefulness that something is perceived to hold by consumers (Zainuddin and Gordon, 2020). An emerging body of evidence suggests that enhancing consumer perceived value can promote more energy efficient consumption behaviours, such as purchasing energy saving appliances, using appliances efficiently, holding positive perceptions towards green energy, and adopting electric vehicles (Sangroya and Nayak, 2017; Gordon et al., 2018; Luo et al., 2022; Kautish et al., 2024).

As a pillar of climate change and carbon reduction policy, environmental managers should therefore focus on the use of strategies, tactics, tools, and programmes that promote and facilitate enhanced consumer perceived value towards energy efficiency. However, existing evidence of consumer value is largely conceptual, exploratory, or cross-sectional in nature, making it difficult to understand how these perceptions towards energy efficiency may change over time and what the implications are for environmental management. Sophisticated longitudinal consumer segmentation studies that track energy users' perceptions towards the value of energy efficiency over time offer a possible solution to this problem (Gordon et al., 2018). These studies have the potential to inform environmental management by evaluating how policy changes or energy programmes shift consumers' value perceptions towards energy efficiency, what factors might cause consumers to move between segments, and tracking whether perceived value is enhanced or degraded over time.

This context is important given the growing expectations on energy markets to progress towards net zero and the implications for evolving consumer needs. To help advance knowledge in this domain, this paper therefore examines segment stability and transition between segments in relation to consumer perceived value towards energy efficiency. The following research questions are addressed.

RQ1: Do consumer perceived value segments towards energy efficiency demonstrate stability over time?

RQ2: What predicts consumer transition between these value segments?

RQ3: How can these insights inform environmental management to promote energy efficiency?

The research draws on consumer segmentation theory, and on a three-wave longitudinal cohort survey of household consumers' perceived value towards using energy efficiently. A person-centred latent profile analysis (LPA) and a novel latent transition analysis (LTA) approach are employed (see Kam et al., 2016; Lanza et al. 2012) to assess segment stability and consumer transition between segments over time. Our research makes three contributions to knowledge. First, we advance conceptual understanding of segmentation in environmental management and energy research by considering segment stability and the extent to which consumers transition between segments over time.

In doing so, we also provide insights into what selected demographic factors (e.g. attitude, age, education level) predict these transitions. Second, we enrich understanding of the role that consumer perceived value can play in promoting energy efficiency as a critical environmental management concern. Third, through using a novel and sophisticated LPA and LTA approach, we provide a methodological technique for environmental managers to measure and predict consumer transition between segments - in this case, in relation to their perceived value towards energy efficiency. The implications for theory and environmental management practice are then considered, as well as limitations and suggestions for future research.

2. Literature review and theoretical framework

2.1. Consumer segmentation and segment stability

Segmentation is a central principle of marketing research and practice (Clarke et al., 2024; Wedel and Kamakura, 2000; Roberts et al., 2014); as well as a core element of organisational management and operations (Freytag and Clarke, 2001; Wind and Cardozo, 1974). As a strategic management tool, segmentation represents the way organisations or stakeholders view the market (Smith, 1956; Wedel and Kamakura, 2002). Segmentation can enable organisations to understand and manage heterogeneous consumer needs (Deepak et al., 2021; Dibb et al., 2002; Ernst and Dolnicar, 2018), decide which markets to operate in (Clarke and Freytag, 2008), which segments to target (Mora Cortez, Clarke and Freytag, 2021; Bennett, 1995), and marketing programmes can be designed to meet the needs of the consumers they contain (Foedermaier and Diamantopolous, 2008).

The benefits associated with segmentation include an improved understanding of consumers, more refined strategic objectives, the identification of priority groups to target, improved efficiencies in resource allocation, better defined and tailored marketing programmes, and enhanced firm competitiveness (Clarke and Freytag, 2008; Barnett and Mahony, 2011; De Keyser, Schepers and Konus, 2015). Within environmental management, segmentation has been applied to improve the targeting of policies to motivate landowners to adopt conservation practices (Lang and Rabotyagov, 2022); and to develop formal and non-formal education programmes on water conservation and integrated pest management that are better aligned with the needs of water users (Huang et al., 2016; Warner et al., 2022).

In relation to energy efficiency, Energy Consumers Australia (2019; 2020) have called for segmentation applications that assist consumers with different needs to enable them to manage their energy use more effectively. Simkin and Dibb (2011) also show the value of segmentation in supporting better targeted marketing and communication within the energy supply sector. Different variables have been used by researchers as the basis for segments that are able to support energy efficiency. Thus, Sütterlin et al. (2011) used energy behavioural and psychosocial variables to develop six heterogeneous consumer energy segments, each with distinct needs and usage. They show that including behavioural variables in segmentation, rather than relying on general consumer characteristics alone, lead to a more comprehensive understanding of different energy needs that can inform the development of effective policy. Poortinga and Darnton (2016) also demonstrate segmentation's value in supporting well-targeted policy and communication to underpin lasting behavioural change. Their six consumer segments used psycho-social, behavioural, and socio-demographic variables that reflect sustainability perceptions and behaviours in relation to domestic energy use, transport, water use, waste, and recycling. Barjak et al. (2022) use a multi-methods approach that goes beyond socio-economic attributes and environmental views, to create a holistic segmentation scheme that includes a wider range of relevant consumer attitudes, such as sociability and openness to new technology. However, further theoretical, and methodological development of segmentation is required (Blocker and Flint, 2007; Clarke et al. (2024); Mora Cortez, Clarke and Freytag,

2021).

Despite being acknowledged as a core marketing concept, further theoretical and methodological development of segmentation is required (Blocker and Flint, 2007; Ritter and Pedersen, 2024). Such development is timely, given a growing discourse about the relevance of market segmentation in a context of market turbulence, technological advances and digitalisation, big data, and individualisation of targeting consumer needs (Boyd and Crawford, 2012; Clarke et al., 2024; Quinn et al., 2016). One such gap in segmentation theory and practice is the understanding of segment stability over time (Quinn and Dibb, 2010). This issue features in debates about the quality of segmentation solutions spanning more than 50 years (Kotler, 1967; Littler, 1992; Dibb and Simkin, 2010), it underpins the notion of segment value; and affects whether segmentation can be used effectively to guide strategy and inform long-term planning in fast-changing marketplaces (Fonseca and Cardoso, 2007; Hajibaba et al., 2020). The energy market is one such example. Ritter and Pedersen (2024) specifically point to the demands placed on organisations to become more environmentally conscious in response to climate change and the potential for this to impact segment stability. One line of research concerns dynamic stability, which focuses on the stability of segmentation solutions over time (Wedel and Kamakura, 2000). Scholars have argued for more conceptual and empirical work to examine dynamic stability and to identify the extent, nature of, and influences on dynamic segment stability, all of which are not sufficiently understood (Blocker and Flint, 2007; Dolnicar et al., 2018; Hu and Rau, 1995; Ritter and Pedersen, 2024).

Within dynamic segment stability, two types of segment change over time have been identified: (1) segment content changes, and (2) segment structural changes. Segment content change, which involve shifts within segments engendered by consumers' changing needs, can take two forms: (1a) latent content changes, and (1b) manifest content changes. Latent content changes suggest that within a market, segment types and their characteristics remain reasonably stable, while consumers transition between those segments in various ways (Blocker and Flint, 2007; Ritter and Pedersen, 2024). For example, householders segmented by firms according to energy-efficiency perceptions may, due to changing environmental and personal factors, transition between segments over time. However, the needs and behaviours underpinning these segments may be relatively stable and the segments sufficiently large to remain viable despite this consumer movement.

The concept of manifest content change reflects what happens when consumer groups move together through similar changes in desired needs to arrive at sets of needs that reflect new segments (Blocker and Flint, 2007). Such content change can be prevalent in markets affected by technological change and product proliferation, such as energy, in which consumers' preferences transition as they try to make sense of new offerings (Simkin and Dibb, 2011). Latent and manifest segment content change are not mutually exclusive. In any given market, some consumers might undergo shifts in needs (manifest content change) leading to new or growth in segments, while others remain within, or transition over time, between established and stable segments (latent content change).

Segment structural change refers to the spatial outcomes associated with altered segment content. Changes in segment size, within-segment dispersion in consumer needs and altered clarity of segment boundaries are all elements of structural change (Blocker and Flint, 2007). Thus, segments may grow or shrink as consumer needs shift. If the benefits valued by consumers change, there may be greater or less dispersion in how closely those within a segment share common needs, or the segment boundary clarity might alter, as consumer needs overlap more than one segment. For both elements, the segment structural characteristics are originally determined by how closely (degree of dispersion) and distinctly (boundary clarity) the segments a firm defines match the market needs. In dynamic consumer markets such as energy, which feature rapid technological change and disruption, segment dispersion may increase over time, while boundary clarity may become more

ambiguous. In summary, to assess dynamic segment stability, it is important, firstly, to assess evidence of segment content change and identify whether this shift reflects latent segment content change and/or manifest segment content change and, secondly, to consider segment structural change as represented by changes in segment size, segment dispersion, and segment boundary clarity.

2.2. Consumer perceived value and environmental management

While a range of demographic, geographic, psychographic, and behavioural characteristics can be used in consumer segmentation research, this study focuses specifically on consumer perceived value towards energy efficiency. Consumer perceived value is universally recognised as a core tenant of marketing (AMA, 2013), and can be defined as the functional, economic, emotional, social, and/or ecological regard, importance, worth or usefulness held towards marketplace offerings including goods, services or consumption behaviours (Zainuddin and Gordon, 2020). Research has demonstrated that consumer perceived value has an important motivation influence on consumption behaviours (Blut et al., 2023; Chen et al., 2025; Islam et al., 2024).

Therefore, promoting and facilitating consumer perceived value is a key focus in marketing (Zainuddin and Gordon, 2020; Blut et al., 2023) and in social marketing efforts to promote energy efficiency behaviour change (Gordon et al., 2018; McAndrew et al., 2021). Although consumer perceived value is a psychographic variable, it has also been found to predict behavioural outcomes (Blut et al., 2023) and can be combined with demographic and geographic characteristics to develop sophisticated and powerful segmentation models. Recent environmental management research suggests that promoting consumer perceived value can facilitate energy efficiency behaviours among consumers, such as the uptake of electric vehicles, efficient use of domestic appliances, purchase of energy saving appliances, and holding positive perceptions towards clean energy (Sangroya and Nayak, 2017; Luo et al., 2022; Kautish et al., 2024). While this evidence is promising, effective environmental policy and programmes require a better understanding of consumers' perceived value towards energy efficiency over time (Gordon et al., 2018). This study helps address existing knowledge gaps through a longitudinal study of segment stability and predictors of transition between segments in relation to consumer perceived value towards energy efficiency.

3. Methodology

3.1. Design, sample, and measures

Our study focuses on the energy market in Australia, which like many globally, is in a state of flux with rising prices and disruptive climate change events (Tayal, 2016). Policy and strategy within this market is increasingly focused on efficiency, sustainability, and a transition to clean energy in the face of climate change (Finkel et al., 2017). Furthermore, energy market stakeholders and consumer advocacy organisations have identified that segmentation could be used to better understand consumers, as the basis for effective policies and programmes to promote energy efficiency whilst maintaining comfort and well-being (Finkel et al., 2017; Energy Consumers Australia, 2020).

A total of 1444 householders (aged ≥ 60 years) in NSW, Australia were surveyed at baseline to assess their perceived value towards energy efficiency, as part of a larger nationally funded project to promote energy efficiency among older households. Older consumers are considered a priority group that often lack support in navigating the energy market, experience poor energy outcomes including hardship and harms to health and well-being, and risk being left behind in the transition to clean energy (Australian Energy Regulator, 2022; Finkel et al., 2017; Gordon et al., 2022). Random digit dialling was undertaken to generate the sample, with a short telephone questionnaire used to screen for

eligibility based on age. An interview-administered questionnaire was conducted in participants' homes by trained research assistants using iPads, with two follow-up surveys conducted at one-year intervals with the same participant cohort. Survey responses were recorded on the Qualtrics survey software platform. All participants gave written informed consent, and ethical approval for the research was obtained from the relevant University Human Research Ethics Committee. Participants received a gift voucher on completion of each survey as recompense for their time.

The survey instrument was developed following extensive review of the extant value literature, the use of existing rigorous and well-tested scale items, and a process of cognitive pre-testing ($n = 24$). The survey included items that measured participants' perceived functional value (6 items, e.g., "Can be easily done"; Gordon et al., 2018; $\alpha = .89-.92$), economic value (3 items, e.g., "Offers value for money"; Koller et al., 2011; $\alpha = .80-.87$), emotional value (7 items, e.g., "Makes me feel calm"; Nelson and Byus, 2002; $\alpha = .93-.94$), social value (3 items, e.g., "Makes a good impression on others"; Sweeney and Soutar, 2001; $\alpha = .87-.92$) and ecological value (3 items, e.g., "Is environmentally friendly"; Koller et al., 2011; $\alpha = .67-.73$) of using energy efficiently. Appendix 1 shows the 22 value items, all of which were assessed on a five-point scale from (1) *strongly disagree* to (5) *strongly agree*. The Cronbach's alpha ranges reported above refer to the levels of internal consistency across the three waves of this study; these collectively indicate an appropriate level of internal consistency. Confirmatory Factor Analysis conducted on the wave 1 data also indicate a relatively good model fit, as reflected by the Confirmatory Fit Index (.99), Tucker Lewis Index (.98), Standardised Root Mean Square Residual (.07), and Root Mean Square Error of Approximation (.09) (Hu and Bentler, 1999). Harman's single-factor technique indicated that the first unrotated factor account for 47 % of the variance in the items, which suggests that common method bias may not be problematic in this sample (Podsakoff et al., 2024).

There was some attrition over time, with 725 participants providing complete data across the three time points. As the three-step LTA method described below requires complete data, the analyses were performed on the sample of 725 individuals. These participants were aged 60–95 years ($M = 71.36$ years; $SD = 7.24$ years), with 58.5 % of the sample being female ($n = 424$) and 41.5 % male ($n = 301$). Education levels varied across the sample as followed: less than high school ($n = 90$; 12.4 %), high school ($n = 279$; 38.5 %), college/TAFE ($n = 229$; 31.6 %), and university degree ($n = 127$, 17.5 %). Of note, 33 % of the sample had solar power, while 67 % did not.

3.2. Statistical analyses

The data were transferred to SPSS for cleaning and descriptive analysis. LPA and LTA were then used to analyse the data. We used LPA to identify distinct energy-efficiency value segments based on the 22-item values scale at each time point. LTA – a repeated measures extension of LPA – then examined these value segments longitudinally to determine their stability (e.g., is the nature of the segments stable or dynamic over time?) and investigate any patterns of movements among segments. All analyses were performed using Mplus version 8.2 (Muthén and Muthén, 2017) and followed the three-step method recommended by Asparouhov and Muthén (2014) to address issues relating to misclassification.

3.3. Latent profile analysis

LPA was conducted to identify the number and nature of profiles at each wave, which guided the specification of the LTA modelling. LPA is a sophisticated finite mixture model approach that identifies unobservable segments of based on a given set of observable variables (in the present context - perceived value). The aim of LPA is to capture complex relationships among items through a latent grouping variable (Lanza

et al., 2012). LPA is a person-centred approach, as opposed to variable-centred approaches such as cluster analysis. Rather than quantifying the role of specific variables, LPA organises a population in terms of a finite number of distinct profiles each comprising similar people (Lanza et al., 2012). Using LPA, each profile represents a group of people (i.e., segment) characterised by a pattern of responses on a set of variables, with being used to identify the optimal number of segments. In this context, LPA enabled us to understand the complexity of perceived value of energy efficiency and whether there were distinct value segments.

The first step in the LPA was to determine the optimal number of segments at each time point. This involved testing a series of LPA models for each time point, first specifying a single segment, followed by two segments and so on, until the optimal number of latent segments was found. This process was informed by several statistical fit indices: Akaike's Information Criteria (AIC), Bayesian Information Criteria (BIC), sample-size adjusted BIC, and Bootstrap likelihood ratio tests (BLRT) (Nylund et al., 2007). While not used to inform model selection, we also report entropy levels, which indicate the level of separation between the profiles. Entropy levels approaching 1 indicate good delineation of profiles with .80 a common rule of thumb for assessing appropriate levels of entropy (Celeux and Soromenho, 1996). In addition, we inspected the characteristics of the identified profiles to ensure they were meaningful and distinct and not merely variations on the same theme (Jung and Wickrama, 2008; B. O. Muthén, 2003). Inspecting these characteristics is important in ensuring a parsimonious solution (a goal of LPA), especially since relying on statistical criteria alone can overestimate the number of segments.

3.4. Latent transition analysis

LTA was then conducted to examine the value segments longitudinally. LTA is a powerful statistical analytic tool which enables assessment of change in segments and transition of consumers between segments over time using a person-centred approach, that accounts for measurement error (Kam et al., 2016). The LTA analysis involved modelling Time 1 segments as predictors of Time 2 segments, and Time 2 segments as predictors of Time 3 segments. The LTA models were tested with and without measurement invariance. Measurement invariance (i.e., constraining the measurement model to be equal over time) can be assumed when the number and nature of the segments are similar across the time points (Ryoo et al., 2018). A constrained model allows for an interpretation of transitions among similar value segments over time. However, measurement invariance should not be assumed if there are meaningful differences in value segments over time (e.g., if the number and nature of value segments differ at each time point). When measurement invariance is not assumed, any changes in segment membership over time reflect a mixture of changes in the nature of the segments as well as transitions among segments. We compared the model fit between an LTA assuming measurement invariance and an LTA model assuming measurement non-invariance and selected the model with the best fit (based on lower BIC).

The best fitting LTA model was then tested and included three covariates – attitude, age, and education level – as predictors of segment membership and transition probabilities. Attitudes were examined at each time point and were modelled as a time-varying covariate (e.g., attitudes at Time 1 predicted transitions between Time 1 and Time 2, attitudes at Time 2 predicted transitions between Time 2 and Time 3). Age and education level were assessed at Time 1. Due to the complex nature of the LTA, we tested these covariates in separate steps (Haltigan and Vaillancourt, 2018).

4. Results

4.1. LPA results

Table 1 shows the model fit criteria for the different LPA models

Table 1
Model fit criteria for the LPA models tested at each of the three time points.

	Number of segments	AIC	BIC	Adjusted BIC	BLRT p-value	Entropy
Wave 1						
	1	36,456.08	36,653.87	36,514.16		
	2	33,714.49	34,021.76	33,809.02	<.001	.87
	3	32,505.69	32,918.45	32,632.67	<.001	.91
	4	31,870.60	32,388.84	32,030.03	<.001	.91
	5	31,275.39	31,899.11	31,467.27	<.001	.92
	6	30,860.34	31,589.54	31,084.67	<.001	.93
Wave 2						
	1	35,196.75	35,398.51	35,258.83		
	2	32,458.56	32,765.83	32,553.09	<.001	.89
	3	31,346.82	31,759.58	31,473.80	<.001	.91
	4	30,552.30	31,070.53	30,711.72	<.001	.92
	5	29,972.79	30,596.51	30,164.67	<.001	.92
	6	29,618.69	30,347.89	29,843.02	<.001	.92
Wave 3						
	1	36,675.09	36,876.88	36,737.17		
	2	33,766.25	34,073.52	33,860.78	<.001	.91
	3	32,510.66	32,923.42	32,637.64	<.001	.94
	4	31,767.25	32,285.49	31,926.68	<.001	.91
	5	31,311.77	31,935.49	31,503.65	<.001	.92
	6	31,014.96	31,744.16	31,239.28	<.001	.92

AIC: Akaike Information Criteria; BIC: Bayesian Information Criterion; BLRT: Bootstrap likelihood ratio test.

tested at each time point. Across all time points, model fit improved as the number of segments increased, although these improvements slowed beyond 4–5 segments. Inspection of the different models also indicated that models with five or more segments had small and overlapping segments. Given the importance of distinctiveness and parsimony, we selected the four-segment solution as the best for each time point since these had improved model fit relative to three segments and identified distinct, and reasonably sized segments.

The characteristics of the segments identified through the LPAs are shown in Fig. 1. The sizes and nature of these four segments were

comparable longitudinally. Consistent with an earlier segment development study (Authors), we labelled these segments Value Opportunists, Frugal Eco-Warriors, Ambivalent, and Independent. In both Figs. 1 and 2, the x-axis shows the value items in order of each dimension – functional value, economic value, emotional value, social value, and ecological value – while the y-axis indicates the level of consumer-perceived value from (1) *strongly disagree* to (5) *strongly agree*. In terms of profiling the segments, each segment was distinct in its perceived value towards energy efficiency. As shown in Fig. 1, individuals in the Value Opportunists profile tended to have a high perception of the value of energy efficiency across all domains. The mean age of Value Opportunists was 71.3 years, with 60 % females and 40 % males, and with education levels as follows: less than high school (19 %), high school (37 %), college/TAFE (29 %), and university degree (15 %). Those in the Frugal Eco-Warriors profile had high levels of agreement across the functional and ecological value dimensions, with relatively high scores across the economic and emotional value dimensions; but were more

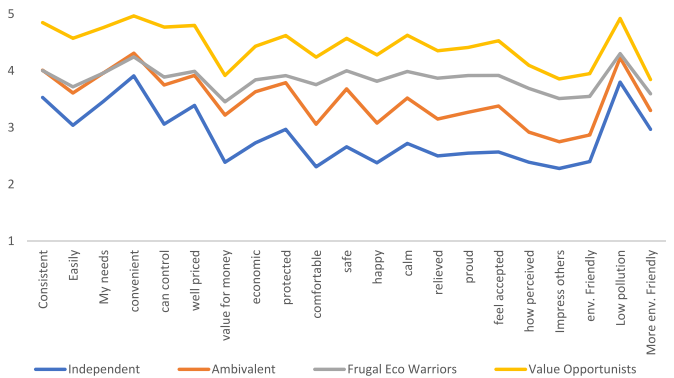


Fig. 2. Characteristics of the four value segments, as tested in the LTA (measurement model constrained to be equal over time).

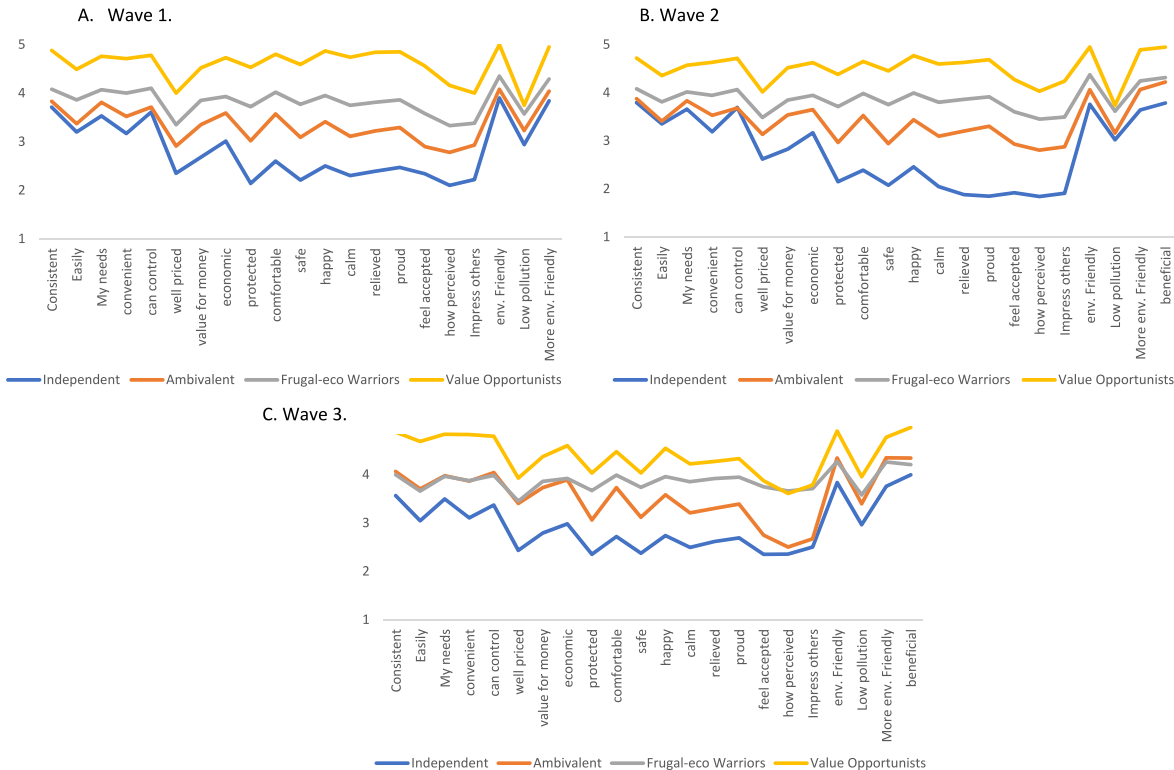


Fig. 1. Characteristics of the value segments as identified through the LPA modelling at each time point.

ambivalent towards items on the social value domain. The mean age of Frugal Eco-Warriors was 73.4 years, with 66 % females and 34 % males, and with education levels as follows: less than high school (13 %), high school (44 %), college/TAFE (25 %), and university degree (18 %).

Individuals in the Ambivalent profile had high levels of agreement on the ecological value dimensions and on some of the functional items but were otherwise trending towards ambivalence (i.e., tended to indicate that they neither agreed nor disagreed) across the other value dimensions. Members of the Ambivalent segment had a mean age of 68.2 years, with 45 % males and 55 % females, and with 12 % completing less than high school, 34 % high school, 39 % college/TAFE, and 15 % with a university degree. Finally, individuals in the Independent profile showed some agreement with functional and ecological value but disagreed with most items on the economic, emotional, and social value dimensions. Those in the Independent segment had a mean age of 69.3 years, with 42 % males and 58 % females. Their level of educational attainment was 11 % less than high school, 40 % high school, 37 % college/TAFE, and 12 % university. These differences in perceived value between the segments illustrates the existence of heterogenous consumer needs that have been identified in prior cross sectional segmentation studies on energy consumers (Sütterlin et al., 2011). This indicates that there is a need to account for diverse consumer needs in segmented, targeted and tailored environmental management policies and programs to successfully promote energy efficiency (see McAndrew et al., 2021).

4.2. Latent transition analysis results

Based on the LPA results, the LTA modelling approach specified four segments at each time point. BIC values supported a model with measurement invariance, and this aligns with the similarities of the segments identified in Fig. 1. Fig. 2 shows the value segments as tested in the LTA model (where the measurement model was held constant over time). Fig. 3 shows the size of these segments at each time point.

Table 2 shows the transition probabilities from the LTA and indicates some movement between segments. Stability was highest for the Frugal Eco-Warriors, with 76 % remaining in this segment between Time 1 and Time 2 and 61 % staying in this segment between Time 2 and Time 3. Individuals who transitioned out of this segment tended to move into the Ambivalent segment. The Ambivalent segment was reasonably stable (60–67 %), although approximately one-quarter transitioned into the Frugal Eco-Warrior segment. This suggests some permeability between the Ambivalent and Frugal Eco-Warrior segments. More than half of Independents (50–66 %) remained in this segment, with 26–39 % transitioning into the Ambivalent segment. The Value Opportunists had the lowest levels of stability (36–47 %), with about half transitioning into the Frugal Eco-Warriors segment. These findings indicate dynamic stability of the segments, empirically supporting the suggestion made by

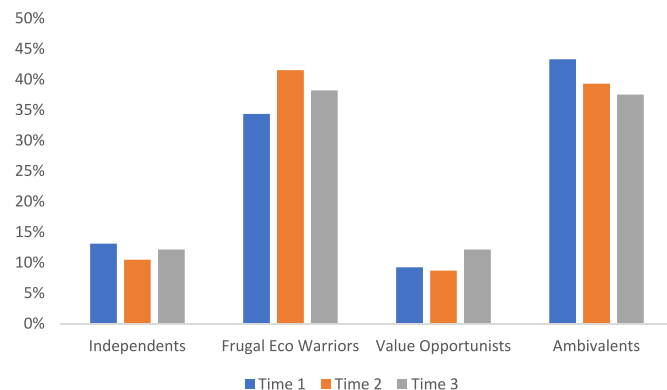


Fig. 3. Size of the value segments as a percentage of the total sample at each time point.

Table 2

Transition probabilities across the three waves.

Wave 1	Wave 2			
	Independent	Frugal Eco-Warriors	Value Opportunists	Ambivalent
Independent	.50	.10	.01	.39
Frugal Eco-Warriors	.01	.76	.08	.15
Value	.01	.46	.47	.06
Ambivalent	.07	.23	.03	.67

Wave 2	Wave 3			
	Independent	Frugal Eco-Warriors	Value Opportunists	Ambivalent
Independent	.66	.07	.01	.26
Frugal Eco-Warriors	.00	.61	.19	.20
Value	.03	.41	.36	.20
Ambivalent	.13	.23	.04	.60

Bold indicates the probability >.50.

some in the extant segmentation literature that segments are relatively stable over time (see Hu and Rau, 1995). The findings also identify that while there is dynamic stability, there are latent content changes due to consumer transition between the segments (Hu and Rau, 1995; Blocker and Flint, 2007). This empirically supports the proposition emerging from prior cross-sectional research (see Gordon et al., 2018; Barjak et al., 2022) that consumer segmentation models can offer a useful and relatively stable strategic tool for informing environmental policies and programmes to promote energy efficiency, but that the transition between segments over time need to be accounted for and understood.

4.3. Predictors of segment transition probabilities

The LTA model tested whether covariates predicted segment membership and transitions among segments over time. These relationships are presented as regression results, with the ambivalent segment selected as the referent given its size.

These results indicated that less positive attitudes predicted the Independent segment at Time 1 ($\beta = -.20, p < .001$) and Time 2 ($\beta = -.24, p < .001$). Positive attitudes predicted Value Opportunists at Time 1 ($\beta = .54, p < .001$), Time 2 ($\beta = .54, p < .001$) and Time 3 ($\beta = .25, p < .001$). Positive attitudes also predicted membership of the Frugal Eco-Warriors segment at Time 2 ($\beta = .13, p = .015$) and Time 3 ($\beta = .10, p = .034$). Attitudes were found to predict transitions among segments over time. More positive attitudes predicted an increased likelihood of transitioning from the Independent segment at Time 1 to Value Opportunists at Time 2 ($\beta = .20, p = .002$) and from Independent at Time 2 to Value Opportunists at Time 3 ($\beta = 1.17, p = .027$). More positive attitudes predicted a reduced likelihood of transitioning from Frugal Eco-Warriors at Time 1 to Independent at Time 2 ($\beta = -.70, p = .042$) and from Independent at Time 2 to Frugal Eco-Warriors at Time 3 ($\beta = .64, p = .001$). Age and education were not associated with segment membership or transitions over time. None of the other covariates were associated with value segment membership at each time point. These findings indicate that some demographic factors may help predict segment transition while others may not. This provides some empirical insight that has been so far lacking on what factors may predict consumer transition between segments (Blocker and Flint, 2007). However, further research is needed to confirm these relationships and to investigate how other psychographic, geographic, and behavioural variables predict transition. Such future research is an important priority given the significant technological, policy and regulatory, and economic shifts that are occurring in energy markets around the world, and the changing patterns of energy consumption and energy efficiency behaviours among consumers as the transition to net zero climate emissions unfolds (Barjak et al., 2022).

5. Discussion

5.1. Theoretical contributions

This study has investigated segment stability based on consumer's perceived value towards energy efficiency, to help inform environmental management. The findings also advance theoretical and methodological understanding of dynamic stability and whether energy consumer segments remain stable in number, size, and profile over time (Blocker and Flint, 2007; Gordon et al., 2018; Ritter and Pedersen, 2024). Our study of dynamic segment stability and transition based on consumers' perceptions of value towards using energy efficiently advances segmentation research to help inform the clean energy transition (Finkel, 2017). Overall, the findings show a reasonable level of dynamic stability over time, albeit with limited transition between segments. We show that these consumers increasingly perceive value in using energy efficiently over time, which has positive implications for the transition to a low carbon future (Curtis et al., 2017).

In answering RQ1, we found household energy consumer segments to be reasonably consistent over time, indicating our value segmentation solution exhibits dynamic stability. These findings are in line with prior marketing studies suggesting the number of segments in a given market remains reasonably stable over time (Calantone and Sawyer, 1978). This is an important finding, given enduring questions about longer-term stability in relation to the number of segments identified within a segmentation solution. These questions have endured partly because of shortfalls in appropriate longitudinal data, behavioural insights, and analytical methods (Wedel and Kamakura, 2002). The sophisticated LPA and LTA approach used here offers a methodological contribution to how segmentation research is conducted and provides a new pathway to investigate dynamic stability and latent content change.

We also identified some changes in segment size over time, with the Value Opportunists and Frugal Eco-Warriors segments getting larger, while the Ambivalent and Independent segments decreased in size. This finding suggests that despite some degree of dynamic stability, latent content changes can result with consumers transitioning between segments, leading to altered segment sizes. While these results are consistent with earlier research (Blocker and Flint, 2007), they provide new insights regarding latent content change among household consumers to inform environmental management, responding to the need for studies which address segment stability in dynamic markets (Ritter and Pedersen, 2024).

Linked to these changes in segment size, we found evidence that some consumers transitioned between segments over time. These transition patterns provide key insights into the nature of these segments, particularly the permeability between different segments. The implication is that some consumers exist at the boundaries of segments and are more susceptible to transition than those who have more stable preferences and behaviour. As such, a key task to support the strategic responses of environmental managers, is to understand which consumers transition between segments and why (Dolnicar et al., 2018). One strategy could be to use household energy efficiency behaviour change programmes that draw on social marketing principles (see McAndrew et al., 2021) to target consumers on segment boundaries to transition into other segments that are more predisposed towards energy efficiency.

To answer RQ2, our findings help understand the factors that explain consumer transition between segments. The LTA identified that more positive attitudes towards using energy efficiently were predictors of consumers' transition between segments, while education and age were not. This suggests that energy policy makers, producers, and retailers should foster positive attitudes and identify other factors that could encourage consumers to transition into segments more predisposed towards energy efficiency.

In addressing RQ3, our findings suggest a reasonable level of dynamic segment stability, with some level of latent content change in

segments over time. Consumer perceptions towards energy efficiency are also shown not to be static. The growth in segments that perceive high levels of value towards using energy efficiently suggests increasing awareness of the need to save energy as part of the transition to a low-carbon future. This is important, as consumers with these perceptions are more likely to perform energy efficient behaviours (Gordon et al., 2018).

5.2. Practical contributions

Overall, our findings reiterate that segmentation is a useful tool for environmental management and for promoting energy efficiency (Sütterlin et al., 2011; Poortinga and Darnton, 2016; Barjak et al., 2022). These findings also build on prior research demonstrating how consumer perceived value can foster behaviour change (Zainuddin and Gordon, 2020; Blut et al., 2023) by identifying how it can facilitate energy efficiency (Gordon et al., 2018; Kautish et al., 2024). This evidence supports the views of Australian energy market stakeholders that investment in segmentation research to enhance consumer-oriented policy and market strategy solutions is needed to support the transition to clean energy (Energy Consumers Australia, 2020; Finkel et al., 2017). Considerable resources are required to undertake segmentation, so environmental managers need assurance that identified segments will retain their value and applicability over time (Dibb and Simkin, 2001). By identifying internal stability in terms of the number of segments, our research offers some reassurance.

Developing sophisticated approaches to segmenting, tracking, and monitoring segments over time, offers insights energy market stakeholders can use to tailor and evaluate their consumer targeting strategies. As well as informing policy change, this targeting could inform marketing and behaviour change programmes to support the clean energy transition (Haines and Mitchell, 2014; McAndrew et al., 2021). These programmes might include the use of price signals, social marketing, nudges, or home retrofits oriented around different consumer lifestyles to promote energy efficiency.

For example, the global cost of living crisis and the rise in energy prices due to the ongoing war in Ukraine has shifted consumers priorities, who may now be less likely to be willing to pay a premium for sustainable options (Crew, 2022). At the same time, as the effects of climate change are increasingly felt through shifting weather patterns, drought and bushfires, the drive towards clean, low-emissions energy production and consumption is inevitable. Approaches which combine this understanding with the identification and tracking of consumer segments could provide rich insights to inform effective energy market policy and strategy.

Given the complex, rapidly evolving and volatile nature of the energy market, routine monitoring of consumers' within-segment preferences will be needed for environmental managers to maximise the benefits of consumer segmentation (Simkin and Dibb, 2011). While this approach segmentation can help the energy market move beyond a one-size-fits-all perspective in which all consumers are treated the same, the dangers of relying on 'set and forget' segmentation solutions must be recognised (Gordon et al., 2018). Further longitudinal studies are therefore needed to track energy consumer segments over the longer term and to monitor dynamic segment stability and the factors that mediate it.

5.3. Limitations and future research

Some research limitations should be acknowledged. Our research adopts a longitudinal consumer segmentation survey over a relatively shorter period of three years. Further investigation is needed to determine if dynamic segment stability holds over longer time periods in the energy market. Over time, a range of market and environmental factors could lead to less stability and more transitions between segments, with implications for how consumers are engaged towards energy efficiency,

and the supply chain geared up to support the transition to clean energy. Furthermore, common method bias is a potential limitation that could have influenced the observed relationships. While Harman’s single-factor test fell below the commonly used cut-off of 50 % in this sample, future research should aim to address common method bias through their research designs (Podsakoff et al., 2024).

Future long-term ethnographic studies could track the relationship between energy consumer segments and behavioural actions that support the clean energy transition. The changing role of so-called ‘prosumers’, who are becoming both energy users and suppliers through solar, battery, micro-grid, and vehicle to grid technologies, and the implications for how energy segments, producers, suppliers, and consumers are reframed, could also be considered (Barjak et al., 2022). While this article has focused on energy consumption and energy efficiency amongst older adults, further research is needed with different demographic groups and in different market contexts to advance the evidence base on dynamic segment stability and the implications for environmental management. While our LPA and LTA study has included selected covariates that help explain consumer transition between segments, replication studies in other contexts could test whether attitudes consistently predict consumer transition between segments. As our study is among the first to combine LPA and LTA methods to investigate dynamic segment stability in an environmental context, replication studies are needed to further test this methodological approach. Finally, research to investigate manifest content change is also needed, especially in environmental contexts that are experiencing rapid technological change, product proliferation, changes in personal values or shifting political or socio-cultural dynamics – such as electric vehicle uptake.

CRediT authorship contribution statement

Ross Gordon: Methodology, Writing – original draft, Formal analysis, Project administration, Funding acquisition, Conceptualization, Investigation. **Sally Dibb:** Writing – original draft. **Christopher Magee:** Formal analysis, Data curation, Writing – original draft.

Declaration of competing interest

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

Acknowledgements

This research is an outcome of a project entitled ‘Energy Efficiency in the 3rd Age’ that involves partnerships between the University of Wollongong (UOW), Macquarie University, Regional Development Australia Illawarra (RDAI), Warrigal, IRT Group, Royal Freemasons’ Benevolent Institution (RFBI), Illawarra Forum, WEA llawarra and the Illawarra Joint Pilot Organisation. This activity received funding from the Australian Government, Department of Industry, Innovation and Science, through the Low-Income Energy-Efficiency Project. The views expressed herein are not necessarily the views of the Commonwealth of Australia, and the Commonwealth does not accept responsibility for any information or advice contained herein. We wish to thank the study participants for taking part in this research. Finally, we thank Katherine Butler and all the other staff working on the Energy Efficiency in the 3rd Age project for their support in helping to administer the study.

Appendix 1. Survey scale items used to measure consumer perceived value towards using energy efficiently

Construct	Source	Item
Functional Value	Gordon et al. (2018)	Using energy efficiently can be done consistently. Using energy efficiently can be done easily. Using energy efficiently can be done according to my needs. Using energy efficiently is beneficial. Using energy efficiency can be done conveniently. Using energy efficiently is something I can control
Economic Value	Koller et al. (2011)	Using energy efficiently is reasonably priced. Using energy efficiently offers value for money. Using energy efficiently is economical.
Emotional Value	Nelson and Byus, 2002	Using energy efficiently makes me feel protected. Using energy efficiently makes me feel comfortable. Using energy efficiently makes me feel safe. Using energy efficiently makes me feel happy. Using energy efficiently makes me feel calm. Using energy efficiently makes me feel relieved. Using energy efficiently makes me feel proud.
Social Value	Walsh, Shiu & Hassan, 2014	Using energy efficiently helps me to feel acceptable. Using energy efficiently improves the way I am perceived Using energy efficiently makes a good impression on other people.
Ecological Value	Koller et al. (2011)	Using energy efficiently is environmentally friendly. Using energy efficiently pollutes the environment only marginally. Using energy efficiently is more environmentally friendly than not doing so.

Data availability

The authors do not have permission to share data.

References

Akhmat, G., Zaman, K., Shukui, T., Sajiid, F., 2014. Does energy consumption contribute to climate change? Evidence from major regions of the world. *Renew. Sustain. Energy Rev.* 36, 123–134.

Anderson, H., Ritter, T., 2008. *Inside the Customer Universe: How to Build Unique Customer Insight for Profitable Growth and Market Leadership*. John Wiley & Sons.

Asparouhov, T., Muthén, B., 2014. Auxiliary variables in mixture modeling: three-step approaches using Mplus. *Struct. Equ. Model.: A Multidiscip. J.* 21 (3), 329–341.

Australian Energy Regulator, 2021. *State of the Energy Market – 2021*. AER, Canberra.

Australian Energy Regulator, 2022. *Towards Energy Equity: a Strategy for an Inclusive Energy Market*. Commonwealth of Australia, Canberra.

Barjak, F., Lindeque, J., Koch, J., Soland, M., 2022. Segmenting household electricity customers with quantitative and qualitative approaches. *Renew. Sustain. Energy Rev.* 157, 112014.

- Barnett, C., Mahony, N., 2011. *Segmenting Publics*. Report Prepared for the National Co-ordinating Centre for Public Engagement. National Co-ordinating Centre for Public Engagement, Bristol.
- Bennett, P.D., 1995. Dictionary of Marketing Terms, second ed. American Marketing Association, Chicago.
- Blocker, C.P., Flint, D.J., 2007. Customer segments as moving targets: integrating customer value dynamism into segment instability logic. *Ind. Mark. Manag.* 36 (6), 81–822.
- Blut, M., Chaney, D., Lunardo, R., Mencarelli, R., Grewal, D., 2023. Customer perceived value: a comprehensive meta-analysis. *J. Serv. Res.* 0 (0). <https://doi.org/10.1177/10946705231222295>.
- Calantone, R.J., Sawyer, A.G., 1978. The stability of benefit segments. *J. Mark. Res.* 15 (3), 395–404.
- Celeux, G., Soromenho, G., 1996. An entropy criterion for assessing the number of clusters in a mixture model. *J. Classif.* 13, 195–212.
- Chen, Y.-C., Tsui, P.-L., Lan, B.K., Lee, C.-S., Chiang, M.-C., Tsai, M.-Y., Lin, Y.-H., 2025. The role of perceived value in shaping consumer intentions: a longitudinal study on green agricultural foods. *Br. Food J.* <https://doi.org/10.1108/BFJ-10-2024-0987>, 20 Feb 2025.
- Clarke, A., Freytag, P.V., 2008. An intra- and inter-organisational perspective on industrial segmentation: a segmentation classification framework. *Eur. J. Market.* 42 (9/10), 1023–1038.
- Clarke, A.H., Freytag, P.V., Mora Cortez, R., 2024. Revisiting the strategic role of market segmentation: five themes for future research. *Ind. Mark. Manag.* 121, A7–A10.
- Crew, B., 2022. Solving the energy crisis. *Nature* 609, S1.
- Curtis, J., Graham, A., Ghafoori, E., Pyke, S., Kaufman, S., Boulet, M., 2017. Facilitating adaptive management in a government program: a household energy efficiency case study. *J. Environ. Manag.* 187, 89–95.
- De Keyser, A., Schepers, J., Konus, U., 2015. Multichannel customer segmentation: does the after-sales channel matter? A replication and extension. *Int. J. Res. Market.* 32 (4), 435–456.
- Department of Energy and Climate Change, 2012. The Energy Efficiency Strategy: the Energy Efficiency Opportunity in the UK. The Stationery Office, London.
- Dibb, S., Simkin, L., 2001. Market segmentation: diagnosing and treating the barriers. *Ind. Mark. Manag.* 30, 609–625.
- Dibb, S., Simkin, L., 2010. Judging the quality of customer segments: segmentation effectiveness. *J. Strat. Market.* 18 (2), 113–131.
- Dibb, S., Stern, P., Wensley, R., 2002. Marketing knowledge and the value of segmentation. *Market. Intell. Plann.* 20 (2), 113–119.
- Dolnicar, S., Grün, B., Leisch, F., 2018. Market Segmentation Analysis: Understanding it, Doing it, and Making it Useful. Springer, Singapore.
- Energy Consumers Australia, 2019. A policymakers' guide to using power shift's strategic framework. Supporting Households to Manage their Energy Bills. Energy Consumers Australia, Sydney.
- Energy Consumers Australia, 2020. Powershift: Final Report. Sydney: Energy Consumers Australia.
- Ernst, D., Dolnicar, S., 2018. How to avoid random market segmentation solutions. *J. Trav. Res.* 57 (1), 69–82.
- Finkel, A., Moses, K., Monroe, C., Effeney, Y., O'Kane, M., 2017. Independent Review into the Future Security of the National Electricity Market – Blueprint for the Future. Commonwealth of Australia, Canberra.
- Foedermayr, E.K., Diamantopoulos, A., 2008. Market segmentation in practice: review of empirical studies, methodological assessment, and agenda for future research. *J. Strat. Market.* 16 (3), 223–265.
- Fonseca, J.R.S., Cardoso, M.G.M.S., 2007. Supermarket customer segments stability. *J. Target Meas. Anal. Market.* 15 (4), 210–221.
- Freytag, P.V., Clarke, A.H., 2001. Business-to-business market segmentation. *Ind. Mark. Manag.* 30 (6), 473–486.
- Golder, P.N., Dekimpe, M.G., An, J.T., van Heerde, H.J., Kim, D.S.U., Alba, J.W., 2023. Learning from data: an empirics-first approach to relevant knowledge generation. *J. Market.* 87 (3), 319–336.
- Gordon, R., Dibb, S., Magee, C., Waitt, G., Cooper, P., 2018. Empirically testing the concept of value-in-behaviour and its relevance for social marketing. *J. Bus. Res.* 82 (1), 56–67.
- Gordon, R., Harada, T., Waitt, G., 2021. Molar and molecular entanglements: parenting, care and making home in the context of energy capitalism. *Environ. Plann. Soc. Space* 39 (3), 534–552.
- Gordon, R., Harada, T., Spotswood, F., 2022. The body politics of successful ageing in the nexus of health, well-being, and energy consumption practices. *Soc. Sci. Med.* 294, 114717.
- Haines, V., Mitchell, V., 2014. A persona-based approach to domestic energy retrofit. *Build. Res. Inf.* 42 (4), 462–476.
- Hajibaba, H., Grün, B., Dolnicar, S., 2020. Improving the stability of market segmentation analysis. *Int. J. Contemp. Hospit. Manag.* 32 (4), 1393–1411.
- Haltigan, J.D., Vaillancourt, T., 2018. The influence of static and dynamic intrapersonal factors on longitudinal patterns of peer victimization through mid-adolescence: a latent transition analysis. *J. Abnorm. Child Psychol.* 46 (1), 11–26.
- Hu, M.Y., Rau, P.A., 1995. Stability of usage segments, membership shifts across segments and implications for marketing strategy: an empirical examination. *Mid Atl. J. Bus.* 31 (2), 161–177.
- Huang, P., Lamm, A.J., Dukes, M.D., 2016. Informing extension program development through audience segmentation: targeting high water users. *J. Agric. Educ.* 57, 60–74.
- Islam, S., Zahin, M., Rahim, S.B., 2024. Investigating how consumer-perceived value and store image influence brand loyalty in emerging markets. *South Asian Journal of Business Studies* 13 (4), 505–526.
- Kautish, P., Lavuri, R., Roubaud, D., Grebivnych, O., 2024. Electric vehicles' choice behaviour: an emerging market scenario. *J. Environ. Manag.* 354, 120250.
- Kam, C., Morin, A.J.S., Meyer, J.P., Topolnitsky, L., 2016. Are commitment profiles stable and predictable? A latent transition analysis. *J. Manag.* 42 (6), 1462–1490.
- Koller, M., Floh, A., Zauner, A., 2011. Further insights into perceived value and consumer loyalty: a “green” perspective. *Psychol. Market.* 28 (12), 1154–1176.
- Lang, Z., Rabotyagov, S., 2022. Socio-psychological factors influencing intent to adopt conservation practices in the Minnesota River Basin. *J. Environ. Manag.* 307, 114466.
- Luo, B., Li, L., Sun, Y., 2022. Understanding the influence of consumers' perceived value on energy-saving products purchase intention. *Front. Psychol.* 12, 640376. <https://doi.org/10.3389/fpsyg.2021.640376>.
- McAndrew, R., Mulcahy, R., Gordon, R., Russell-Bennett, R., 2021. Household energy efficiency interventions: a systematic review. *Energy Policy* 150, 112136.
- Mora Cortez, R., Clarke, A.H., Freytag, P.V., 2025. B2B market segmentation – an analysis of current practices and their implications. *J. Bus. Res.* 189, 115144. <https://doi.org/10.1016/j.jbusres.2024.115144>. ISSN 0148-2963.
- Mora Cortez, R., Clarke, A.H., Freytag, P.V., 2021. B2B market segmentation: a systematic review and research agenda. *J. Bus. Res.* 126, 415–428.
- Muthén, B.O., 2003. Statistical and substantive checking in growth mixture modeling: comment on Bauer and Curran (2003). *Psychol. Methods* 8 (3), 369–377.
- Muthén, L.K., Muthén, B.O., 2017. *Mplus User's Guide*. Muthén & Muthén, Los Angeles, CA.
- Nelson, D.G., Byus, K., 2002. Consumption value theory and the marketing of public health. *Health Market. Q.* 19 (4), 69–85.
- Nylund, K.L., Asparouhov, T., Muthén, B.O., 2007. Deciding on the number of classes in latent class analysis and growth mixture modeling: a Monte Carlo simulation study. *Struct. Equ. Model.* 14 (4), 535–569.
- Poortinga, W., Darnton, A., 2016. Segmenting for sustainability: the development of a sustainability segmentation model from a Welsh sample. *J. Environ. Psychol.* 45, 221–232.
- Podsakoff, P.M., Podsakoff, N.P., Williams, L.J., Huang, C., Yang, J., 2024. Common method bias: it's bad, it's complex, it's widespread, and it's not easy to fix. *Annual Review of Organizational Psychology and Organizational Behavior* 11, 17–61.
- Quinn, L., Dibb, S., 2010. Evaluating market-segmentation research priorities: targeting re-emancipation. *J. Market. Manag.* 26 (13–14), 1239–1255.
- Quinn, L., Dibb, S., Simkin, L., Canhoto, A., Analogbe, M., 2016. Troubled waters: the transformation of marketing in a digital world. *Eur. J. Market.* 50 (12), 2103–2133.
- Roberts, J.H., Kayande, U., Stremersch, S., 2014. From academic research to marketing practice: exploring the marketing science value chain. *Int. J. Res. Market.* 31 (2), 127–140.
- Ryoo, J.H., Wang, C., Swearer, S.M., Hull, M., Shi, D., 2018. Longitudinal model building using Latent Transition Analysis: an example using school bullying data. *Front. Psychol.* 9, 675.
- Sangroya, D., Nayak, J., 2017. Factors influencing buying behaviour of green energy consumer. *J. Clean. Prod.* 151, 393–405.
- Simkin, L., Dibb, S., 2011. Segmenting the energy market: problems and successes. *Market. Intell. Plann.* 29 (6), 580–592.
- Simshauser, P., Nelson, T., Doan, T., 2011. The boomerang paradox – part II: policy prescriptions for reducing fuel poverty in Australia. *Electr. J.* 24 (2), 63–75.
- Smith, W., 1956. Product differentiation and market segmentation as alternative marketing strategies. *J. Market.* 21 (1), 3–8.
- Sweeney, J.C., Soutar, G.N., 2001. Consumer perceived value: the development of a multiple item scale. *J. Retailing* 77 (2), 203–220.
- Sütterlin, B., Brunner, T., Siegrist, M., 2011. Who puts the most energy into energy conservation? A segmentation of energy consumers based on energy-related behavioral characteristics. *Energy Policy* 39 (12), 8137–8152.
- Tayal, D., 2016. Disruptive forces on the electricity industry: a changing landscape for utilities. *Electr. J.* 29, 13–17.
- United Nations Environment Programme, 2014. The Emissions Gap Report 2014: a UNEP Synthesis Report. UNEP, Nairobi.
- Warner, L.A., Diaz, J.M., Osborne, E.W., Oi, F., Reed, C.N., 2022. Evaluating connections between personal well-being and adoption of landscape best management practices: an audience segmentation study. *J. Environ. Manag.* 302, 113959.
- Wind, Y., Cardozo, R.N., 1974. Industrial market segmentation. *Ind. Mark. Manag.* 3 (3), 153–165.
- Wedel, M., Kamakura, W., 2000. *Market Segmentation: Conceptual and Methodological Foundations*. Kluwer, Dordrecht.
- Wedel, M., Kamakura, W., 2002. Introduction to the special issue of market segmentation. *Int. J. Res. Market.* 19 (3), 181–183.
- Yergin, D.H., 2006. Ensuring energy security. *Foreign Aff.* 85 (2), 69–82.
- Zainuddin, N., Gordon, R., 2020. Value creation and value destruction in social marketing services: a review and research agenda. *J. Serv. Market.* 34 (3), 347–361.