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Shaping consumer behaviour in a digital landscape: the impact of technology readiness on the purchase of sustainable IoT products

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Abstract

Purpose – This study examines the influence of technology readiness on purchase behaviour toward sustainable Internet of Things (IoT) products. Specifically, it explores how technology readiness dimensions, including optimism, innovativeness, discomfort, and insecurity, affect perceived value, attitudes, and purchase intention while shaping consumer behaviour in a digital landscape.

Design/methodology/approach – Using Structural Equation Modeling (SEM), the research assesses responses from a structured survey aimed at consumers of sustainable IoT products. The model analyzes the direct and indirect relationships between the technology readiness constructs and consumer attitudes and behaviours.

Findings – The findings reveal that optimism and innovativeness positively impact perceived value and purchase intention, while discomfort and insecurity act as barriers. Moreover, a perceived value significantly mediates the relationship between technology readiness and purchase intention, reinforcing its critical role in influencing purchase behaviour.

Research limitations/implications – This study has several limitations, including a focus on a relatively young demographic (ages 18–25), which may not fully represent older populations with potentially different levels of technology readiness, and its geographical specificity, which limits the broader applicability of the results to regions with varying technological infrastructures and cultural attitudes towards sustainability.

Practical implications – Businesses and policymakers can leverage these insights to design targeted marketing strategies that enhance consumer optimism and innovativeness while addressing discomfort and insecurity to foster the adoption of sustainable technologies.

JEL Classification — O14, O32, O33

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Originality/value – This study expands the understanding of consumer readiness for sustainable technologies and underscores the importance of perceived value in promoting sustainable consumption behaviours in the digital age.

Keywords Technology readiness, Decision-making process, Circular economy, Sustainable products

Paper type Research article

1. Introduction

The relationship between technology readiness, sustainable IoT products, and environmental sustainability remains a topical subject in academic research and industry practice. Digital transformation is steadily increasing in significance, while the importance of sustainability is also on the rise. In this context, it is essential to understand consumer behaviour regarding the adoption of eco-friendly products and technology.

Advancements in IoT technology provide smarter resource management and help reduce environmental impact. Consumer awareness and regulatory actions are increasing the demand for sustainable IoT products. However, embracing these products remains inconsistent, as individual differences in technology readiness significantly influence consumer decisions (Parasuraman, 2000; Parasuraman and Colby, 2015).

Past research analyzed technology readiness (Parasuraman, 2000) and sustainable consumption (Welsch and Kühling, 2010; Chen and Chang, 2012; Roy *et al.*, 2014; Islam *et al.*, 2015; Bibri and Krogstie, 2017) separately. Few studies examined their combined impact (e.g. Cavalieri *et al.*, 2021; Chauhan *et al.*, 2022). Technology readiness dimensions – optimism, innovativeness, discomfort, and insecurity – affect perceived value, attitudes, and purchasing behaviour. This gap hinders both theoretical advancement and practical applications.

On this line, our study investigates how technology readiness connects with perceived value, attitudes, and purchasing behaviour. Each component serves a role. Consumer predispositions are captured by technology readiness. Attitudes and perceived value shape evaluations, while purchasing behaviour reflects final decisions.

To address this issue, current research examines the effects of technology readiness on purchase behaviour toward sustainable Internet of Things (IoT) products in seven countries. Structural equation modelling (SEM) and survey analysis are applied as main methodological credentials and provide relevant insights and robust evidence into how technology readiness dimensions, including optimism, innovativeness, discomfort, and insecurity, affect perceived value, attitudes, and purchase intention, with spillovers on purchase behaviour. Findings contribute to theory and practice since businesses, policymakers, and researchers gain actionable recommendations. Adoption drivers are identified, supporting future studies and real-world applications.

The study is structured in five sections. After a general representation of the research background and relevance of the topic, a detailed literature review is presented, focusing on the interplay between the circular economy and the Internet of Things from the consumer perspective, the fundamentals of technology readiness and the credentials of the decision-making process of purchasing sustainable IoT goods. Section 3 details the research model and hypotheses, while Section 4 brings to the fore the methodology applied and the data used for the empirical analysis. Finally, results and discussion are entailed in Section 5, followed by concluding remarks.

2. Literature review

2.1 Circular economy (CE) and internet of things (IoT): consumers' perspective

The circular economy (CE) promotes resource reuse, repair, recycling, and regeneration, offering a sustainable alternative to the traditional economic model. Integrating digital innovations such as the Internet of Things (IoT) offers resource efficiency and reduces waste.

Consumers' interactions will be remade, supporting circular models and enhancing sustainability (Stahel, 2016).

According to Kirchherr *et al.* (2017), Circular Economy, or CE, is an approach in which efficiency in the use of resources and waste minimization predominate. The CE model is based on the 4 Rs: reducing, reusing, recycling, and recovering. The whole idea is to demand less from resources, keep goods in life a little longer, recycle materials, and recover energy. CE has been evolving towards digital integration, as indicated by Chauhan *et al.* (2022), Rejeb *et al.* (2022), and Chao and Di (2024). IoT plays a significant role in business and consumer participation and in the transition from linear systems to circular systems.

One significant issue in the paradigm of consumer perusal is IoT in CE. Sustainable products aim to reduce environmental impacts during the life cycle. Resource management through IoT increases efficiency and waste reduction aspects of sustainability (Alcayaga *et al.*, 2019). These technologies allow real-time data acquisition and optimization of resource allocation. The synergy between IoT and CE allows consumers to make informed decisions, supporting sustainable consumption and responsible production (Lobonç *et al.*, 2025; Zhao *et al.*, 2024).

This section decodes the impact of IoT on CE in terms of opportunities and challenges it brings. The advantages notwithstanding, there are many barriers standing between IoT and CE. The biggest of them is cognizance of the role played by IoT in CE. Information about IoT as such regarding the understanding of many consumers is meagre. Other limitations to acceptance are fears on the fronts of data security and privacy: How is data personalized from IoT devices? Is the query that bothers consumers a lot?

Cost-precision is another area of difficulty (Gómez-Carmona *et al.*, 2020). Consumers know IoT is associated with costs but do not mind that they might not benefit from the spurious accuracies. IoT functionality is generally mistrusted (Shirvani and Masdari, 2023). Complicated interoperability and compatibility issues further complicate seamless integration, leading to poor consumer involvement in CE. However, standardization and improved interoperability could mitigate these concerns, enhancing consumer confidence (Cavaleri *et al.*, 2021).

Despite challenges, IoT offers consumers various opportunities to engage in CE. Schwanholz and Leipold (2020) argue that IoT-CE integration transforms consumption patterns. Consumers drive change by making informed choices and supporting sustainable businesses. Participation in sharing economies and circular business models reduces environmental footprints. These engagements improve cost efficiency, accessibility, and convenience.

IoT also enables informed purchasing. Real-time data enhances consumer decision-making, allowing product selection based on sustainability metrics (Cavaleri *et al.*, 2021; Mostaghel and Chirumalla, 2021). Consumers align purchases with values, reinforcing sustainability. Additionally, IoT facilitates collaborative consumption. Connected platforms promote resource-sharing, reducing individual ownership needs and optimizing usage.

IoT-driven circular models introduce alternative consumption patterns. Subscription-based and product-as-a-service models shift consumer focus from ownership to usage (Cheng *et al.*, 2021). These approaches support resource optimization, reducing environmental impact.

Consumer participation is vital for IoT-CE initiatives. Adoption depends on the willingness to use IoT solutions and engage in circular models. Businesses and policymakers must address key obstacles, including cost concerns, reliability issues, and uncertainty (Camacho-Otero *et al.*, 2018; Mostaghel and Chirumalla, 2021). Providing transparency and clear communication fosters consumer trust, increasing engagement.

Governments play a crucial role by introducing supportive policies. Tax incentives encourage IoT adoption. Consumer education raises awareness, promoting informed choices. Regulatory frameworks reinforce sustainable consumption, further advancing circular economy principles.

2.2 Technology readiness (TR)

Grasping how individuals and organizations adapt to new technologies appears vital when viewed through the lens of technology readiness. In today's rapidly shifting digital landscape—where adopting innovations such as IoT is fundamental—this seems more pertinent than ever. Technology readiness appears to significantly affect how consumers and industries perceive and integrate new tech, a fact that proves vital for the successful rollout of sustainable IoT solutions.

A thorough evaluation of consumers' technology readiness is essential, particularly given the exponential growth of tech-based products and services and the accelerated pace at which companies incorporate technology into their marketing and customer service strategies (Parasuraman, 2000). Later, Parasuraman and Colby (2015) underscored the importance of optimism and innovativeness while also recognizing that discomfort and insecurity can act as inhibitors.

Technology readiness is defined as a general state of mind resulting from a gestalt of mental enablers and inhibitors that collectively determine a person's predisposition to use new technologies (Parasuraman, 2000).

This construct is divided into two conceptual subcategories: motivators (optimism and innovativeness) and inhibitors (discomfort and insecurity), being manifested through four distinct dimensions (Parasuraman and Colby, 2015): (1) *optimism*, which shows a positive view of technology toward improving quality of life, efficiency, and productivity. Optimistic individuals view technology as a tool for empowerment by or through societal advancement; on the other side, (2) *innovativeness* shows the mentality of being a technology pioneer and a leader. It reflects one's desire to experiment and adopt upcoming technologies leading earlier than counterparts; (3) *discomfort* shows a lack of control over technology. This dimension involves feelings of unease or frustration in using sophisticated or unfamiliar technological systems; (4) finally, *insecurity* reveals mistrust or skepticism regarding the reliability of the technology and its implications regarding privacy.

Venkatesh *et al.* (2012) surveyed technology readiness as an inclination to adopt e-commerce. They found out that his higher amount of technology readiness in persons will indeed determine them to engage themselves in online shopping, which is now converted into an easy and important way of buying. Technological readiness generally differs from person to person due to many influences that affect it. One of the significant influences on this technology readiness is technology anxiety, which is defined as fear or discomfort people may experience when dealing with new technologies. A study conducted by Horwood *et al.* (2021) shows that older populations exhibit generally higher levels of technology anxiety compared to younger ones. Such a difference can be attributed to the fact that older people did not grow up with technology like younger generations and, thus, find it more difficult or think they are not as good at using new technologies (Franco, 2023).

From another point of view, Tuyet and Tuan's (2019) paper is about technology readiness (TR) in self-service technologies. In their study, the authors examined the relationships between TR and perceived value, customer satisfaction, and continuance intention. Such empirical evidence has supported these relationships, indicating that TR plays an essential role in forming consumer attitudes and intentions towards adopting and using technology in the future.

Technology readiness is also substantially affected by values people link to technology or a brand. Technology perceived by people as being in harmony with their own manifested values is more likely to determine its adoption and engagement. On the other hand, people are less inclined to participate in co-creation or endorsements when a brand they deal with is at odds with their personal values. Added to these factors, the environment where an individual lives and works is a key determinant of that person's technological readiness level. For example, people who are living and working in an advanced technical environment, able to access resources and the support center, will find themselves with a higher level of readiness for technology than others living in a backward technological region (Venkatesh *et al.*, 2012).

Alongside this, other variables, such as anticipation, awareness, privacy concerns, perceptions of the value of use, and utility, play an important role in shaping consumer technology acceptance and usage (Parasuraman and Colby, 2015).

The TRAM model has provided good reach in examining the psychological processes that enable technology acceptance, stressing the need for service vendors to consider the technology readiness of people and system attributes in their strategies (Lin *et al.*, 2007). Furthermore, the work done by Lin and Chang (2011) identifies a more fine-grained model of technology acceptance, integrating TR with TAM into the original conception of TRAM, underscoring the role of individual readiness in the adoption process and generating distinctly helpful insights for researchers and practitioners in technology management and marketing. Venkatesh *et al.* (2012) later argued that motivation theories would frame the motivational factors that drive consumers to accept and use new technologies. The Technology Acceptance Model has become the dominant paradigm for studying technology acceptance and adoption. This model was initially developed to explain people's technology adoption behaviour in workplace settings but is now equally used in the consumer arena (Venkatesh *et al.*, 2012).

Consumer technology readiness (TR) is gaining importance in determining the success rate and adoption of innovations as technology is changing rapidly. From the consumers' perspective, TR is a measure with two fundamental values: availability and accessibility of the technology and psychological and behavioural acceptance of the new technologies. Analysis of TR from the consumer's viewpoint would highlight variables that act as barriers and facilitators to the adoption of emerging technologies. Equally, when these aspects are well identified and tackled, it becomes simple for companies and technology developers to craft the right strategies to improve user experience and, consequently, adoption rates. Moreover, understanding and improving conventional TR levels could ultimately guarantee that the transition to a highly technological society benefits from all the advantages of digital innovation (Parasuraman, 2000).

2.3 The decision-making process of purchasing sustainable IoT goods

Rapid advances in technology and improving awareness of environmental sustainability have brought forth an altogether different paradigm in consumer behaviour, especially in the decision-making process concerning sustainable Internet of Things (IoT) goods. When coupled with the promise of advanced technology capabilities, these products become even more popular. For businesses promoting these products, understanding the decision-making process for such goods will help them in their marketing endeavours, whereas consumers may rely on the understanding of such processes to make wise choices.

It draws from a number of theoretical frameworks: the decision-making process of consumers regarding sustainable IoT goods. It is an all-encompassing term for behaviours, decisions, and interactions concerning the selection, procurement, usage, and disposal of goods and services from Engel *et al.* (1968) and Kotler and Keller (2016). It refers specifically to the actions of consumers during the stage of purchase regarding the decision about the buy, the product chosen, the timing of purchase, and the purchase method (Solomon, 2018). Research done by Mostaghel and Chirumalla (2021) shows that the decision-making process for sustainable products from the consumers' perspective is highly affected by perceived value. This perceived value includes functional, social, emotional, epistemic, and conditional dimensions that together define a consumer's attitude towards sustainable products. Such an attitude, which is based on a high perceived value, may produce purchase intention and actual buying behaviour. This corresponds with the view, and hence, most probably, consumers with a really high perceived value and attitude about sustainable products will carry quite strong purchase intentions and take part in behaviour that results in purchasing.

The perceived value of a sustainable product to a consumer is the judgment compared to associated costs, including functional, social, emotional, epistemic, and conditional dimensions. These dimensions finally shape the creation of purchase intentions for the

sustainable product. The perceived values for sustainable products will include, in addition to the monetary aspects of environmental impact, energy efficiency, and product longevity (Holopainen, 2014; Chamberlin and Boks, 2018). Perceived value in the circular economy context can be mainly increased through environmental benefits such as reduced carbon emissions and energy savings (Constantinescu and Muntean, 2022; Korohodova *et al.*, 2024). Without exception, however, consumers weigh this value against the background of their understanding of the environmental benefits of such products, fit with individual needs and wants, and congruence with one's own values and beliefs concerning sustainability and ecological preservation (Shevchenko *et al.*, 2023).

Consumer's attitude towards sustainable goods is multidimensional. There are three attributes to such attitudes: cognitive, affective, and behavioural components. The cognitive element refers to knowledge and beliefs concerning sustainable goods' environmental impact, health benefits, and performance. The affective element refers to emotions such as sympathy, appreciation, and anxiety about the environment. The behavioural element involves actions and intentions towards purchasing and consuming sustainable goods, such as preference for a sustainable option and willingness to pay a premium for it (Zhang *et al.*, 2020). This attitude can be explained by variables including influence by personal values, beliefs on environmental sustainability, social norms, and info on products (Zhang *et al.*, 2020; Shevchenko *et al.*, 2023).

According to the Theory of Reasoned Action, consumers' attitudes towards circular business models and their willingness to pay a premium are the primary factors of purchase intentions. Mostaghel and Chirumalla (2021) have shown that attitudes are essential in understanding buying intentions, in concordance with this theory, in that changing individuals' perceptions will change buying intents, in this case, creating favourable attitudes toward sustainable cities, endorsing social norms in favour of sustainable consumption, and resource provision to overcome perceived barriers will help encourage buying intentions for circular business models.

It means that purchase intention refers to the possibility or inclination of consumers to purchase a specified good. The Theory of Reasoned Action (Mostaghel and Chirumalla, 2021) and the Theory of Planned Behavior (Ajzen, 1991) indicated direct pertinent involvement of perceived value and attitude towards purchase intention. Hence, for sustainable products, purchase intention will be modelled upon one's attitude to these products and perceived value (Zhang *et al.*, 2020). Pisitsankhakarn and Vassanadumrongdee (2020) recalls discussing attitudes and subjective norms, boosting intentions to buy remanufactured automotive products with some suggestions of cooperation among government and industry to enhance product quality and pricing strategies. Suki (2016) suggested that novelty and satisfaction of knowledge affect purchase intentions, thus possibly reinforcing the suggestion that consumers are willing to try new and different offers, which produces revelation for a purchaser. The Theory of Cognitive Dissonance (Deng, 2013) gives us meaningful insight into the area surrounding consumer purchase behaviour, showing that a person is internally consistent with beliefs and attitudes. An individual's purchase behaviour under terms of consumption will be in line with the individual's attitudes regarding environmental sustainability; thus, a cognitive link will be created, and dissonance will appear when the above conditions don't apply.

3. Research model and hypotheses

The effect of technology readiness (TR) on consumer perceived value of products or services (CPV) has been researched widely. The work of Yieh *et al.* (2012) looks at TR and its impact on CPV from a digital finance perspective, establishing a significant contribution toward understanding how different dimensions of TR affect CPV and showing the direction in which technology influences consumer perception. A MIMIC SEM model was used, and the results revealed that TR dimensions, i.e. optimism and innovativeness, have a positive impact on CPV while discomfort and insecurity (the inhibiting factors of TR) have a negative impact on CPV. This brings into stark relief that, as consumers assign value to services, different dimensions of

technology readiness will affect that perception in different ways. In this regard, the dimension of optimism impacted CPV the most, indicating that positive attitudes about technology serve to increase the perceived value of services.

Tuyet and Tuan (2019) investigate the relationship between consumers' technological readiness and the perceived value of technologies, thereby shedding light on how consumers' acceptance of technology readiness affects their perceptions of value toward these technologies. In their study, they looked at TR dimensions such as optimism, innovativeness, discomfort, and insecurity, arguing, in a nutshell, that high levels of technology readiness are proven to greatly enhance the perceived value derived from using the technologies. Later, in the study by Vy *et al.* (2022), the link between technology readiness and perceived value was explored in digital finance, particularly in online securities trading. The study provides empirical evidence of the significant impact that technology readiness has on the perceived value of digital financial services. The results highlight the need for digital finance platforms to focus not only on their services' intrinsic qualities but also on users' technological skills and readiness.

This paper aims to improve the existing specialised literature. As a result, we consider it worthwhile to investigate the influence of consumer technology readiness on the perceived value of technology and, subsequently, the impact on consumers' intention to purchase sustainable IoT products.

In this sense, we formulated the hypothesis H1 and H2:

- H1. Consumer technology readiness has a direct, positive and significant influence on the perceived value of sustainable IoT products and services.
- H2. Consumers' technology readiness has a direct, positive, and significant influence on their intention to purchase sustainable IoT products and services.

We concluded that the four specific dimensions of consumer technology readiness analysed in Yieh *et al.*'s (2012) research are essential and relevant, so we kept their analysis in our study. As a result, we formulated our hypotheses specific to the fields of consumer technological training: H1a, H1b, H1c, H1d, and H2a, H2b, H2c, and H2d, respectively.

- H1a. The optimism dimension specific to consumers' technology readiness has a direct, positive, and significant influence on the perceived value of sustainable IoT products and services.
- H1b. The innovativeness character specific to consumers' technology readiness has a direct, positive, and significant influence on the perceived value of sustainable IoT products and services.
- H1c. Discomfort associated with consumer technology readiness has a direct, positive, and significant influence on the perceived value of sustainable IoT products and services.
- H1d. Insecurity specific to consumers' technology readiness has a direct, positive, and significant influence on the perceived value of sustainable IoT products and services.
- H2a. The optimism dimension specific to consumers' technology readiness has a direct, positive, and significant influence on their intention to purchase sustainable IoT products and services.
- H2b. The innovativeness character specific to consumers' technology readiness has a direct, positive, and significant influence on their intention to purchase sustainable IoT products and services.
- H2c. Discomfort associated with consumers' technology readiness has a direct, positive, and significant influence on their intention to purchase sustainable IoT products and services.

H2d. Insecurity specific to consumers' technology readiness has a direct, positive, and significant influence on their intention to purchase sustainable IoT products and services.

Hypothesis H3 is supported by the research of [Moshtaghel and Chirumalla \(2021\)](#), wherein the authors, conceptualizing a theoretical conceptual model, suggested that consumer perceived value has a direct positive impact on consumer attitudes. The tenets of attitude regarding sustainable products are grounded in the perceived value ([Chaiken and Maheswaran, 1994](#)). Furthermore, the information they share with potential consumers significantly impacts their attitude towards sustainability ([Lieder et al., 2018](#); [Potkány et al., 2024](#)).

H3. Perceived value of sustainable IoT products and services has a direct, positive, and significant influence on attitude toward purchasing sustainable IoT products and services.

The understanding of how attitudes towards sustainable IoT products shape purchase intentions is thus important. The rational and experiential systems, as explained by [Chaiken and Maheswaran \(1994\)](#), are the prime processes that determine human attitudes, [Moshtaghel and Chirumalla \(2021\)](#) stated that one in a circular business context: rational processes determine attitudes based on cognitive evaluations of variables of cost-benefit and ethical beliefs. This rational basis is different from experiential processes, which, owing to previous experience, may be based on affect or a heuristic. The presumed antecedent to customer attitude is said to be the customer's perceived value (based on belief). If this is so, the input for companies selling sustainable IoT products should be to focus on improving consumer attitudes toward their brands, products, and services while enhancing their positive attributes and benefits ([Moshtaghel and Chirumalla, 2021](#)). Through this switch, companies direct the recorded intent of consumers to purchase sustainable IoT products and create a way for the acceptance of sustainable technologies owned by society, the environment, and the economy ([Moshtaghel and Chirumalla, 2021](#)). These arguments are the basis of the formulation of hypothesis *H4*.

H4. Attitudes toward the purchase of sustainable IoT products and services have a direct, positive, and significant influence on the intention to purchase these products and services.

The objective of analysing consumers' attitudes and intentions regarding purchasing products or services is to obtain information about their actual purchasing actions. However, the lag between when a customer intends to make a purchase and when they do complicates researchers' ability to accurately track actual purchase behaviour ([Moshtaghel and Chirumalla, 2021](#)). [Kim and Lee's \(2023\)](#) study investigated the link between consumers' intention to purchase sustainable products and their actual purchase behaviour. The authors found that the intention to purchase sustainable products significantly impacts actual purchase behaviour, and factors such as ease of purchase and sustainability credibility moderate this relationship. Research findings suggest that firm purchase intention for sustainable products can lead to more overt purchase behaviour, especially when situational factors are favourable. On the other hand, [Jung et al. \(2020\)](#) investigated the gap between attitude and actual purchase intention. The authors emphasized the importance of attitude, purchase intention, and individual characteristics in understanding sustainable purchase behaviour. These arguments formed the basis of the formulation of hypothesis *H5*.

H5. The intention to purchase sustainable IoT products and services has a direct, positive, and significant influence on the actual purchase behaviour of these products and services.

This paper considered several control variables associated with consumer purchase intention. In the specialized literature, there is evidence that age is an important factor in people's pro-

environmental behaviour. For example, young people tend to have higher levels of environmental knowledge, while older people tend to adopt higher levels of environmentally friendly behaviour. Compared to younger people, who tend to have a more dynamic lifestyle, older people can take more responsible action. At the same time, personal factors related to the level of education and the level of consumer income can influence the consumer's purchase intention (Leonidou *et al.*, 2010). Consequently, these arguments substantiated the formulation of hypothesis H6.

- H6. Consumers' personal characteristics exert a moderating role in the relationship between consumers' purchase intentions and their actual purchase behaviour of sustainable IoT products and services.

Therefore, following the study of the specialized literature, we conclude that existing research papers have analysed specific aspects of consumers, namely the influence of consumers' technological training on the value perceived by consumers of some products and services. We consider it necessary to investigate these aspects and influences and their relationship to the intention to purchase sustainable IoT products and services, as we believe that they have not yet been sufficiently analysed. The present paper is mainly oriented toward identifying the role of technological preparation and its four domains, both on the value perceived by consumers of sustainable IoT products and services and on the intention to purchase these products and services, influence possibly manifested both directly and indirectly through consumer attitudes. Our research also investigates the moderating role of consumers' personal characteristics regarding consumers' age, education, and income level in the appropriate context of sustainable IoT products and services.

The hypotheses and sub-hypotheses of this research will be tested with SEM analysis models using STATA 18 software.

4. Research data and methodology

The study was conducted in Romania, Latvia, Lithuania, Poland, Portugal, Turkey, and Kyrgyzstan. These countries represent a mix of developed and developing/emerging economies, allowing us to capture a broad spectrum of consumer behaviour and technology readiness levels. The selected countries span diverse geographical regions (Eastern Europe, Southern Europe, and Central Asia), offering insights into how cultural and regional differences may influence attitudes toward sustainable IoT products. Each chosen country actively engages with digitalization and sustainability initiatives, making them relevant for studying technology readiness and its impact on sustainable consumer behaviour.

For primary data collection purposes, an online questionnaire was used. 285 fully completed questionnaires were received. The survey was distributed via Google Forms. The survey revealed diverse demographics regarding age, education, and income. Based on the questionnaire data provided, the majority of respondents (53.1%) fall within the 18–25 age group, representing a predominantly young demographic. The next significant age bracket, 26–40 years, comprises 19.6% of participants, followed by 16.5% in the 41–55 age range. A smaller proportion, 8.8%, belongs to the 56–70 age group, while only 2% of the respondents are over 70 years old. Regarding education, 35.2% of the participants hold a high school diploma or equivalent. A notable 33.9% possess a Bachelor's degree, while 20.7% have completed a Master's degree. A smaller fraction, 8.1%, have earned a Ph.D. or equivalent, and only 1.1% have vocational or technical education. A minimal of 0.9% report having only a middle school education. Regarding income levels, the largest group, 28.4%, earns over €1,600 monthly. This is followed by 23.3% of respondents earning below €400 monthly. The remaining participants are distributed as follows: 18.5% earn between €401 and €800 per month, 15% between €801 and €1,200 per month, and 14.8% between €1,201 and €1,600 per month.

The sample group of the study mainly consists of young individuals (18–25 years old). This age group is particularly relevant to the study as they are early adopters of technology and key drivers of sustainability trends. For practical purposes, a nonprobability method of sampling was used (Reynolds *et al.*, 2003; Etikan, 2020; Cornesse *et al.*, 2020), and convenience sampling, and therefore, the final results could not be viewed as representative of the relevant populations.

The five measurement scales used in this study to operationalize the constructs and develop the questionnaire are widely recognized in international literature and have been adapted to fit the national context (Appendix Table A1, Constructs, Items and Scales). Specifically, “Technology Readiness” was measured using the TRI 2.0 scale, which consists of 16 items and was developed by Parasuraman and Colby (2015). The construct “Perceived Value of sustainable IoT products” was measured using a 7-item scale adapted from Suki (2016). For the construct “Attitude towards sustainable IoT products,” two scales were employed: three items were adapted from Kazeminia *et al.* (2016) to measure attitude, while five items were adapted from Mostaghel and Chirumalla (2021) for additional attitude measurements. The construct “Purchase Intention towards sustainable IoT products” was measured using a 3-item scale adapted from Mostaghel and Chirumalla (2021), focusing on the intent to purchase sustainable products. Similarly, “Purchase Behavior towards Sustainable IoT Products” was assessed with a 3-item scale, from Mostaghel and Chirumalla (2021), which captures actual purchasing behaviours. All items across the constructs were measured using a five-point Likert scale (1 = Strongly disagree, 5 = Strongly agree). Each scale was translated into the respondents’ native language using a standardized back-translation procedure to maintain consistency with the original scale. The scales were reviewed by bilingual experts to ensure that the translated items were culturally appropriate and semantically equivalent. The internal consistency of the scales was assessed using Cronbach’s alpha for each country sample; all scales demonstrated acceptable reliability across the different language versions.

This study employs several statistical techniques, including descriptive statistics, correlation analysis, and Structural Equation Modeling (SEM). SEM enables the analysis of complex models (Lin *et al.*, 2007; Chen and Chang, 2012; Roy *et al.*, 2014; Islam *et al.*, 2015; Parasuraman and Colby, 2015) with multiple dependent and independent variables, making it ideal for exploring the multidimensional relationships between technology readiness dimensions (optimism, innovativeness, discomfort, insecurity), perceived value, attitudes, purchasing intention and purchasing behaviour. SEM allows for the simultaneous testing of both direct and indirect effects. This capability is critical in the current study, as perceived value and attitudes act as mediators between technology readiness dimensions and purchasing behaviour. Therefore, SEM is chosen as the primary methodological approach due to its ability to model complex relationships, account for measurement error, and provide confirmatory analysis of theoretical models. STATA 18 was used to conduct all analyses. The SEM model, detailed in Figure 1, systematically outlines the direct, indirect, and total relationships between the constructs, using Maximum Likelihood Estimation (MLE) for cross-sectional data analysis. The model investigates the relationships among five key constructs: Technology Readiness (TR), Perceived Value (PV), Attitude (AT), Purchase Intention (PI), and Purchase Behavior (PB).

In this design, both measurement and structural components are integrated into the SEM framework, offering a comprehensive view of the relationships between the constructs. SEM’s ability to adjust for measurement error enhances the accuracy of the estimated relationships between latent constructs. This method aligns with prior studies in the field, such as Yieh *et al.* (2012) and Pisitsankkhakarn and Vassanadumrongdee (2020), which employed similar SEM approaches to explore related topics.

This figure illustrates the relationships between the dimensions of technology readiness (optimism, innovativeness, discomfort, and insecurity) and their impact on perceived value, attitudes, purchasing intentions and actual purchase behaviour for sustainable IoT products. The SEM approach provides accurate evidence for the five research hypotheses, analysing the direct, indirect, and cumulative relationships between observable and latent variables within the theoretical framework.

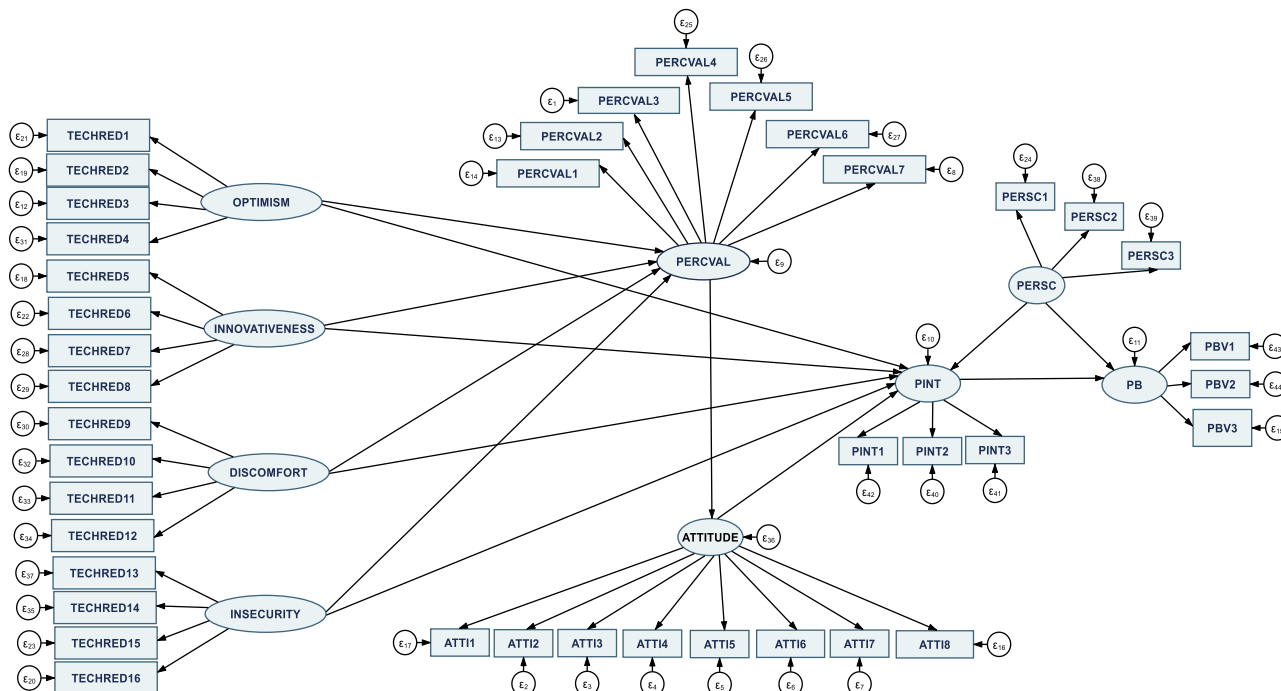


Figure 1. The general configuration of the research model based on structural equation modelling (SEM). Source: Authors' own creation

5. Results and discussion

5.1 Empirical results

The next part is contingent on the empirical results, following a comprehensive examination of theoretical foundations, literature review, research model, and methodology. This chapter, therefore, will reveal findings based on our rigorous data analysis in a strive to test the research hypotheses, as mentioned in previous sections. With the help of Structural Equation Modeling (SEM), we have explored the interlinkages among technology readiness, perceived value, purchase intention, and, finally, consumer behaviour regarding the purchase of sustainable IoT products within the dynamic configuration of the circular economy.

Our analysis sheds light on the complex dynamics that influence consumers' engagement with sustainable technologies and reveals key insights into the crucial roles technology readiness and perceived value play in shaping consumers' attitudes and purchase intentions, with spillovers on the actual purchase behaviour of sustainable IoT products and services. As we traverse these findings, we will systematically present the data along with the implications of our statistical interpretations and relate or recoil with existing theories and previous studies. The relevant results for the measurement model are shown in [Figure 2](#).

According to the data presented in [Table 1](#), the minimal value obtained for Cronbach's alpha is 0.9503 for the item PINT1. This significantly surpasses the suggested minimum criterion of 0.7, as [Porter and Donthu \(2008\)](#) recommended. This indicates that all measurement scales exhibit high internal consistency and are reliable for assessing the constructs. Furthermore, the highest Cronbach's alpha recorded is 0.9538 for the item PERSC1, further affirming the robustness of the measurement model used in this study.

The analysis from [Table 2](#) reveals that optimism, innovativeness, perceived value, and attitude are generally positive predictors across multiple outcomes, such as purchase intention and behaviour. Conversely, discomfort and insecurity negatively affect perceived value, attitude, and purchase-related outcomes. While perceived value and attitude strongly affect both purchase intention and actual behaviour, insecurity and discomfort, particularly insecurity, consistently hinder positive outcomes. These findings are significant for designing marketing strategies, suggesting that enhancing perceived value and addressing feelings of discomfort and insecurity could be key to improving consumer attitudes and behaviours.

Wald's tests for equations related to the SEM models were performed to evaluate the significance of the relationships within the model. The chi-square values and their respective *p*-values of 0.0000 for most of the observed variables indicate that the relationships or effects being tested are statistically significant. This suggests a very low probability that these observed relationships occurred by chance, reinforcing the strength and relevance of these relationships in the model.

The goodness-of-fit tests ([Table 3](#)) provide a comprehensive evaluation of model performance through various metrics. These include the likelihood ratio tests, where the chi-square value for the model vs. saturated comparison ($\chi^2_{\text{ms}} = 2224.361$, $p < 0.001$) indicates significant deviation from the saturated model, and the baseline vs. saturated comparison ($\chi^2_{\text{bs}} = 8059.710$, $p < 0.001$) shows that the baseline model fits substantially worse than the saturated model. Additionally, information criteria such as the Akaike Information Criterion (AIC = 24069.072) and Bayesian Information Criterion (BIC = 24553.916) assess the trade-off between model fit and complexity, with lower values indicating a better balance. While CFI and TLI are widely used, other fit indices, such as the Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR), provide additional insights into model fit ([Xia and Yang, 2019](#)). For instance, an RMSEA value below 0.08 indicates a reasonable fit. Baseline comparisons are presented using the Comparative Fit Index (CFI = 0.794) and Tucker-Lewis Index (TLI = 0.779), where both values fall below the preferred threshold of 0.90, suggesting room for improvement in the model's fit.

The adequacy of the residuals is evaluated through the Standardized Root Mean Squared Residual (SRMR = 0.006), which indicates a good fit, as it is well below the threshold of 0.08.

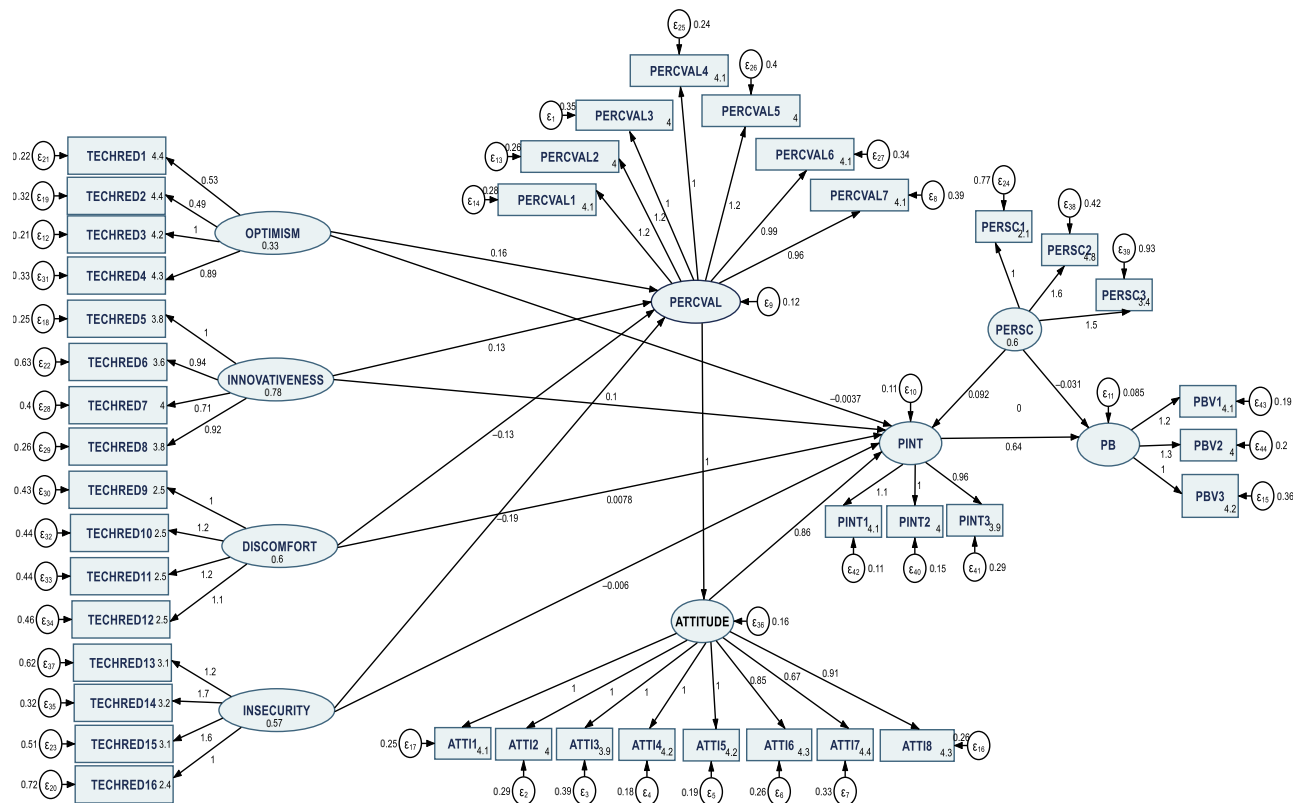


Figure 2. Results of the SEM. Source: Authors' own creation in Stata 18

Table 1. Alpha Cronbach. Authors’ research in Stata 18

Item	Obs	Sign	Item-test correlation	Alpha
PERCVAL3	283	+	0.5254	0.9519
PERCVAL7	283	+	0.5568	0.9517
PERCVAL2	283	+	0.6493	0.9511
PERCVAL1	283	+	0.6912	0.9508
PERCVAL4	283	+	0.6197	0.9513
PERCVAL5	283	+	0.6296	0.9513
PERCVAL6	283	+	0.5748	0.9516
TECHRED3	283	+	0.4390	0.9525
TECHRED2	283	+	0.3179	0.9533
TECHRED1	283	+	0.3448	0.9531
TECHRED4	283	+	0.3724	0.9529
PINT2	283	+	0.7496	0.9505
PINT3	283	+	0.6696	0.9510
PINT1	283	+	0.7778	0.9503
TECHRED5	283	+	0.6246	0.9513
TECHRED6	283	+	0.6034	0.9514
TECHRED7	283	+	0.5052	0.9521
TECHRED8	283	+	0.5954	0.9515
PBV3	283	+	0.5346	0.9519
PBV1	283	+	0.6444	0.9512
PBV2	283	+	0.6468	0.9511
TECHRED9	283	–	0.5348	0.9519
TECHRED10	283	–	0.6271	0.9513
TECHRED11	283	–	0.6511	0.9511
TECHRED12	283	–	0.6800	0.9509
PERSC1	283	+	0.2301	0.9538
PERSC2	283	+	0.4833	0.9522
PERSC3	283	+	0.6008	0.9515
TECHRED16	283	–	0.5930	0.9515
TECHRED15	283	–	0.6678	0.9510
TECHRED14	283	–	0.6812	0.9509
TECHRED13	283	–	0.5763	0.9516
ATTI2	283	+	0.6928	0.9508
ATTI3	283	+	0.6627	0.9510
ATTI4	283	+	0.7529	0.9504
ATTI5	283	+	0.7525	0.9504
ATTI6	283	+	0.6441	0.9512
ATTI7	283	+	0.4830	0.9522
ATTI8	283	+	0.6436	0.9512
ATTI1	283	+	0.6804	0.9509

Source(s): Authors’ own creation in Stata 18

Additionally, the Coefficient of Determination ($CD = 0.995$) shows that 99.5% of the variance is explained by our model, suggesting a strong overall performance in explaining the observed data.

The positive influence of optimism and innovativeness on perceived value and attitudes toward sustainable IoT products aligns with [Parasuraman \(2000\)](#), who identified these dimensions as enablers of technology adoption. The inhibitory effects of discomfort and insecurity are compared with findings from [Roy et al. \(2014\)](#), who highlighted similar barriers in consumer engagement with innovative products. The role of perceived value as a mediator between technology readiness and purchase behaviour is supported by [Chen and Chang \(2012\)](#), who emphasized the importance of value perception in driving green purchase intentions.

Table 2. Indirect and total effects captured in the SEM model by MLE method

Structural	Estimate	Std. Err.	<i>z</i>	<i>p</i> > <i>z</i>	[95% Conf. Interval]
<i>PERCVAL</i>					
OPTIMISM	0.1567548	0.0567598	2.76	0.006	0.0455–0.2680
INNOVATIVENESS	0.1330044	0.0383062	3.47	0.001	0.0579–0.2080
DISCOMFORT	–0.1298768	0.0493769	–2.63	0.009	–0.2266 to 0.0330
INSECURITY	–0.1871236	0.049553	–3.78	0.000	–0.2842 to 0.0900
<i>ATTITUDE</i>					
PERCVAL	1.011801	0.1124734	9.00	0.000	0.7913–1.2322
OPTIMISM	0.1586047	0.0574516	2.76	0.006	0.0460–0.2712
INNOVATIVENESS	0.134574	0.0386434	3.48	0.000	0.0588–0.2103
DISCOMFORT	–0.1314094	0.0502234	–2.62	0.009	–0.2298 to 0.0329
INSECURITY	–0.1893318	0.0499924	–3.79	0.000	–0.2873–0.0913
<i>PINT</i>					
PERCVAL	0.8691414	0.1035615	8.39	0.000	0.6661–1.0721
ATTITUDE	0.8590044	0.072249	11.89	0.000	0.7173–1.0006
OPTIMISM	0.1324929	0.0732887	1.81	0.071	–0.0111 to 0.2761
INNOVATIVENESS	0.2176285	0.0518222	4.20	0.000	0.1160–0.3191
DISCOMFORT	–0.1051184	0.0659893	–1.59	0.111	–0.2344 to 0.0242
PERSC	0.0924605	0.0412613	2.24	0.025	0.0115–0.1733
INSECURITY	–0.1686117	0.0654369	–2.58	0.010	–0.2968 to 0.00403
<i>PB</i>					
PERCVAL	0.5538645	0.0832795	6.65	0.000	0.3906–0.7170
ATTITUDE	0.5474046	0.0679927	8.05	0.000	0.4141–0.6806
PINT	0.6372547	0.0667169	9.55	0.000	0.5064–0.7680
OPTIMISM	0.0844317	0.0472678	1.79	0.074	–0.0082 to 0.1770
INNOVATIVENESS	0.1386848	0.0352247	3.94	0.000	0.0696–0.2077
DISCOMFORT	–0.0669872	0.0425639	–1.57	0.116	–0.1504 to 0.0164
PERSC	0.0281963	0.0402148	0.70	0.483	–0.0506 to 0.1070
INSECURITY	–0.1074486	0.0428615	–2.51	0.012	–0.1914 to 0.0234

Source(s): Authors' own creation in Stata 18

5.2 Discussion

The study's findings indicate that technology readiness has a tangible effect on how consumers assess the value of sustainable IoT products and their likelihood of buying them. In plain language, the four dimensions – optimism, innovativeness, discomfort, and insecurity – appear to work together in shaping consumer decision-making. For instance, when consumers exhibit a high degree of optimism and innovativeness, their product valuation and intent to purchase seem to rise sharply. This observation aligns with earlier studies by [Yieh et al. \(2012\)](#) and [Venkatesh et al. \(2012\)](#) and echoes the foundational ideas of [Parasuraman \(2000\)](#) and later of [Parasuraman and Colby \(2015\)](#), who regard these positive traits as vital catalysts for technology adoption. On the other hand, discomfort and insecurity emerge as significant psychological hurdles, curtailing technology uptake by diminishing the value consumers assign to products and by weakening their enthusiasm. [Roy et al. \(2014\)](#) have reported a similar pattern. Meanwhile, the perceived value itself appears to be an essential engine behind both consumer attitudes and purchase intentions. When a product's concrete benefits – whether environmental or functional – are communicated clearly, consumers tend to form positive attitudes that, in turn, increase the probability of an actual purchase. This cascade of influence seems to align with the Theory of Planned Behavior ([Ajzen, 1991](#); [Zhang et al., 2020](#)), hinting that perceived value and attitudes may mediate the relationship between

Table 3. Goodness-of-fit tests

Fit statistic	Value	Description
<i>“Likelihood ratio”</i>		
$\chi^2_{\text{ms}}(727)$	2224.361	“Model vs. saturated”
$p > \chi^2$	0.000	
<i>“Baseline vs. saturated”</i>		
$\chi^2_{\text{bs}}(780)$	8059.710	“Baseline vs. saturated”
$p > \chi^2$	0.000	
<i>“Population error”</i>		
RMSEA	0.085	“Root mean squared error of approximation”
90% CI, lower bound	0.081	
upper bound	0.090	
pclose	0.000	“Probability RMSEA $\leq$ 0.05”
<i>“Information criteria”</i>		
AIC	24069.072	“Akaike’s information criterion”
BIC	24553.916	“Bayesian information criterion”
<i>“Baseline comparison”</i>		
CFI	0.794	“Comparative fit index”
TLI	0.779	“Tucker–Lewis index”
<i>“Size of residuals”</i>		
SRMR	0.006	“Standardized root mean squared residual”
CD	0.995	“Coefficient of determination”
Source(s): Authors’ own creation in Stata 18		

technology readiness and the final buying decision – a notion that echoes [Chen and Chang’s \(2012\)](#) findings on green purchase intentions.

These insights are consistent with broader debates on technology readiness and sustainability. [Yieh et al. \(2012\)](#) similarly identified optimism and innovativeness as powerful motivators, whereas discomfort and insecurity serve as inhibitors. The mediating role of perceived value – observed in our study – appears consistent with [Mostaghel and Chirumalla’s \(2021\)](#) assertion that value perception is central to sustainable purchasing. Notably, our research advances the discussion by positioning consumer attitudes as the critical bridge between how value is perceived and actual purchase behavior. Interestingly, one curious nuance was that, despite a strong association with perceived value and attitude, optimism showed only a marginal direct effect on purchasing – suggesting that even highly optimistic consumers might be held back by cost considerations or logistical challenges.

On the practical side, the results of this study have two critical implications. First, companies can seek to enhance the perceived value of sustainable IoT products by highlighting positives such as environmental improvement, energy savings, and long-run savings. In other words, marketing should, perhaps, calm fears and uncertainties by providing credible information that is transparent about product reliability, safety, and usability.

Given the strong connection between consumers’ attitudes and purchase intent, one may even argue that promotions aimed at nurturing sustainability perceptions serve to incite higher purchase intentions. Auxiliary initiatives – from government policies to educational programs, subsidies, tax incentives, and digital literacy campaigns – would further entrench this positive direction.

Interestingly, digital literacy-enhancing initiatives seem to potentially relieve the discomfort and insecurity of lower technology readiness ([Alrefai et al., 2024](#)). Other likely options for policymakers may be some subsidies or tax concessions for manufacturers as a way

to bring production costs down and promote innovativeness (Martínez *et al.*, 2021; Parra *et al.*, 2021). The public conscience could be gently swayed toward greener consumption patterns by accentuating the environmental and social good of these products. Not only do such initiatives advance digital literacy, but they also strive to achieve broad society participation in the digital economy-in turn, enhancing resource-use efficiency, minimizing adverse environmental impacts, and arguably enhancing people's quality of life (Prothero *et al.*, 2011; Rahmani *et al.*, 2023; Alrefai *et al.*, 2024).

However, beyond these positive findings, one has to admit that our study has some deficiencies. Data collection was almost purely from a young age group (18–25), which indeed captures an early-adoption trend but cannot be truly representative of the older population, which makes readiness levels concerning technology quite different. Can these demographic differences bring out the need for more in-depth, inclusive research in the future? In turn, the geographical coverage of the study has somewhat narrowed the implications of the findings on a much larger area, especially if such an area would have some infrastructural digital changes or very different cultural perceptions concerning sustainability. It appears some unrecognized cultural biases might have shaped the interpretation; for example, while individualistic cultures often extol personal innovation, collectivistic ones could very well place greater emphasis on social trust. These variations have been subtle across the seven countries under scrutiny (Romania, Latvia, Lithuania, Poland, Portugal, Turkey, and Kyrgyzstan).

Hypothetically, a long-term approach may provide richer insights into changing consumer attitudes and behaviour as IoT technologies are increasingly incorporated into everyday life.

Technology readiness indeed appears to have a significant impact on how consumers perceive and create value and, therefore, their purchase decision for sustainable IoT products. The enablers and inhibitors in governing decision-making, this research underlines the practical and possible revolutionary guidance for businesses and policymakers willing to embrace sustainable technology adoption, hence fostering such practice in the market. Moreover, the significant influence of perceived value and consumer sentiment on purchase intention emphasizes the necessity for marketing strategies beyond mere informing toward emotional resonance and the broader reach toward a more sustainable consumption in an increasingly digital world.

6. Conclusions

The study examined the impact of technology readiness on consumer attitudes, perceived value, and purchase behaviours towards sustainable IoT products. By analysing technology readiness in four dimensions – optimism, innovativeness, discomfort, and insecurity – the research showed how these would impact consumers' value perceptions and their intention to adopt sustainable IoT solutions.

It was discovered that optimism and innovativeness affect perceived value and purchase intention positively. In contrast, consumers' discomfort and insecurity inhibit these perceptions. These inhibitors reflect psychological challenges toward adopting technology, with sustainability being the most affected. Perceived value emerged as a fundamental parameter influencing consumer attitude and purchase intention, establishing the significance of highlighting environmental and practical benefits offered by sustainable IoT products.

In addition, consumer attitude strongly and directly affects purchase intention and behaviour, thereby confirming the centrality of attitude to sustainable consumer decision-making processes. Ultimately, the study advances the budding literature on the purchase behaviour of sustainable technologies by illustrating how technology readiness is relevant in influencing adoption patterns. Psychological inhibitors must be addressed, and perceptions of value must be enhanced to promote sustainable IoT product adoption. Such insights have significant implications for businesses, policymakers, and marketers who wish to enhance sustainable consumption within the ever-increasing digital landscape.

This research presents several limitations, primarily related to the sample size and structure, mainly consisting of young individuals aged 18–25, which may not fully represent older populations with potentially different levels of technology readiness; therefore, different age groups may exhibit distinct characteristics. The geographical location of the respondents may also be a limitation since there are regions with different technological infrastructures. For future research, we aim to evaluate changes in purchasing behaviour over time using longitudinal studies and include a more diverse sample to increase the generalizability of the results and explore possible mediators that could provide a more nuanced understanding of the factors influencing sustainable consumption.

Appendix

Table A1. Constructs, items and scales

Construct	Items	Code	Scale
Technology readiness	“New technologies contribute to a better quality of life”	TECHRED1	Parasuramann and Colby (2015)
	“Technology gives me more freedom of mobility”	TECHRED2	
	“Technology gives people more control over their daily lives”	TECHRED3	
	“Technology makes me more productive in my personal life”	TECHRED4	
	“Other people come to me for advice on new technologies”	TECHRED5	
	“In general, I am among the first in my circle of friends to acquire new technology when it appears”	TECHRED6	
	“I can usually figure out new high-tech products and services without help from others”	TECHRED7	
	“I keep up with the latest technological developments in my areas of interest”	TECHRED8	
	“When I get technical support from a provider of a high-tech product or service, I sometimes feel as if I am being taken advantage of by someone who knows more than I do”	TECHRED9	
	“Technical support lines are not helpful because they don’t explain things in terms I understand”	TECHRED10	
	“Sometimes, I think that technology systems are not designed for use by ordinary people”	TECHRED11	
	“There is no such thing as a manual for a high-tech product or service that’s written in plain language”	TECHRED12	
	“People are too dependent on technology to do things for them”	TECHRED13	
	“Too much technology distracts people to a point that is harmful”	TECHRED14	
	“Technology lowers the quality of relationships by reducing personal interaction”	TECHRED15	
	“I do not feel confident doing business with a place that can only be reached online”	TECHRED16	

(continued)

Table A1. Continued

Construct	Items	Code	Scale
Perceived value	“Sustainable products have an acceptable standard of quality”	PERCVAL1	Adapted from Suki (2016)
	“The sustainable product offers value for money”	PERCVAL2	
	“Buying a sustainable product would improve the way that I am perceived”	PERCVAL3	
	“Buying green products instead of conventional products would feel like making a good personal contribution to something better”	PERCVAL4	
	“I would buy the green product instead of conventional products under worsening environmental conditions”	PERCVAL5	
	“Before buying the product, I would obtain substantial information about the different makes and models of products”	PERCVAL6	
	“When I have a choice between two equal products, I purchase the one that is less harmful to other people and the environment”	PERCVAL7	
Attitude	“I am willing to buy a sustainable IoT product if I knew the added cost paid is for a better environment”	ATTI1	Adapted from Kazeminia et al. (2016) Adapted from Mostaghel and Chirumalla (2021)
	“I am willing to pay more for a sustainable IoT product today in exchange for possibly better experiences in the future”	ATTI2	
	“I am willing to pay more for a sustainable IoT as opposed to ‘regular’ product”	ATTI3	
	“I believe that my use of sustainable IoT products will benefit society, the environment, and the economy”	ATTI4	
	“I feel good about myself when I use sustainable products”	ATTI5	
	“I think sustainability is a meaningful exercise”	ATTI6	
	“I feel sad when I see how much the natural environment is spoiled”	ATTI7	
Purchase intention	“I believe that my use of sustainable IoT products will help improve the environment, society, and the economy”	ATTI8	Adapted from Malik et al. (2017)
	“I would prefer to purchase a sustainable IoT product over a regular product”	PINT1	
	“I am willing to purchase a sustainable IoT product for ecological reasons”	PINT2	
Purchase behaviour	“I would actively seek out sustainable IoT products in a store in order to purchase it”	PINT3	Adapted from Mostaghel and Chirumalla (2021)
	“I make a special effort to buy sustainable products”	PBV1	
	“I have switched products for sustainable reasons”	PBV2	
	“When I have a choice between two identical products, I purchase the one that is less harmful to the environment and society”	PBV3	

Source(s): Authors’ own creation

References

- Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211, doi: [10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T).
- Alcayaga, A., Wiener, M. and Hansen, E.G. (2019), "Towards a framework of smart-circular systems: an integrative literature review", *Journal of Cleaner Production*, Vol. 221, pp. 622-634, doi: [10.1016/j.jclepro.2019.02.085](https://doi.org/10.1016/j.jclepro.2019.02.085).
- Alrefai, A., ElBanna, R., Al Ghaddaf, C., Abu-AlSondos, A.I., Mahmoud Chehaimi, E. and Alnajjar, I.A. (2024), "The role of IoT in sustainable digital transformation: applications and challenges", *2024 2nd International Conference on Cyber Resilience (ICCR)*, IEEE, pp. 1-4, doi: [10.1109/ICCR61006.2024.10532884](https://doi.org/10.1109/ICCR61006.2024.10532884).
- Bibri, S.E. and Krogstie, J. (2017), "The core enabling technologies of big data analytics and context-aware computing for smart sustainable cities: a review and synthesis", *Journal of Big Data*, Vol. 4 No. 1, p. 38, doi: [10.1186/s40537-017-0091-6](https://doi.org/10.1186/s40537-017-0091-6).
- Camacho-Otero, J., Boks, C. and Pettersen, I.N., (2018), "Consumption in the circular economy: a literature review", *Sustainability*, Vol. 10 No. 8, p. 2758, doi: [10.3390/su10082758](https://doi.org/10.3390/su10082758).
- Cavalieri, A., Reis, J. and Amorim, M., (2021), "Circular economy and Internet of Things: mapping Science of case studies in the manufacturing industry", *Sustainability*, Vol. 13 No. 6, p. 3299, doi: [10.3390/su13063299](https://doi.org/10.3390/su13063299).
- Chaiken, S. and Maheswaran, D., (1994), "Heuristic processing can bias systematic processing: effects of source credibility, argument ambiguity, and task importance on attitude judgment", *Journal of Personality and Social Psychology*, Vol. 66 No. 3, pp. 460-473, doi: [10.1037/0022-3514.66.3.460](https://doi.org/10.1037/0022-3514.66.3.460).
- Chamberlin, L. and Boks, C., (2018), "Marketing approaches for a circular economy: using design frameworks to interpret online communications", *Sustainability*, Vol. 10 No. 6, p. 2070, doi: [10.3390/su10062070](https://doi.org/10.3390/su10062070).
- Chao, L. and Di, L. (2024), "Comparative analysis of digitalization and economic growth and relevant countermeasures", *Transformations in Business and Economics*, Vol. 23 No. 1, pp. 196-214.
- Chauhan, C., Parida, V. and Dhir, A., (2022), "Linking circular economy and digitalization technologies: a systematic literature review of past achievements and future promises", *Technological Forecasting and Social Change*, Vol. 177, 121508, doi: [10.1016/j.techfore.2022.121508](https://doi.org/10.1016/j.techfore.2022.121508).
- Chen, Y.S. and Chang, C.H. (2012), "Enhance green purchase intentions: the roles of green perceived value, green perceived risk, and green trust", *Management Decision*, Vol. 50 No. 3, pp. 502-520, doi: [10.1108/00251741211216250](https://doi.org/10.1108/00251741211216250).
- Cheng, C., Ren, X., Dong, K., Dong, X. and Wang, Z., (2021), "How does technological innovation mitigate CO2 emissions in OECD countries? Heterogeneous analysis using panel quantile regression", *Journal of Environmental Management*, Vol. 280, 111818, doi: [10.1016/j.jenvman.2020.111818](https://doi.org/10.1016/j.jenvman.2020.111818).
- Constantinescu, R. and Muntean, D.R. (2022), "Circular economy: adopting new green trends in marketing for a sustainable consumer experience based on Internet of Things", *Proceedings of the International Conference on Business Excellence*, Vol. 16 No. 1, pp. 1421-1433, doi: [10.2478/piche-2022-0132](https://doi.org/10.2478/piche-2022-0132).
- Cornesse, C., Blom, A.G., Dutwin, D., Krosnick, J.A., De Leeuw, E.D., Legleye, S., Pasek, J., Pennay, D., Phillips, B., Sakshaug, J.W., Struminskaya, B. and Wenz, A., (2020), "Review of conceptual approaches and empirical evidence on probability and nonprobability sample survey research", *Journal of Survey Statistics and Methodology*, Vol. 8 No.1, pp. 4-36, doi: [10.1093/jssam/smz041](https://doi.org/10.1093/jssam/smz041).
- Deng, X., (2013), "Factors influencing ethical purchase intentions of consumers in China", *Social Behavior and Personality: An International Journal*, Vol. 41 No. 10, pp. 1693-1703, doi: [10.2224/sbp.2013.41.10.1693](https://doi.org/10.2224/sbp.2013.41.10.1693).
- Engel, J.F., Kollat, D.T. and Blackwell, R.D. (1968), *Consumer Behavior*, Holt, Rinehart and Winston, New York.

- Etikan, I. (2020), "Comparison of convenience sampling and purposive sampling", *Journal of Theoretical & Applied Statistics*, Vol. 5 No. 1, p. 1, doi: [10.11648/j.ajtas.20160501.11](https://doi.org/10.11648/j.ajtas.20160501.11).
- Franco, P. (2023), "Older consumers and technology: a critical systematic literature review", *AMS Review*, Vol. 13 No. 1, pp. 92-121, doi: [10.1007/s13162-023-00256-4](https://doi.org/10.1007/s13162-023-00256-4).
- Gómez-Carmona, O., Casado-Mansilla, D., Kraemer, F.A., López-de-Ipiña, D. and García-Zubia, J., (2020), "Exploring the computational cost of machine learning at the edge for human-centric Internet of Things", *Future Generation Computer Systems*, Vol. 112, pp. 670-683, doi: [10.1016/j.future.2020.06.013](https://doi.org/10.1016/j.future.2020.06.013).
- Holopainen, J.M., Häyrynen, L. and Toppinen, A., (2014), "Consumer value dimensions for sustainable wood products: results from the Finnish retail sector", *Scandinavian Journal of Forest Research*, Vol. 29 No. 4, pp. 378-385, doi: [10.1080/02827581.2014.925138](https://doi.org/10.1080/02827581.2014.925138).
- Horwood, S., Anglim, J. and Mallawaarachchi, S.R., (2021), "Problematic smartphone use in a large nationally representative sample: age, reporting biases, and technology concerns", *Computers in Human Behavior*, Vol. 122, 106848, doi: [10.1016/j.chb.2021.106848](https://doi.org/10.1016/j.chb.2021.106848).
- Islam, S.M.R., Daehan Kwak, , Humaun Kabir, M., Hossain, M. and Kyung-Sup Kwak,(2015), "The Internet of Things for health care: a comprehensive survey", *IEEE Access*, Vol. 3, pp. 678-708, doi: [10.1109/ACCESS.2015.2437951](https://doi.org/10.1109/ACCESS.2015.2437951).
- Jung, H.J., Choi, Y.J. and Oh, K.W. (2020), "Influencing factors of Chinese consumers' purchase intention to sustainable apparel products: exploring consumer 'attitude-behavioral intention' gap", *Sustainability*, Vol. 12 No. 5, p. 1770, doi: [10.3390/su12051770](https://doi.org/10.3390/su12051770).
- Kazemina, A., Hultman, M. and Mostaghel, R., (2016), "Why pay more for sustainable services? The case of ecotourism", *Journal of Business Research*, Vol. 69 No. 11, pp. 4992-4997, doi: [10.1016/j.jbusres.2016.04.069](https://doi.org/10.1016/j.jbusres.2016.04.069).
- Kim, N. and Lee, K., (2023), "Environmental consciousness, purchase intention, and actual purchase behavior of eco-friendly products: the moderating impact of situational context", *International Journal of Environmental Research and Public Health*, Vol. 20 No. 7, p. 5312, doi: [10.3390/ijerph20075312](https://doi.org/10.3390/ijerph20075312).
- Kirchherr, J., Reike, D. and Hekkert, M., (2017), "Conceptualizing the circular economy: an analysis of 114 definitions", *Resources, Conservation and Recycling*, Vol. 127, pp. 221-232, doi: [10.1016/j.resconrec.2017.09.005](https://doi.org/10.1016/j.resconrec.2017.09.005).
- Korohodova, O., Moiseienko, T., Hlushchenko, Y. and Chernenko, N. (2024), "Ukraine's green economy growth in the context of industry 4.0: challenges and solutions", *Ekonom*, Vol. 103 No. 2, pp. 24-44, doi: [10.15388/Ekon.2024.104.2.2](https://doi.org/10.15388/Ekon.2024.104.2.2).
- Kotler, P. and Keller, K.L. (2016), *Marketing Management*, 15th ed., Pearson Education.
- Leonidou, L.C., Leonidou, C.N. and Kvasova, O., (2010), "Antecedents and outcomes of consumer environmentally friendly attitudes and behaviour", *Journal of Marketing Management*, Vol. 26 Nos. 13-14, pp. 1319-1344, doi: [10.1080/0267257X.2010.523710](https://doi.org/10.1080/0267257X.2010.523710).
- Lieder, M. , Asif, F.M.A., Rashid, A., Mihelić, A. and Kotnik, S., (2018), "Towards circular economy implementation in manufacturing systems using a multi-method simulation approach to link design and business strategy", *The International Journal of Advanced Manufacturing Technology*, Vol. 93 No. 9, pp. 2681-2706, doi: [10.1007/s00170-017-0610-9](https://doi.org/10.1007/s00170-017-0610-9).
- Lin, J.S.C. and Chang, H.C., (2011), "The role of technology readiness in self-service technology acceptance", *Managing Service Quality: An International Journal*, Vol. 21 No. 4, pp. 424-444, doi: [10.1108/09604521111146289](https://doi.org/10.1108/09604521111146289).
- Lin, C.H., Shih, H.Y. and Sher, P.J., (2007), "Integrating technology readiness into technology acceptance: the TRAM model", *Psychology and Marketing*, Vol. 24 No. 7, pp. 641-657, doi: [10.1002/mar.20177](https://doi.org/10.1002/mar.20177).
- Lobont, O.-R., Criste, C., Bovary, C. and Țăran, A.-M. (2025), "Settling the debate: does digitalisation impact the economic growth in the European Union member states?", *Technological and Economic Development of Economy*, Vol. 31 No. 4, pp. 980-1007, doi: [10.3846/tede.2025.22576](https://doi.org/10.3846/tede.2025.22576).
- Malik, C., Singhal, N. and Tiwari, S. (2017), "Antecedents of consumer environmental attitude and intention to purchase green products: moderating role of perceived product necessity",

- Martínez, I. , Zalba, B., Trillo-Lado, R., Blanco, T., Cambra, D. and Casas, R., (2021), "Internet of Things (IoT) as sustainable development goals (SDG) enabling technology towards smart readiness indicators (SRI) for university buildings", *Sustainability*, Vol. 13 No. 14, p. 7647, doi: [10.3390/su13147647](https://doi.org/10.3390/su13147647).
- Mostaghel, R. and Chirumalla, K., (2021), "Role of customers in circular business models", *Journal of Business Research*, Vol. 127, pp. 35-44, doi: [10.1016/j.jbusres.2020.12.053](https://doi.org/10.1016/j.jbusres.2020.12.053).
- Parasuraman, A., (2000), "Technology Readiness Index (TRI): a multiple-item scale to measure readiness to embrace new technologies", *Journal of Service Research*, Vol. 2 No. 4, pp. 307-320, doi: [10.1177/109467050024001](https://doi.org/10.1177/109467050024001).
- Parasuraman, A. and Colby, C.L., (2015), "An updated and streamlined technology readiness index: TRI 2.0", *Journal of Service Research*, Vol. 18 No. 1, pp. 59-74, doi: [10.1177/1094670514539730](https://doi.org/10.1177/1094670514539730).
- Parra, D.T., Talero-Sarmiento, L.H., Ortiz, J.D. and Guerrero, C.D. (2021), "Technology readiness for IoT adoption in Colombian SMEs", *2021 16th Iberian Conference on Information Systems and Technologies (CISTI)*, IEEE, pp. 1-6. doi: [10.23919/CISTI52073.2021.9476499](https://doi.org/10.23919/CISTI52073.2021.9476499).
- Pisitsankhakharn, R. and Vassanadumrongdee, S., (2020), "Enhancing purchase intention in the circular economy: an empirical evidence of remanufactured automotive product in Thailand", *Resources, Conservation and Recycling*, Vol. 165, 104702, doi: [10.1016/j.resconrec.2020.104702](https://doi.org/10.1016/j.resconrec.2020.104702).
- Porter, C.E. and Donthu, N., (2008), "Cultivating trust and harvesting value in virtual communities", *Management Science*, Vol. 54 No. 1, pp. 113-128, doi: [10.1287/mnsc.1070.0765](https://doi.org/10.1287/mnsc.1070.0765).
- Potkány, M., Neykov, N., Streimikis, J. and Lesníková, P. (2024), "Circular economy efficiency in the context of waste management in the selected Central and Eastern European countries – evidence from DEA and fractional regression analysis", *Economics and Sociology*, Vol. 17 No. 3, pp. 175-195, doi: [10.14254/2071-789X.2024/17-3/10](https://doi.org/10.14254/2071-789X.2024/17-3/10).
- Prothero, A. , Dobscha, S., Freund, J., Kilbourne, W.E., Luchs, M.G., Ozanne, L.K. and Thøgersen, J. (2011), "Sustainable consumption: opportunities for consumer research and public policy", *Journal of Public Policy and Marketing*, Vol. 30 No. 1, pp. 31-38, doi: [10.1509/jppm.30.1.31](https://doi.org/10.1509/jppm.30.1.31).
- Rahmani, H., Shetty, D., Wagih, M., Ghasempour, Y., Palazzi, V., Carvalho, N.B., Correia, R., Costanzo, A., Vital, D., Alimenti, F., Kettle, J., Masotti, D., Mezzanotte, P., Roselli, L. and Grosinger, J. (2023), "Next-generation IoT devices: sustainable eco-friendly manufacturing, energy harvesting, and wireless connectivity", *IEEE Journal of Microwaves*, Vol. 3 No. 1, pp. 237-255, doi: [10.1109/JMW.2022.3228683](https://doi.org/10.1109/JMW.2022.3228683).
- Rejeb, A. , Suhaiza, Z., Rejeb, K., Seuring, S. and Treiblmaier, H., (2022), "The Internet of Things and the circular economy: a systematic literature review and research agenda", *Journal of Cleaner Production*, Vol. 350, 131439, doi: [10.1016/j.jclepro.2022.131439](https://doi.org/10.1016/j.jclepro.2022.131439).
- Reynolds, Simintiras, A.C. and Diamantopoulos, A., (2003), "Theoretical justification of sampling choices in international marketing research: key issues and guidelines for researchers", *Journal of International Business Studies*, Vol. 34 No. 1, pp. 80-89, doi: [10.1057/palgrave.jibs.8400000](https://doi.org/10.1057/palgrave.jibs.8400000).
- Roy, S., Lassar, W.M. and Butaney, G. (2014), "The mediating impact of stickiness and loyalty on word-of-mouth promotion of technology readiness: a consumer perspective", *Journal of Business Research*, Vol. 67 No. 5, pp. 839-847, doi: [10.1108/EJM-04-2013-0193](https://doi.org/10.1108/EJM-04-2013-0193).
- Schwanholz, J. and Leipold, S., (2020), "Sharing for a circular economy? An analysis of digital sharing platforms' principles and business models", *Journal of Cleaner Production*, Vol. 269, 122327, doi: [10.1016/j.jclepro.2020.122327](https://doi.org/10.1016/j.jclepro.2020.122327).
- Shevchenko, T., Saidani, M., Ranjbari, M., Kronenberg, J., Danko, Y. and Laitala, K., (2023), "Consumer behaviour in the circular economy: developing a product-centric framework", *Journal of Cleaner Production*, Vol. 384 No. 2, 135568, doi: [10.1016/j.jclepro.2022.135568](https://doi.org/10.1016/j.jclepro.2022.135568).
- Shirvani, M.H. and Masdari, M., (2023), "A survey study on trust-based security in Internet of Things: challenges and issues", *Internet of Things*, Vol. 21, 100640, doi: [10.1016/j.iot.2022.100640](https://doi.org/10.1016/j.iot.2022.100640).

- Solomon, M.R. (2018), *Consumer Behavior: Buying, Having, and Being*, 12th ed., Pearson.
- Stahel, W.R. and MacArthur, E. (2016), "The circular economy. A User's Guide", *Nature*, Vol. 531, pp. 435-438, doi: [10.4324/9780429259203](https://doi.org/10.4324/9780429259203).
- Suki, N.M. (2016), "Green product purchase intention: impact of green brands, attitude, and knowledge", *British Food Journal*, Vol. 118 No. 12, pp. 2893-2910, doi: [10.1108/BFJ-06-2016-0295](https://doi.org/10.1108/BFJ-06-2016-0295).
- Tuyet, T.T. and Tuan, N.M., (2019), "The relationships of technology readiness, perceived value, satisfaction, and continuance intention – a study of self-service technologies in Viet Nam", *Science and Technology Development Journal: Economics-Law and Management*, Vol. 3, pp. SI24-SI34, doi: [10.32508/stdjelm.v3iSI.608](https://doi.org/10.32508/stdjelm.v3iSI.608).
- Venkatesh, V., Thong, J.Y. and Xu, X., (2012), "Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology", *MIS Quarterly*, Vol. 36 No. 1, pp. 157-178, doi: [10.2307/41410412](https://doi.org/10.2307/41410412).
- Vy, P.D., Dinh, T., Vu, L.T. and Pham, L., (2022), "Customers' perceived value, satisfaction, and loyalty in online securities trading: do moderating effects of technology readiness matter?", *International Journal of E-Services and Mobile Applications*, Vol. 14 No. 1, pp. 1-24, doi: [10.4018/IJESMA.295962](https://doi.org/10.4018/IJESMA.295962).
- Welsch, H. and Kühling, J. (2010), "Determinants of pro-environmental consumption: the role of reference groups and routine behavior", *Ecological Economics*, Vol. 69 No. 1, pp. 166-176, doi: [10.1016/j.ecolecon.2009.08.009](https://doi.org/10.1016/j.ecolecon.2009.08.009).
- Xia, Y. and Yang, Y., (2019), "RMSEA, CFI, and TLI in structural equation modeling with ordered categorical data: the story they tell depends on the estimation methods", *Behavioral Research*, Vol. 51 No. 1, pp. 409-428, doi: [10.3758/s13428-018-1055-2](https://doi.org/10.3758/s13428-018-1055-2).
- Yieh, K., Chen, J.S. and Wei, M.B., (2012), "The effects of technology readiness on customer perceived value: an empirical analysis", *Journal of Family and Economic Issues*, Vol. 33 No. 2, pp. 177-183, doi: [10.1007/s10834-012-9314-3](https://doi.org/10.1007/s10834-012-9314-3).
- Zhang, Y., Xiao, C. and Zhou, G., (2020), "Willingness to pay a price premium for energy-saving appliances: role of perceived value and energy efficiency labeling", *Journal of Cleaner Production*, Vol. 242, 118555, doi: [10.1016/j.jclepro.2019.118555](https://doi.org/10.1016/j.jclepro.2019.118555).
- Zhao, Q., Su, C.-W., Pirtea, M.P. and Costea, F. (2024), "Is technological innovation a push for trade friction?", *Economic Research – Ekonomska Istraživanja*, Vol. 37 No. 1, 2170901, doi: [10.1080/1331677X.2023.2170901](https://doi.org/10.1080/1331677X.2023.2170901).

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