

Promoting textile product repair services in the European setting: do emotions shape consumers' evaluations?

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ABSTRACT

Promoting repair services as a viable alternative to disposal is a desirable approach to sustainable consumption. Grounding on the Stimulus-Organism-Response (S-O-R) model, this work explores the role of emotions, both positive (happiness) and negative (anger and sadness) in triggering textile product repair, its antecedents and outcomes, understanding the interplay between emotional responses and cognitive evaluations in shaping pro-environmental behaviors. A laboratory experiment adopting facial micro-expression analysis and a survey study on final consumers confirm that leveraging emotions, especially negative ones, boosts intention to repair and positively impacts consumers' evaluation of the practice. The study further contributes to the Right-to-Repair literature by depicting the antecedents and outcomes of repair intention in the European setting, where laws regulating repair have been recently introduced. Implications for practitioners and policymakers are provided.

1. Introduction

Environmental sustainability is increasingly attracting the attention of both governments and consumers, urging collective actions (Shang and Wu, 2022; Chao, 2022; Xu et al., 2022). Among the most polluting sectors in Europe, the textile industry stands out for its significant environmental impact.¹ Clothing consumption is expected to increase by 63 % by 2030, partly driven by a trend of overconsumption (Diddi et al., 2019), with less than 1 % of textile waste recycled, indicating a potentially escalating environmental burden.² In response, the EU has developed strategies since 2020 for sustainable and circular textiles. These initiatives focus on improving production and consumption processes, encouraging sustainable fashion, and enhancing the durability, reparability, reuse, and recyclability of textile products.³ Moreover, governmental efforts are increasingly directed at educating consumers to make more sustainable purchasing decisions (Chao, 2022; Forti et al., 2020; Parajuly et al., 2019; Joshi and Rahman, 2017).

In Europe, the recent approval of the EU's Directive on Repair of

Goods⁴ and further regulations, such as the Ecodesign for Sustainable Products Regulation of July 2, 024,⁵ aim at improving repair rights, guaranteeing consumers access to spare parts, tools and repair information from companies. At the same time, growing interest in sustainability has led many companies to launch initiatives focused on extending the life of textile products. Increasingly, manufacturers are offering professional repair services—ranging from door-to-door options to mail-in repairs. For example, Patagonia not only provides DIY repair kits but also offers repair services in their stores or through mail, often at no cost. Product repair plays a crucial role in the circular economy, and its importance continues to grow as it helps extend product lifespan, minimizes waste by restoring the product functions and thus improves resource management (Boldoczki et al., 2020). Furthermore, product repair is a cost-effective strategy that can be easily integrated into existing commercial systems, typically requiring only minimal adjustments to production processes (Boldoczki et al., 2020; Richards and Allenby, 1994). Repair is usually associated with both physical and psychological obsolescence, which stems from shifting trends or the

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¹ ETC/CE Report 2/2022. Textiles and the environment: the role of design in Europe's circular economy <https://www.cscp.org/wp-content/uploads/2022/03/ETC-Design-of-Textiles.pdf>.

² European Commission. Source: https://environment.ec.europa.eu/strategy/textiles-strategy_en.

³ EU strategy for sustainable and circular textiles. European Commission. Source: https://environment.ec.europa.eu/publications/textiles-strategy_en.

⁴ Directive on repair of goods. Source: https://commission.europa.eu/law/law-topic/consumer-protection-law/directive-repair-goods_en.

⁵ Ecodesign for Sustainable Products Regulation. Source: https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/product-s-labelling-rules-and-requirements/ecodesign-sustainable-products-regulation_en.

desire for newness (van Nes and Cramer, 2005). Since most products today are discarded rather than reintegrated into the circular economy, incentivizing consumers toward repair is a key priority (Poppelaars et al., 2020).

Existing research has delved into the cognitive mechanisms driving consumer's intention to repair, but there remains a substantial research gap in understanding the affective side of this decision (Maduku, 2024; Marikyan and Papagiannidis, 2024). Emotions have a decisive role in shaping consumption behavior, particularly in sustainable consumption choices (Chao and Yu, 2023), where rational evaluations only partially account for consumer purchasing patterns (Moons and de Pelsmacker, 2012). While previous research has already acknowledged the affective drivers of sustainable behaviors (e.g. Berki-Kiss and Menrad, 2022), the emotional drivers of repair intentions and related consumer responses are still largely unexplored, as underlined by recent calls for research (Marikyan and Papagiannidis, 2024). This includes the identification of the emotions, both positive (as happiness) and negative (as anger and sadness), and how they interact with cognitive evaluations to shape pro-environmental actions.

To bridge this gap, the current work grounds on the Stimulus-Organism-Response (S-O-R), a suitable model to assess drivers of sustainable behaviors (e.g. Zheng et al., 2019) and to account for the emotional impact on the purchasing process (Sherman et al., 1997). Building on the recent work of Marikyan and Papagiannidis (2024), this study explores the influence of emotions on product repair intention and their related outcomes, integrating cognitive and affective components in decision-making processes. Diverging from earlier studies that mainly relied on explicit self-reports to assess emotions (Smith and Lazarus, 1990), this paper employs an implicit measurement approach through facial micro-expression analysis. Central to theories of emotion (De la Torre and Cohn, 2011; Tian et al., 2001), facial expression analysis has proven effective in assessing emotional responses less affected by social desirability bias (Bettiga and Lamberti, 2020; Döllinger et al., 2021), a common issue in studies involving sustainable behaviors where participants might feel pressured to respond in socially approved manners (Cerri et al., 2019; Chéron et al., 2022; Durmaz et al., 2023).

This study makes three contributions to research. First, it explores the factors that motivate consumers to choose product repair and the outcomes of this choice by accounting for the emotional dimension, which has been previously underexplored yet recognized as crucial for fostering sustainable behaviors (Brosch and Steg, 2021; Schneider and an der Linden, 2023). By applying the S-O-R, this paper advances the understanding of repair intentions and contributes to extant the literature on sustainable behaviors and the Right-to-Repair (Jin et al., 2023; Roskladka et al., 2023) emphasizing the experiential perspective of consumer decision-making. In doing so, this paper addresses a notable gap in the literature on sustainable consumption, which calls for techniques to evaluate implicit consumer reactions to minimize biases inherent in self-reported data (Neubig and Roosen, 2024). Second, while prior research has mainly focused on electronic devices as primarily addressed by the Right-to-Repair law (Sonego et al., 2022; Svensson-Hoglund et al., 2021), the present study extends this focus to textile products, which exhibit a significant environmental impact but are still underexplored. Plus, these products may exhibit a relevant impact on consumers' affective evaluations, as they are closely tied to self-perception and identity (Hossain et al., 2025). Third, this research explores the drivers of repair within the European context, where there is heightened sensitivity to sustainability issues (Ricciolini et al., 2022). This region has recently felt the effects of the Right-to-Repair movement alongside other sustainability-oriented legislative efforts. Accordingly, this study adds to the ongoing research that examines the changes brought by new sustainability legislation (Hummel and Jobst, 2024). Through the examination of emotions' influence on the intention to repair, this study seeks to make a significant contribution to managerial practice and policymakers by offering insights into how emotional factors can be leveraged to promote and facilitate the usage of repair

services by consumers. Specifically, it suggests strategies that could prompt consumers towards repair, highlighting which emotions could be leveraged through corporate and institutional communication campaigns.

2. Literature review and hypotheses

2.1. Emotions in repair choices

Emotions constitute key drivers of purchasing decisions (Di Muro and Murray, 2012; Schoefer and Diamantopoulos, 2008). This is confirmed when consumers approach ethical or sustainable decisions as they are not processed exclusively through mere deliberation (Carrus et al., 2008; Berki-Kiss and Menrad, 2022; Joshi and Rahman, 2019; Liang et al., 2019). Recent works have confirmed the significant impact of emotions on consumers' intention toward sustainable consumption (Maduku, 2024) and specifically toward product repair (Mrad et al., 2025). In repair decisions, emotional drivers often outweigh cognitive factors, with recycling behavior especially driven more by emotions than cognition (Meneses, 2010). Repairing goods enhances feelings such as empowerment because consumers feel control over their products (Bradley and Persson, 2022). Furthermore, research revealed a "virtuous ethical cycle" where positive emotions lead to more ethical consumer actions, in turn resulting in more positive post-decision emotions and reinforced future ethical intentions (Escadas et al., 2020). On the other hand, adverse psychological reactions may occur if consumers feel an obligation to behave sustainably. For instance, Psychological Reactance Theory indicates individuals might react negatively when they perceive a threat to their freedom (Brehm and Brehm, 2013; Rosenberg and Siegel, 2018). Hence, repair mandates may also cause negative consumer responses, as reactance is likely to take place when faced with obligatory choices (Kwon and Ahn, 2021). When consumers evaluate product consumption, they anticipate the emotions the product usage may generate (Chang, 2016). Immediate emotional responses are triggered by the anticipation of future events (Bagozzi et al., 2016; Baumgartner et al., 2008). Emotions are linked to these immediate and instinctive reactions (Bettiga and Lamberti, 2020; Carrera et al., 2012) which may significantly impact intentions and goal-directed behavior.

Among the diverse emotions consumers may experience, happiness, anger and sadness stand out as particularly influential predictors of sustainable consumption decisions (Escadas et al., 2023; Harth et al., 2013; Lowe et al., 2019; Wang and Wu, 2016). These emotions, part of Ekman's seven basic emotions, are universal responses that are distinguished from each other by their unique characteristics (Celeghin et al., 2017). Happiness is connected to consumer ethical behaviors, positive post-decision emotions, and future ethical behavioral intentions (Escadas et al., 2020). It is not only connected to consumers' ethical decisions but even a prerequisite for them, in terms of ethical awareness, ethical judgment, ethical intention and ethical behavior (Escadas et al., 2023). Moreover, when consumers are exposed to positive emotional stimuli, green purchasing behaviors are positively influenced, impacting future thoughts and actions (Fredrickson, 1998). Anger is the emotional response linked to violations of the ethics of individuals, such as abuses of individual rights (Rozin et al., 1999), and tends to promote active behaviors, like attacking the cause of the violation (Hutcherson and Gross, 2011). In terms of sustainable behavior, anger is found to encourage consumers toward ethical purchasing practices (Jin et al., 2020; Klemm and Kaufman, 2024). Sadness is the emotional response emerging from the perception of failure in achieving an intended goal and the feeling of not being able to restore the present capabilities (Frijda, 1986). Sadness leads individuals to engage in more analytical evaluations, reducing the occurrence of cognitive biases, and thus improving judgment (Forgas, 1998; Forgas et al., 2005). Overall, negative emotions elicit a greater concern for the environment and the willingness to engage in environmentally friendly actions (Lowe et al., 2019). Building on this foundation, this paper proposes that the

emotions of happiness, sadness, and anger act as drivers in the decision-making process related to product repair, serving as affective states that shape cognitive evaluations (Bagozzi et al., 2016; Bettiga and Lamberti, 2020; Carrera et al., 2012). Since these emotions are visceral and arise without conscious effort, this study assumes they function as moderators of subsequent cognitive elaboration.

2.2. Stimulus-Organism-Response model in product repair

To explore the impact of emotions on product repair and related outcomes, the present paper draws on the Stimulus-Organism-Response (S-O-R) model, which has been extensively validated as a framework for assessing the drivers of sustainable behaviors (Zheng et al., 2019). While various extant theories address sustainable consumer behavior, they focus predominantly on the cognitive aspects of decision-making. The Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975), a behavioral psychology foundation theory, addresses attitude and social norms as drivers of behavioral intentions. The Theory of Planned Behaviors (TPB) (Ajzen, 1991), its successor, primarily focuses on rational decision-making processes through the assessment of attitudes, perceived behavioral control and subjective norms as drivers of intention. Similarly, the Technology Acceptance Model (TAM) (Davis, 1989), explains intentions and behaviors grounded on perceived usefulness and ease of use. These models thus may not fully capture the affective drivers of consumer behaviors, especially relevant for pro-environmental actions (e.g. Meneses, 2010). In contrast, the S-O-R model recognizes the emotional influences, such as the affective attachment to products (White et al., 2019). This approach facilitates a more comprehensive evaluation of sustainable behaviors by integrating both cognitive evaluations and emotional responses, making it particularly effective in situations where emotions influence intentions, such as in pro-environmental consumer behavior. According to this model, stimuli

(S) impact an individual's internal state (Eroglu et al., 2003; Gao and Bai, 2014; Houston and Rotschild, 1977; Zheng et al., 2019). Stimuli can be of a wide variety, ranging from elements connected to products or services to those linked to the social-psychological context of purchasing or consumption (Bagozzi, 1986; Houston and Rotschild, 1977). The organism (O) refers to the person's internal experience, characterized by both cognitive states, meaning elaboration of the external information, and emotional states (Houston and Rotschild, 1977). The responses (R) refer to the cognitive, psychological and behavioral reactions processed by the organism, which manifest in outcomes such as repeat behavior or purchase decisions (Bagozzi, 1986; Houston and Rotschild, 1977; Jang and Namkung, 2009). This study adapts and extends the framework developed by Marikyan and Papagiannidis (2024), applying it to the context of product repair. In the proposed model, the stimuli consist of external factors influencing repair behavior—namely, social factors, technical repair factors and beliefs about the legislation. Intention to repair is represented by the organism while the responses encompass outcomes at the personal, organizational, and technological levels. Fig. 1 presents the conceptual model, illustrating the relationships among stimuli, organism, and responses.

Among stimuli, social factors include subjective norms, herd behavior and social image. These are the reflection of the beliefs shaped by the society in which the individual interacts, but also the desired image that an individual would like to have of himself (Bursztyn and Jensen, 2017; Scharfstein and Stein, 1990). Subjective norms represent the individual's perceptions of the social pressure to perform a certain behavior (Ajzen, 1991). Individuals are motivated to act if their referent group approves it, hence consumers might be encouraged to repair a product if their close circle incentivizes such behavior. More broadly, herd behavior refers to the alignment of one's behavior with the actual behavior of other people (Raafat et al., 2009). Here consumers tend to conform to the societal norms and behaviors accepted and adopted by

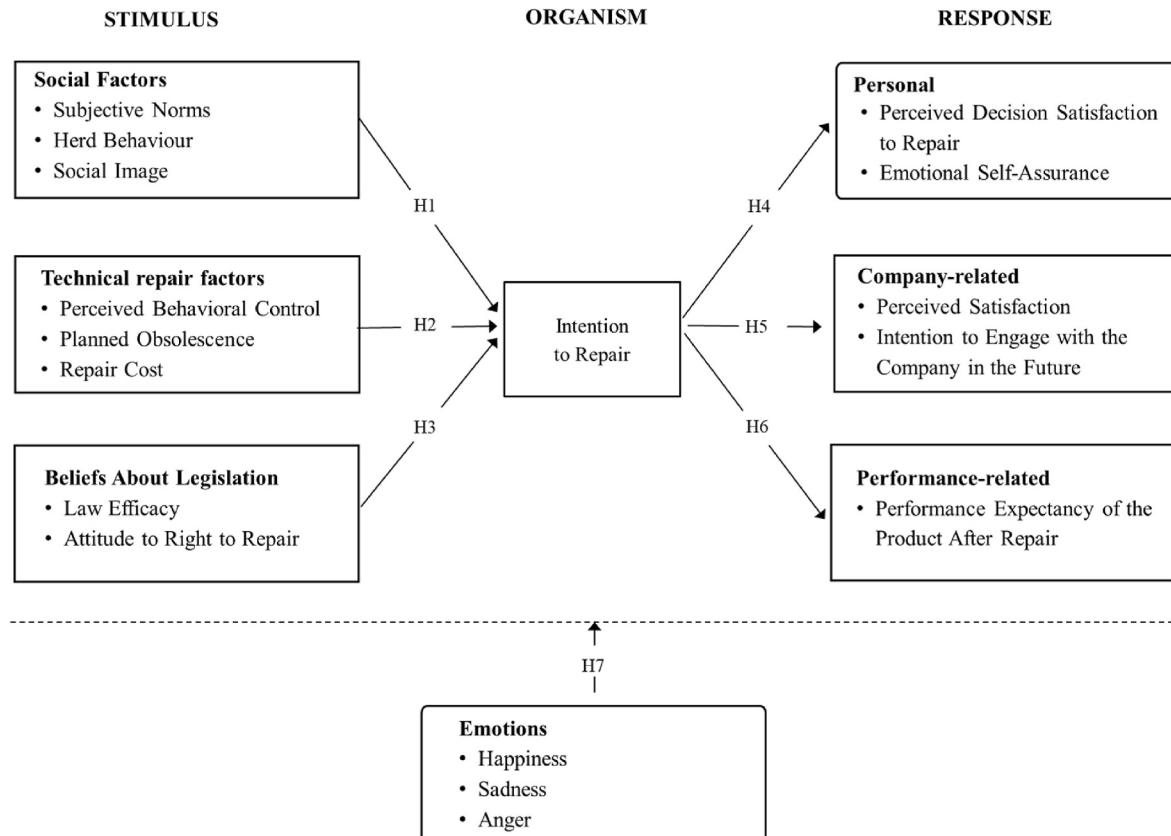


Fig. 1. Conceptual model.

the wider public and imitate others in their decision-making (Ali et al., 2021; Su et al., 2023). This is the case of pro-environmental actions, where the societal impact may incentivize individual sustainable actions. Furthermore, consumers may adjust their consumption to align with socially desirable norms, aiming to be viewed favorably by others (Touré-Tillery et al., 2022). The social image reflects the extent to which certain behaviors help achieve respect and admiration in social groups (Lin and Bhattacharjee, 2010). Being recognized as environmentally friendly can influence the intention to engage in product repair practices. Factors such as perceived behavioral control, planned obsolescence, and repair costs involve rational evaluations of the resources available for product repair. The extent to which consumers perceive they have control over repair practices is known as perceived behavioral control and it is positively related to the intention to repair. Indeed, acknowledging personal abilities to perform a behavior incentivizes the intention to undertake this behavior (Ajzen, 1991). Planned obsolescence refers to the perception that a product will shortly become obsolete (Levinthal and Purohit, 1989). Contrary to expectations, the perception of planned product obsolescence was found to have a significant and positive effect on repair intention (Marikyan and Papagiannidis, 2024), suggesting that repair can anyway prolong the lifespan of the product. Repair cost constitutes instead a detractor, representing the financial cost (monetary) and non-financial costs (mental effort to accomplish the behavior, time spent) associated with repair (Nadro et al., 2024). Therefore, it impacts negatively the intention to repair. Lastly, beliefs about legislation include both law efficacy, which refers to individuals' beliefs about legislation effectiveness, and attitude towards the right to repair, which is a proxy of the behavior (Dwivedi et al., 2019), thus positively related to the intention to repair. Indeed, when consumers trust in the efficacy of government actions, they are more likely to participate in activities that improve the well-being of their community, confident that their efforts can achieve meaningful results (Mak and Terryn, 2020).

Moving to the Organism, the intention to repair refers to the cognitive acceptance of the behavior, thus the consumers' disposition to engage in repair practices (Bhattacharjee and Sanford, 2009). This intention is positively related to consumer responses, including personal, company-related and performance-related outcomes. Among personal outcomes, the perceived decision satisfaction to repair and the emotional self-assurance, are both psychological reactions (Bagozzi, 1986) that are positively impacted by the intention to repair. Consumers with a strong intention to repair are more likely to feel satisfied with their decision post-repair and experience increased self-assurance as they perceive their goals being achieved (Gray et al., 2020). Regarding company-related outcomes, a higher intention to repair positively relates to increased satisfaction with the manufacturer and a greater likelihood of future interactions with the same company. Confidence in one's own decision increases the satisfaction related to the outcomes (Flavián et al., 2019) and expectations are determinants of consumer satisfaction in product repair services (Bearden and Teel, 1983). Finally, the intention to repair increases customers' perception of improved product performance post-repair (Marikyan and Papagiannidis, 2024), a performance-related outcome. In fact, consumers can expect that a fixed product will have better performance and the repair will improve its expected life. In that, consumer trust in the manufacturer and a reliable repair process with skilled employees can be of support (Lechner et al., 2024), spurring also continuous relationships with a Company (Hong et al., 2020). More formally, this paper proposes the following research hypotheses.

H1. Subjective norms (H1_a), herd behavior (H1_b), and social image (H1_c) each positively affect the intention to repair.

H2. Perceived behavioral control (H2_a) and planned obsolescence (H2_b) each positively affect the intention to repair. Perceived repair cost (H2_c) negatively affects the intention to repair.

H3. Perceived law efficacy (H3_a) and attitude towards the right to repair (H3_b) each positively affect the intention to repair.

H4. Intention to repair positively affects perceived satisfaction with repair (H4_a) and emotional self-assurance (H4_b).

H5. Intention to repair positively affects perceived satisfaction with the manufacturer (H5_a) and intention to engage with the company (H5_b).

H6. Intention to repair positively affects performance expectancy after repair.

H7. Happiness (H7_a), sadness (H7_b) and anger (H7_c) each moderate the repair decision-making process.

3. Study 1

To test the proposed hypotheses, a first pilot study was conducted to validate visual stimuli designed to induce the emotions of happiness, sadness, and anger in consumers. These stimuli were later used in the subsequent study. The pilot study employed implicit emotional measures to minimize the influence of biases commonly associated with self-reported data on sustainable behaviors (Chéron et al., 2022; Durmaz et al., 2023).

3.1. Visual stimuli development

Three emotionally evocative video stimuli were developed, each composed of a sequence of images centered on environmental themes. Visual stimuli have been shown to be effective in eliciting emotional engagement (Maceachren and Brewer, 2004; Poškus et al., 2019) and are frequently used in implicit measurement techniques such as facial expression analysis (Adyapady and Annappa, 2023). In the present study, this approach was selected over self-reported measures due to the well-documented tendency of participants to withhold emotional expressions when asked explicitly—particularly in contexts like sustainability, where social norms and the desire to appear environmentally responsible often shape responses (Cerri et al., 2019; Chéron et al., 2022; Durmaz et al., 2023). By contrast, facial expression analysis offers a more ecologically valid means of capturing emotional responses, especially when participants may be unaware of, or reluctant to verbalize, their genuine affective states or when they are induced to describe stimuli in terms of common stereotypes (Franěk et al., 2022). Prior research reveals that facial micro-expressions are a reliable method to detect genuine emotions, being subtle, involuntary movements responding to external stimuli without the subject's control (Saffaryazdi et al., 2022).

Each stimulus lasted 30 s, in line with prior research on emotional elicitation (Ménard et al., 2015), and presented sequential images addressing environmental issues like polluted oceans, deforestation and wildfires, meant to capture attention related to pro-environmentalism (Larson and Edsall, 2010; O'Neill and Smith, 2014). The videos also included auditory cues, which are known to enhance emotional involvement (Carlson et al., 2006; Siedlecka and Denson, 2019). Video A was designed to evoke happiness, featuring scenes of community conservation efforts, playful animals, and social gatherings, all set to cheerful music (Chen et al., 2021). Video B aimed to elicit sadness through somber imagery of destroyed habitats, endangered species, and pervasive plastic waste, underscored by slow, melancholic music. Here, the desire to maintain composure may inhibit participants from expressing the full depth of their reaction verbally. Finally, Video C sought to elicit anger, with scenes of industrial pollution, wildfires, and deforestation, intensified by aggressive music. The emotional experience was further intensified using color backgrounds: red for anger, yellow for joy, and blue-purple for sadness (Damiano et al., 2023; Jonauskaite et al., 2020).

3.2. Experimental procedure and measures

The experiment involved 22 participants, 11 males and 11 females, all of Italian nationality and aged between 22 and 64, with a mean age of 28. These participants were recruited from the university where the study was conducted, aligning with sample sizes used in prior research on facial expression analysis (Yan et al., 2013). To ensure clarity in detecting facial expressions, individuals with heavy facial hair or styles that obscured the mouth were excluded, and participants were advised to minimize any facial jewelry that could cover facial features. The participants gathered at a facility affiliated with a leading Italian university, where they received a briefing on the study's procedures and provided written informed consent. Each participant underwent the experiment in a controlled laboratory setting, seated in front of a 24-inch monitor with separators to prevent external distractions and wearing headphones to block out ambient noise. This controlled environment was chosen to maximize internal validity, ensuring that the observed effects could be attributed only to visual stimuli. The lighting was uniform with indirect frontal lighting. Throughout the study, facial expressions were recorded using a webcam (Logitech C920 HD Pro) at 30 frames per second, positioned at eye level to minimize any variation in face angle. Initially, participants were asked to watch a neutral grey image for 10 s and maintain a neutral facial expression. Subsequently, they watched the three videos (A-C) in randomized order. Instructions emphasized not touching their faces or allowing hair to obstruct their expressions, crucial for facial expression detection. Participants were also instructed not to interact with keyboards or other devices, ensuring their full attention on the videos. Each session lasted about 15 min and was conducted individually to reduce external influences.

Facial features were assessed using the frontal camera and analyzed with Noldus FaceReader 7.0. Data related to facial features was extracted only when lighting and the participants' head orientation met the General Face Model's minimum detection requirements. To account for individual differences in baseline expressions, a face model calibration was performed for each participant using a resting state face frame recorded at the start of the session. The recognition of expressions was performed employing the General Face Model with smoothing classifications through Noldus FaceReader analysis software. The software assigned intensity scores ranging from 0 (minimum) to 1 (maximum) to each frame, and expressions were considered relevant if they appeared within a 3-s latency window following the stimulus onset and exceeded a 0.1 intensity threshold, in line with previous research (Mandolfo et al., 2023). The analysis quantified the number of peaks exceeding this threshold for expressions of joy, anger, and sadness in each video. This approach aims to assess micro-expressions, which are brief, involuntary, and localized facial movements largely beyond participants' control. These micro-expressions have been effectively linked to corresponding emotional states (Skiendziel et al., 2019; Zhou et al., 2023).

3.3. Results of facial micro-expression analysis

As expected, the intensity of the emotions elicited varied, with neutral expressions frequently observed throughout the session. The number of emotional peaks (Table 1) indicated the predominant emotion triggered by each stimulus (Landmann, 2023; Lewinski et al., 2014; Lewinski, 2015). A Kruskal-Wallis test, followed by a Dunn test for each video, was conducted to determine whether statistically significant

differences existed among the number of peaks detected for each emotion. The results of the Kruskal-Wallis test (Table 2) confirmed significant differences between the peaks of happiness ($p < .001$), sadness ($p < .05$), and anger ($p < .01$). The results of the Dunn test (Table 3) further supported that the emotions elicited corresponded to those intended by the stimuli. Overall, these findings substantiated the effectiveness of the three visual stimuli in evoking the targeted emotions of happiness, sadness, and anger.

4. Study 2

4.1. Scenario development

Study 2 aimed to test the proposed conceptual model by examining the three emotion-eliciting conditions (happiness, sadness and anger) and their impact on product repair intentions and related outcomes. An online survey targeting Italian consumers served as the method for this experimental study. Online surveys were chosen for their efficiency, cost-effectiveness and reliability compared to face-to-face surveys. This approach also allowed for the replication of the research method used by Marikyan and Papagiannidis (2024) and enabled quick data collection from a wide and geographically diverse population.

In the survey, respondents were first presented with a product repair scenario, designed in line with prior research, simulating a familiar situation to elicit genuine answers (Xie et al., 2015). To minimize possible pre-existing affection, the scenario asked participants to imagine evaluating the repair of a non-branded backpack, thereby avoiding biases linked to prior brand experiences (Koenig-Lewis and Palmer, 2014). Among textile products, outdoor equipment—specifically backpacks—was selected, as this category enables consumers to independently assess product damage, with limited influence from cost, experience, or strong personal attachment. Furthermore, costs have been shown to influence repair intentions (Laitala et al., 2021) and backpacks typically have comparable costs for repair and replacement. Plus, backpacks are commonly used items, making them relatable to most consumers and they are more likely to experience frequent damage due to their exposure to external conditions, thereby making them appropriate for studying repair behaviors. Also, thanks to their characteristics, backpacks have been subject of several studies on sustainable behaviors (Mugge et al., 2005; Testa et al., 2022) and are central to innovative business models in the textile fashion industry (Todeschini et al., 2017). The following scenario was presented: "Imagine you have purchased a new backpack, suitable for both everyday use and hiking. Suppose that two years after your purchase, the backpack breaks. One of the shoulder straps tears significantly during a hike, making it uncomfortable and impractical to use. So, you visit the online site of the shop where you bought the backpack to look for a solution and see the following video, which proposes a repair option".

4.2. Procedure and sample

After the presentation of the product repair scenario, participants were randomly shown one of the three emotionally charged videos developed during the initial pilot study. At the end of each video, the option to repair the product was presented. This process simulated the exposure to an online advertisement for repair services. Subsequently, participants answered questions regarding their past behavior and engagement with the product category: the frequency of using repair

Table 1
Number of peaks detected for each visual stimulus.

Video stimuli	Emotion elicited	Number of peaks		
		Happiness	Sadness	Anger
A	Happiness	302	99	82
B	Sadness	143	318	176
C	Anger	20	132	305

Table 2
Kruskal-Wallis test results.

	Happiness	Sadness	Anger
Kruskal-Wallis H	16.340	8.990	9.121
df	2	2	2
Asymp. Sig. (p-value)	<0.001	0.011	0.002

Table 3
Dunn test results.

	Happiness			Sadness			Anger		
	1–2	1–3	2–3	1–2	1–3	2–3	1–2	1–3	2–3
Z	2.445	3.997	1.653	−2.987	−1.206	1.657	−1.958	−3.553	−1.676
Mean diff.	7.95 ^b	13.92 ^c	5.97	−10.95 ^b	−2.81	8.13 ^a	−4.70 ^a	−13.84 ^c	−9.14 ^a

Note.

^a $p < .05$.

^b $p < .01$.

^c $p < .001$.

services and their history of purchasing similar products. Intention to repair—a four-item construct (e.g., “I expect that I will repair the backpack instead of buying a new one”)—along with its underlying drivers and outcomes, was assessed using pre-validated 7-point Likert scales. These scales were adapted from established instruments in previous research, specifically those used in the study by Marikyan and Papagiannidis (2024), with adjustments made to fit the context of backpack products. Constructs such as environmental concern, environmental activism, and attachment to technology were omitted as they did not display a significant influence in the reference study, and neither are relevant to the present research context. Also, participants were informed about the Right-to-Repair initiative in Europe, highlighting the recently approved directive from April 2024. The complete list of measurement scales and items is provided in Appendix A. Finally, socio-demographic data were collected, including age, gender, level of education, nationality, occupation, household income, and place of residence. The questionnaire was translated into Italian, the native language of the participants. The data collection resulted in 330 complete responses over a sample of 363 total responses, aligning with sample sizes typical of prior works adopting PLS-SEM (Kallweit et al., 2014; Troebs et al., 2018). Appendix B reports the socio-demographic profile of the respondents.

4.3. Results

4.3.1. Common method variance

Common method variance can be a concern with self-reported questionnaires, as it reflects variance attributable to the measurement method rather than the underlying constructs. To minimize this issue, the order of the questions was randomized to prevent response bias due to question sequencing (Podsakoff et al., 2003). Moreover, the articulated relationships in the model reduced the likelihood that respondents could rely on a cognitive map when providing answers. To assess the presence of common method variance, the Variance Inflation Factor (VIF), a collinearity statistic for the inner model, was calculated. Results indicated that all VIFs were below the threshold of 3.3, indicating that the model can be considered free of common method bias (Kock, 2015). The results are detailed in Appendix C.

4.3.2. Mann-Whitney test

An initial analysis was conducted to evaluate the influence of emotions on the intention to repair, its drivers, and related outcomes. As a Shapiro-Wilk test indicated that the data for all constructs violated the assumption of normality ($p < .001$), a Mann-Whitney test was used to assess whether significant differences existed in the model constructs across the emotion-eliciting scenarios. This non-parametric test is especially advantageous when the data do not meet the requirements for a t -test, making the Mann-Whitney U test a preferable alternative (McKnight and Najab, 2010). Significant differences emerged across several variables depending on the emotional condition. Specifically, participants in the sadness condition reported significantly higher perceived repair costs ($U = 5109$, $p = .027$) and greater perceived planned obsolescence by companies ($U = 5196.5$, $p = .042$) compared to those in the happiness condition. No notable differences were observed

between the sadness and anger conditions. Regarding outcomes associated with the intention to repair, the sadness condition led to significantly higher emotional self-assurance ($U = 5159$, $p = .034$), greater perceived satisfaction with the manufacturer ($U = 5164$, $p = .035$), and higher performance expectancy ($U = 5166.5$, $p = .035$) than the happiness condition. Additionally, when comparing anger to happiness, participants in the anger condition perceived a higher degree of planned obsolescence ($U = 5154$, $p = .008$) and greater performance expectancy post-repair ($U = 5488$, $p = .046$). Taken together, negative emotions appear to prompt more negative evaluations of the company's practices, such as the imposition of repair costs and intentional product obsolescence. However, these emotions also lead to a greater emotional reward from repairing the product, along with greater expectations toward the repair outcome and the manufacturer facilitating the repair. This suggests that eliciting negative emotions may result in consumers who, facing the perceived greater effort of repair, anticipate satisfactory outcomes from the manufacturer's side. The full descriptive statistics are displayed in Table 4.

4.3.3. Measurement model evaluation

To test the conceptual model, Partial Least Square Structural Equation Model (PLS-SEM) was applied, as it allows for the analysis of complex relationships within a single model. PLS-SEM is particularly well-suited for this purpose, as it can deal with complex models without stringent assumptions about data distribution (Hair et al., 2011; Vinzi et al., 2010). It enables the estimation of latent variable scores as an exact linear combination of their associated manifest variables (Fornell and Bookstein, 1982), a feature that has led to its widespread adoption across several social science disciplines (Hair et al., 2012). Furthermore, PLS-SEM is more reliable and less susceptible to sample size than other methods, such as covariance-based SEM (Hair et al., 2011). The analysis was conducted using SmartPLS software version 4.1.0.6. The reliability and validity of the data were assessed through a Confirmatory Factor Analysis (CFA). Firstly, the reliability of the indicators was evaluated by examining the outer loadings, where each indicator must exceed a threshold of 0.6. All items were retained, as they met this criterion (Bagozzi and Yi, 1988; Hulland, 1999). Composite Reliability (CR) was employed as an alternative to Cronbach's Alpha for the assessment of consistency reliability, given that it is based on outer loadings and therefore provides more accurate values (Vinzi et al., 2010). All latent variables exceeded the CR threshold of 0.7 (Chin, 1998; Henseler et al., 2009; Werts et al., 1974). The average variance extracted (AVE) for each latent variable was above 0.5, indicating satisfactory results (Bagozzi and Yi, 1988; Chin, 1998; Hock and Ringle, 2010). Discriminant validity was assessed using the Fornell-Larcker criterion (Fornell and Larcker, 1981), confirming that the square root of the AVE exceeded its correlations with the other latent variables. The results are presented in Appendix D. Lastly, the heterotrait-monotrait correlation ratio (HTMT) confirmed that the constructs measured distinct concepts, with all analyses yielding satisfactory results. The model fit was evaluated using the standardized root mean square residual (SRMR) and the normed fit index (NFI), both of which are commonly used indicators in PLS-SEM for assessing the appropriateness of the overall model (Huang, 2021). The SMRM was 0.045, well below the 0.08 threshold, indicating a good fit

Table 4

Descriptive statistics for each variable across the three emotion-eliciting conditions.

Variable	Emotion-eliciting condition	Mean	Std. Dev.
Herd Behavior	Happiness	3.179	1.532
	Sadness	3.284	1.557
	Anger	3.430	1.565
Subjective Norms	Happiness	3.764	1.638
	Sadness	4.118	1.751
	Anger	4.042	1.725
Social Image	Happiness	4.802	1.424
	Sadness	4.820	1.475
	Anger	5.009	1.221
Perceived Behavioral Control	Happiness	4.211	1.695
	Sadness	4.240	1.639
	Anger	4.430	1.591
Repair Cost	Happiness	3.647	1.396
	Sadness	4.088	1.623
	Anger	3.928	1.467
Planned Obsolescence	Happiness	4.463	1.337
	Sadness	4.847	1.212
	Anger	4.950	1.264
Law Efficacy	Happiness	5.345	1.233
	Sadness	5.578	1.228
	Anger	5.544	1.198
Attitude to the Right to Repair	Happiness	5.945	1.108
	Sadness	6.008	1.180
	Anger	5.811	1.313
Intention to Repair	Happiness	4.975	1.475
	Sadness	5.257	1.482
	Anger	5.070	1.463
Perceived Decision Satisfaction to Repair	Happiness	5.264	1.385
	Sadness	5.642	1.209
	Anger	5.554	1.335
Emotional Self-Assurance	Happiness	4.572	1.483
	Sadness	5.004	1.540
	Anger	4.892	1.432
Perceived Satisfaction	Happiness	4.760	1.507
	Sadness	5.184	1.498
	Anger	5.147	1.399
Intention to Engage with the Company in the Future	Happiness	4.446	1.768
	Sadness	4.895	1.546
	Anger	4.743	1.571
Performance Expectancy	Happiness	4.915	1.531
	Sadness	5.297	1.560
	Anger	5.320	1.394

(Henseler et al., 2016; Hu and Bentler, 1998). The NFI value was 0.801, and while values closer to 1 are typically preferred, those ranging from 0.8 to 0.9 are also considered acceptable (Huang, 2021; Yusif et al., 2020).

4.3.4. Structural model evaluation and hypotheses testing

Bootstrapping was used to assess the reliability and significance of the path coefficients in the model. The analysis was conducted using 5,000 subsamples with a percentile bootstrap confidence interval method and a two-tailed test type with a significance level of 0.05. The results are presented in Table 5. In the domain of social factors, social image and subjective norms proved significant, whereas herd behavior was not significant, thus confirming H1_a and H1_c and rejecting H1_b. For technical repair factors, perceived behavioural control, planned obsolescence and repair cost were found significant, supporting H2_a, H2_b and H2_c. It is noted that while perceived behavioral control and planned obsolescence positively influenced the intention to repair, the relationship with repair cost was negative, aligning with the hypotheses. Regarding beliefs about legislation, the results supported the relevance

of law efficacy (H3_a), while the attitude to the right to repair (H3_b) did not show a significant effect. In terms of responses, all hypothesized relationships were supported. The intention to repair was found to positively affect perceived decision satisfaction (H4_a), emotional self-assurance (H4_b), perceived satisfaction with the manufacturer (H5_a), and intention to engage with the company (H5_b). Also, intention to repair positively affects performance expectancy after repair, confirming H6. In terms of effect sizes, Cohen (1988) describes f^2 values of 0.02, 0.15, and 0.35 as small, medium and large effects, respectively. In the present model, effect sizes ranged from small to large, indicating that while some predictors exert a substantial impact on the model's outcomes, others have only a minimal effect. This variability is typical in complex models where different constructs influence the outcome variables to varying degrees (Chin, 2010). R^2 and R_{adj}^2 explain a moderate variance in the outcome, as shown in Table 6. Additionally, a multi-group analysis has been conducted to compare responses across three emotion-eliciting scenarios, with the results detailed in Appendix E.

4.4. Discussion

Results show that the S-O-R model well explains the drivers and responses toward product repair in the European scenario, where repair legislation is relatively new, unlike the US where prior research has been conducted (Marikyan and Papagiannidis, 2024). Particularly, the significance of social image and subjective norms highlights that the decision to repair a product is influenced by the beliefs of one's close social circle rather than the broader society. This suggests that eco-friendly behaviors may be incentivized at a community level (e.g., within work, school or neighborhood environments) rather than through campaigns targeting a broader public. Regarding the technical drivers, all showed a significant effect on the intention to repair. Perceived behavioral control and planned obsolescence positively influenced intentions, in line with prior literature (Marikyan and Papagiannidis, 2024) suggesting that awareness of a product's obsolescence and the ability to extend its lifespan through repair enhance the willingness to repair. Conversely, the cost of repairs negatively impacts this intention, as higher costs make the repair option less appealing. The role of legislation produced mixed results. While law efficacy is found significant in impacting the intention to repair, the attitude toward the Right-to-Repair legislation is not. This may be due to the novelty of these laws in Europe and consumers' yet-to-be-formed opinions on their effectiveness. In terms of personal outcomes, repair intention positively affected satisfaction with the manufacturer and emotional self-assurance, indicating that consumers motivated to repair are likely to feel more satisfied and confident in their decision (White, 2015). The findings related to company outcomes underscore that a strong intention to repair is linked to greater satisfaction with the manufacturer, as well as an increased willingness to engage with the company in the future. This suggests that consumers motivated to repair are more likely to develop long-lasting relationships and loyalty with the manufacturer. This result is coherent with prior findings, displaying that individuals caring about product repairability are more prone to recommend purchases and become loyal to a brand (Sabbaghi et al., 2016). In this perspective, an outstanding recovery service may significantly increase the levels of satisfaction with the manufacturer, re-purchase intent and positive word-of-mouth (Maxham III, 2001). When compared to the recent work by Marikyan and Papagiannidis (2024), the present study demonstrates a comparable level of explanatory power. Specifically, the model accounts for 45 % of the variance in the intention to repair, compared to 50 % in the reference study. It also explains 35 % of satisfaction with the decision to repair (against 41 %), 37 % for emotional self-assurance (against 35 %), 22 % for intention to engage with the company in the future (against 11 %), 20 % for perceived satisfaction (against 12 %), and 28 % for performance expectancy (against 30 %). These findings indicate a stronger explanatory power for

Table 5
Bootstrapping results.

	Original sample	Sample mean	Standard deviation	T statistics	Confidence interval [95 %]	Effect sizes (f^2)	HP
Social Factors							
Subjective Norms - > Intention to Repair	0.209 ^c	0.206	0.047	4.451	[0.109; 0.295]	0.064	H1 _a
Herd Behaviour - > Intention to Repair	0.045	0.049	0.047	0.963	[-0.043; 0.143]	0.003	H1 _b
Social Image - > Intention to Repair	0.131 ^a	0.131	0.061	2.152	[0.009; 0.250]	0.019	H1 _c
Technical Repair Factors							
Perceived Behavioural Control - > Intention to Repair	0.104 ^a	0.107	0.048	2.152	[0.011; 0.203]	0.017	H2 _a
Repair Cost - > Intention to Repair	-0.140 ^b	-0.144	0.050	2.781	[-0.239; -0.039]	0.032	H2 _b
Planned Obsolescence - > Intention to Repair	0.109 ^a	0.116	0.050	2.181	[0.018; 0.213]	0.017	H2 _c
Beliefs About Legislation							
Law Efficacy - > Intention to Repair	0.265 ^c	0.260	0.076	3.471	[0.110; 0.408]	0.073	H3 _a
Attitude to Right-to-Repair - > Intention to Repair	0.154	0.156	0.080	1.917	[0.002; 0.317]	0.028	H3 _b
Personal							
Intention to Repair - > Perceived Decision Satisfaction to Repair	0.591 ^c	0.592	0.044	13.517	[0.501; 0.671]	0.538	H4 _a
Intention to Repair - > Emotional Self-Assurance Company-related	0.613 ^c	0.614	0.036	17.047	[0.540; 0.682]	0.601	H4 _b
Intention to Repair - > Perceived Satisfaction	0.445 ^c	0.448	0.045	9.984	[0.359; 0.530]	0.247	H5 _a
Intention to Repair - > Intention to Engage with the Company in the Future	0.472 ^c	0.473	0.046	10.185	[0.381; 0.561]	0.287	H5 _b
Performance-related							
Intention to Repair - > Performance Expectancy of the Product After Repair	0.532 ^c	0.533	0.045	11.724	[0.441; 0.617]	0.395	H6

Note.

^a $p < .05$.^b $p < .01$.^c $p < .001$.**Table 6**
 R^2 and R_{adj}^2 values.

	R^2	R_{adj}^2
Intention to Repair	0.447	0.433
Perceived Decision Satisfaction to Repair	0.350	0.348
Emotional Self-Assurance	0.375	0.374
Perceived Satisfaction	0.198	0.196
Intention to Engage with the Company in the Future	0.223	0.221
Performance Expectancy of the Product After Repair	0.283	0.281

company-related outcomes and a similar efficacy for other constructs, underscoring the robustness of the model in explaining consumer repair intentions and associated outcomes within the European textile product context.

Furthermore, the findings show that different emotions influence consumers' repair evaluations. Sadness leads to more critical and pessimistic assessments of planned obsolescence and repair costs, as individuals' evaluations may be twisted toward larger negativity while experiencing sadness (Carson and Adams, 1980; Cunningham, 1988; Shaver et al., 1987). Consumers also place greater emotional value on the repairing practice, as a means of improving their mood, thus displaying higher emotional self-assurance (Morris and Reilly, 1987; Zillmann, 1988). Planned obsolescence and performance expectancy also show greater relevance when anger is elicited. Anger emphasizes the role of external factors (Roseman, 1991), potentially leading to a stronger belief that products are designed to fail or become obsolete intentionally. It pushes more positive expectations about the outcome (Lerner and Keltner, 2001; Lerner and Tiedens, 2006), causing individuals to expect the repaired product to perform better. Overall, negative emotions seem to motivate consumers toward repair practices, confirming that negative emotions can heighten concern for environmental issues and motivate individuals towards environmentally friendly actions (de Lima et al., 2019; Lowe et al., 2019).

5. Academic, managerial and policy-maker implications

This paper contributes to research in three ways. First, it expands the current literature on sustainable consumer behavior and Right-to-Repair (Jin et al., 2023; Lloveras et al., 2024; Roskladka et al., 2023) by exploring the role of emotions in the decision-making process for product repair. Findings show that emotions, particularly negative ones such as sadness and anger, play a critical role in shaping cognitive evaluations in sustainable decision-making. This study is the first to demonstrate how emotions influence consumer decisions about repairing products, complementing existing theories that suggest these choices are driven mainly by rational considerations, such as mental depreciation (Makov and Fitzpatrick, 2021). These results directly address the recent call for research advanced by Marikyan and Papagiannidis (2024), illustrating how negative emotions lead to more critical assessments of company practices as consumer judgments are distorted toward greater negativity (Carson and Adams, 1980; Cunningham, 1988; Shaver et al., 1987). Plus, they also elicit a greater value in the act of repairing, as a way to enhance consumers' mood (Morris and Reilly, 1987; Zillmann, 1988) and increase the expectancy of the repair outcome (Lerner and Keltner, 2001) thereby encouraging environmentally friendly behaviors (de Lima et al., 2019; Lowe et al., 2019). Moreover, these findings are supported by using facial micro-expressions to assess both positive and negative emotions. By adopting this implicit method, the study contributes to the methodological discourse in consumer behavior research on sustainability, an area that has traditionally depended on self-reported data for measuring emotions (Cerri et al., 2019; Chéron et al., 2022; Durmaz et al., 2023). In particular, this paper responds to recent calls for methods that mitigate biases linked to social desirability, which commonly influence self-reported data on sustainability issues (Neubig and Roosen, 2024). A second contribution of the study lies in the assessment of the consumers' repair responses toward textile products, while prior research mainly focuses on electronic devices (Svensson-Hoglund et al., 2021). The application of the S-O-R model was extended to this product category, which is increasingly associated with the provision of repair services due to its substantial environmental impact (Klemm and Kaufman, 2024).

The third contribution of this study lies in assessing the pro-environmental behaviors of European consumers, a region noted for its strong commitment to sustainability (Ricciolini et al., 2022). Recently, this region has adopted the Right-to-Repair movement, following similar measures in the USA, such as the introduction of the Repair Bill in 2018. The findings presented corroborate and expand upon those of Marikyan and Papagiannidis (2024) who investigated the American context. The model developed in the present paper explains a significant portion of the variance in consumers' intentions to repair and their satisfaction with these decisions. The comparative explanatory power, relative to the findings of Marikyan and Papagiannidis (2024), highlights the model's relevance across various cultural settings. This research highlights the simultaneous impact of social, technical, and legislative factors on shaping consumers' repair intentions and underscores the associated outcomes related to performance, company, and personal factors. Along these lines, the study contributes to the broader discourse on how new sustainability legislation is shaping consumer behavior (Hummel and Jobst, 2024).

From a managerial perspective, understanding how emotions affect repair choices could help companies create suited communication and marketing activities to promote their repair services. Emotions evoked by brief stimuli such as images or videos, can impact consumer preferences and decision-making, thereby affecting purchasing behavior. Companies may employ emotional advertising to evoke such emotions in their target customers. This work demonstrates that sadness, rather than happiness or anger, positively influences the intention to repair. It not only increases positive expectations about the act of repairing, making it an emotionally rewarding experience, but also increases positive evaluations toward the manufacturer and the expected performance of the product post-repair. Therefore, displaying communication with a sad undertone may increase consumer engagement in sustainable practices and enhance satisfaction with these actions. For instance, images depicting the consequences of pollution on the environment and fauna may lead consumers to act more environmentally friendly. Also, since social image and peer influence are crucial in shaping sustainable consumer behaviors, creating relationship-driven communication strategies may prove effective. Encouraging customers to share their repair experiences on social media or through user-generated content can highlight the benefits of repair and enhance its social desirability. Furthermore, engaging micro-influencers targeting niche audiences can be more cost-effective than broad-scale campaigns. Companies should also remove the perceived complexity of accessing repair, seeing the role of perceived behavioral control in determining repair intention. Providing educational resources, such as video tutorials, digital repair guides, or repair blogs can improve consumer confidence. For example, Patagonia's Worn Wear program demystifies product repair by offering step-by-step repair guides, providing simple instructions along with visuals. The guide lists the tools and materials necessary to perform the repair, advising where they can be purchased, and features a community-driven comment section to foster a supportive repair culture. The brand also promotes repair services through storytelling and social proof, sharing customer stories about repaired items on its website and social media, which helps build a community of brand advocates and fosters long-term loyalty. Similarly, Barbour Wax For Life program, allows customers to return their jackets at any time to be re-waxed, repaired or altered, and offers wax care kits for customers to perform maintenance themselves. The managerial implications discussed extend beyond the textile industry to other fields, such as electronics or household appliances, where sustainability and reparability are critical aspects. For example, in electronics, Fairphone, an Amsterdam-based company known for sustainable electronics, uses a modular design that allows customers to easily repair their devices by making spare parts available. By positioning their offer as the most sustainable phone in the world, they create not only tangible benefits but also an affective connection with consumers. On the pricing side, to overcome the barrier of repair costs, companies can implement subsidized repair programs

that offer free or low-cost services. For instance, Nudie Jeans, a Swedish company selling jeans, offers free repair on every pair of jeans, in an effort to position its product as lasting "forever" and strengthening the emotional bond with its offerings. Furthermore, subscription-based repair models, such as AppleCare, make repairs more affordable by spreading costs over time. From a policy perspective, it is crucial to acknowledge the significant role that law efficacy plays in influencing the intention to repair. The findings of the present study suggest that an increase in the perceived effectiveness of European directives for repair may result in greater intention to repair. Accordingly, enhancing consumer awareness and understanding of the Right-to-Repair and related legislation within the European context appears as a key area for policy intervention.

6. Conclusions, limitations and future research

This paper examined the factors influencing the decision to repair a product, particularly emphasizing the interaction between emotions and personal, economic and social variables. The findings offer a new perspective within the broader discourse on sustainable consumption, which has traditionally focused on cognitive determinants. This paves the way to further research exploring the interplay between emotional responses and cognitive evaluations in shaping pro-environmental consumer behaviors. The study's findings can be extended in several ways. Firstly, the current research explores repair practices for textile products, while most of the research concentrates on electronic devices. Expanding the investigation to include other product categories—such as household appliances, which have a considerable environmental impact—could provide a more comprehensive understanding of how diverse factors influence repair intentions. Repairing such products may prevent premature disposal and contribute to sustainability efforts.

Secondly, for consumers, the choice to repair a product is shaped by various factors. Research could delve into the impact of emotional ties to the product, like attachment and brand loyalty, as well as the consumer's skills or resources. This includes exploring barriers that discourage consumers from opting for repairs, such as a lack of technical knowledge or the inconvenience and unavailability of repair services. While the current results indicated significant differences between happiness and sadness conditions in the relationships between intention to repair and emotional self-assurance, as well as between planned obsolescence and intention to repair, no other significant effects were observed. Future studies may delve into this area to explore additional mechanisms or moderating variables that could explain these effects more comprehensively and expand the range of emotional stimuli. Indeed, happiness, sadness, and anger represent only a portion of the broader spectrum of human affective experiences. Emotions such as guilt or pride may significantly impact the decision-making process toward repair. Thus, expanding on this affective scope may further uncover the experiential drivers of sustainable consumption decisions and support the proposal of more targeted interventions.

Furthermore, the present study was limited to Italian consumers. To understand the impact of cultural or social attitudes on repair practices, future research could include comparisons from various geographical or cultural settings to provide further benchmarks and enhance the generalizability of the findings. For instance, societies that place a great value on collectivism or frugality may show different responses to product repair compared to more individualistic or consumption-oriented cultures. Hence, future research can shed light on repair promotional strategies that fit specific socio-cultural environments.

Lastly, while this study addressed the intention to repair, actual repair behavior may differ due to practical or financial constraints. Future research could bridge this gap by using different methodological approaches that observe actual behaviors, such as conducting longitudinal studies to monitor consumer repair activities over time and assess whether initial intentions translate into actions. In these contexts, facial micro-expression analysis can also be applied to monitor real-time

consumer reactions during repair processes to offer insights into the actual behavior versus stated intentions. Promoting repair services as a viable alternative to disposal will not only enhance consumer engagement in sustainable behaviors but also support a broader societal shift toward a circular economy.

CRediT authorship contribution statement

Debora Bettiga: Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation, Conceptualization. **Marco Mandolfo:** Writing – review & editing, Writing – original draft, Methodology, Investigation. **Giuliano Noci:** Validation, Supervision,

Resources, Conceptualization.

Declaration of competing interest

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

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Appendix A. Survey structure and measurements

Past behavior and engagement with the product category.

- How many times have you used a repair service in the last 5 years?
- Have you ever bought this type of product before? (yes/no)

Social factors (H1_{a-c})

Herd behavior (Sun, 2013; Vedadi and Warkentin, 2020)

- It seems that repairing the backpack instead of buying a new one is a common practice, therefore I would like to do the same
- I follow others when it comes to the decision to repair the backpack instead of buying a new one
- I would choose to repair the backpack instead of buying a new one because many other people around me do that

Subjective norm (Ajzen, 1991; Venkatesh et al., 2003)

- Moore and Benbasat, 1991 People who influence my behavior think that I should repair the backpack rather than buy a new one
- People who are important to me think that I should repair the backpack rather than buy a new one

Social image (Moore and Benbasat, 1991; Venkatesh et al., 2003)

- People who repair the products have more respect than those who buy new ones instead
- People who repair the products have a social image of environmental supporters
- Repairing products instead of buying new ones is a symbol of sustainable behavior in our society

Technical Repair Factors (H2_{a-c})

Perceived behavioral control (Ajzen, 1991; Taylor and Todd, 1995; Venkatesh et al., 2003)

- I have the resources or I can refer this to a repairman with the necessary resources to repair the backpack
- I have the knowledge or I can refer this to a repairman with the necessary knowledge to repair the backpack

Perception of planned obsolescence (Guiltinan, 2009)

I think that companies ...

- Make design fragile
- Use unnecessary fragile materials for the final product
- Design for limited repair
- Make it time-consuming to repair a product
- Make spare parts limited

Repair cost (Woon et al., 2005)

- The cost of repairing the backpack instead of buying a new one undermines the convenience of this practice
- There are too many overheads associated with trying to repair the backpack instead of buying a new one
- Repairing the backpack instead of buying a new one would require a considerable investment of effort other than time

Beliefs About Legislation (H3_{a-b})

The Right to Repair law, approved by the European Union in April 2024, requires product manufacturers to provide repair services that are timely and affordable. In addition, consumers must be informed about their right to repair.

Law efficacy (Woon et al., 2005)

- The law regulating repair would enable me to fix the backpack instead of buying a new one
- If I exercise my right to repair, I will be able to have the backpack fixed without buying a new one
- The law regulating repair would help fix issues with my backpack
- The law regulating repair provides an effective solution to the issues with my backpack
- Repairing the backpack is an effective way to extend the usage of my old backpack

Attitude toward right to repair (Davis, 1993; Elliott et al., 2007)

My attitude toward the right to repair law is ...

- Good
- Positive
- That it is wise
- Favorable
- That it is beneficial

Intention to repair (Vedadi and Warkentin, 2020)

In the future ...

- I intend to repair the backpack instead of buying a new one
- I expect that I will repair the backpack instead of buying a new one
- I predict that I will repair the backpack instead of buying a new one
- I plan to repair the backpack instead of buying a new one

Personal (H4_{a-b})

Perceived satisfaction with repair (Holmes-Rovner et al., 1996; McKinney et al., 2002; Sainfort and Bridget, 2000)

I expect that after repairing my backpack I would feel ...

- Very satisfied with my decision
- Contented with my decision
- Very pleased with my decision
- Delighted with my decision

Emotional self-assurance (Bagozzi et al., 2020)

I believe that repairing the backpack would ...

- Make me feel good
- Make me feel happy
- Make me feel joyful
- Make me feel proud
- Will be emotionally rewarding

Company-related (H5_{a-b})

Perceived satisfaction (McKinney et al., 2002)

I believe that after repairing the backpack instead of buying a new one I will be ...

- Very dissatisfied — very satisfied with the manufacturer of the backpack
- Very displeased — very pleased with the manufacturer of the backpack
- Frustrated — contented with the manufacturer of the backpack
- Disappointed — delighted with the manufacturer of the backpack

Intention to engage with the manufacturer in the future (Venkatesh et al., 2003)

I believe that after repairing the backpack instead of buying a new one ...

- I will intend to engage with the manufacturer of the backpack in the future
- I predict that I will engage with the manufacturer of the backpack in the future
- I plan that I will engage with the manufacturer of the backpack in the future
- I expect that I will purchase more products offered by the manufacturer of the backpack in the future

Performance-related (H6)

Performance expectancy (Venkatesh et al., 2003)

I believe that the repaired backpack ...

- Will be as useful for accomplishing my tasks as it was before it needed to be repaired
- Will be as instrumental for accomplishing my tasks as it was before it needed to be repaired
- Will be as helpful for increasing my performance as it was before it needed to be repaired
- Will be as useful for increasing the chances of my task completion as it was before it needed to be repaired

Appendix B. Sample description

Gender	
Male	43.6 %
Female	55.5 %
Prefer not to answer	0.9 %
Age	
<30	54.2 %
30-44	7.6 %
45-60	19.4 %
>60	18.8 %
Education	
Upper secondary school	29.7 %
Bachelor's degree (or equivalent)	28.8 %
Master's degree/specialist degree (or equivalent)	37.6 %
Doctorate (or equivalent)	3.0 %
Other	0.9 %
Income	
Less than 10,000 euro per year	0.9 %
10,000–30,000 euro per year	10.9 %
30,000–50,000 euro per year	20.6 %
50,000–70,000 euro per year	13.3 %
Over 70,000 euro per year	31.2 %
I prefer not to answer	23.1 %
Frequency of using repair services in the last five years	
Never	39.4 %
1 to 5 times	52.1 %
6 to 10 times	5.5 %
10 to 20 times	2.1 %
More than 20 times	0.9 %
Prior similar backpack purchase	
Yes	60.9 %
No	39.1 %

Appendix C. Variance Inflation Factor (VIF) values

Inner model	VIF
Attitude to Right-to-Repair - > Intention to Repair	1.509
Herd Behavior - > Intention to Repair	1.247
Law Efficacy - > Intention to Repair	1.740
Perceived Behavioral Control - > Intention to Repair	1.154
Planned Obsolescence - > Intention to Repair	1.238
Repair Cost - > Intention to Repair	1.117
Social Image - > Intention to Repair	1.641
Subjective Norms - > Intention to Repair	1.232

Appendix D. Composite reliability (CR), Average Variance Extracted (AVE) and Fornell-Larcker criterion

Attitude to Right-to-Repair	0,937														
Emotional Self-Assurance	0,361	0,904													
Herd Behavior	0,173	0,296	0,843												
Intention to Engage with the Company in the Future	0,280	0,494	0,263	0,920											
Intention to Repair	0,449	0,613	0,275	0,472	0,920										
Law Efficacy	0,509	0,483	0,217	0,416	0,546	0,847									
Perceived Behavioural Control	0,173	0,269	0,246	0,245	0,290	0,284	0,922								
Perceived Decision Satisfaction to Repair	0,516	0,683	0,260	0,440	0,591	0,545	0,271	0,916							
Perceived Satisfaction	0,279	0,470	0,193	0,424	0,445	0,436	0,191	0,504	0,869						
Performance Expectancy of the Product After Repair	0,410	0,472	0,204	0,306	0,532	0,514	0,262	0,436	0,345	0,891					
Planned Obsolescence	0,215	0,365	0,181	0,225	0,264	0,310	0,046	0,333	0,216	0,297	0,784				
Repair Cost	-0,050	-0,015	0,067	0,067	-0,113	0,026	-0,101	0,009	0,041	0,028	0,276	0,842			
Social Image	0,497	0,521	0,297	0,318	0,471	0,525	0,165	0,485	0,253	0,363	0,257	-0,017	0,821		
Subjective Norms	0,185	0,351	0,340	0,277	0,404	0,312	0,157	0,329	0,210	0,260	0,151	0,033	0,306	0,935	
Average Variance Extracted (AVE)	0,879	0,818	0,710	0,846	0,846	0,718	0,850	0,839	0,756	0,794	0,614	0,709	0,674	0,874	
Composite Reliability (CR)	0,966	0,947	0,826	0,941	0,940	0,903	0,855	0,936	0,893	0,917	0,854	0,817	0,757	0,882	
Constructs	Attitude to Right-to-Repair	Emotional Self-Assurance	Herd Behavior	Intention to Engage with the Company in the Future	Intention to Repair	Law Efficacy	Perceived Behavioural Control	Perceived Decision Satisfaction to Repair	Perceived Satisfaction	Performance Expectancy of the Product After Repair	Planned Obsolescence	Repair Cost	Social Image	Subjective Norms	

Appendix E. Multi-Group Analysis

A multi-group analysis was conducted using bootstrapping with 5000 resamples to compare responses across three emotion-eliciting scenarios. Findings showed a significant difference (-0.227 ; $p < .01$) in the relationship between Intention to Repair and Emotional Self-Assurance and between Planned Obsolescence and Intention to Repair (-0.273 ; $p < .05$) in the comparison between happiness and sadness conditions. This indicates that experiencing sadness amplifies the perceived impact of planned obsolescence on the intention to repair, which, in turn, exerts a stronger influence on emotional self-assurance. No other statistically significant differences were identified. The full results are presented in the table below. These findings align with the results from the Mann-Whitney test, which also indicated heightened levels of emotional self-assurance and planned obsolescence in scenarios involving negative emotions. This confirms that eliciting negative emotions, especially sadness, results in a more negative appraisal of company practices. However, it simultaneously strengthens the intention to repair and enhances the emotional reward derived from repairing, highlighting the greater attention consumers pay to these practices.

	Difference (Happiness - Anger)	Difference (Happiness - Sadness)	Difference (Sadness - Anger)
Social Factors			
Subjective Norms - > Intention to Repair	0.092	-0.067	0.159
Herd Behaviour - > Intention to Repair	-0.087	-0.017	-0.069
Social Image - > Intention to Repair	-0.265	-0.027	-0.239
Technical Repair Factors			
Perceived Behavioural Control - > Intention to Repair	-0.193	-0.019	-0.173
Repair Cost - > Intention to Repair	-0.021	0.030	-0.051
Planned Obsolescence - > Intention to Repair	-0.153	-0.273 *	0.121
Beliefs About Legislation			
Law Efficacy - > Intention to Repair	0.135	0.156	-0.021

(continued on next page)

(continued)

	Difference (Happiness - Anger)	Difference (Happiness - Sadness)	Difference (Sadness - Anger)
Attitude to Right-to-Repair - > Intention to Repair Personal	0.144	-0.047	0.191
Intention to Repair - > Perceived Decision Satisfaction to Repair	-0.123	-0.177	0.055
Intention to Repair - > Emotional Self-Assurance Company-related	-0.162	-0.227 **	0.065
Intention to Repair - > Perceived Satisfaction	-0.163	-0.001	-0.162
Intention to Repair - > Intention to Engage with the Company in the Future Performance-related	0.009	0.017	-0.008
Intention to Repair - > Performance Expectancy of the Product After Repair	-0.187	-0.137	-0.050

Note: **p* < .05, ***p* < .01, ****p* < .001.

Data availability

Data will be made available on request.

References

Adyapady, R.R., Annappa, B., 2023. A comprehensive review of facial expression recognition techniques. *Multimed. Syst.* 29 (1), 73–103. <https://doi.org/10.1007/S00530-022-00984-W>.

Ajzen, I., 1991. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* 50 (2), 179–211.

Ali, M., Amir, D.H., Shamsi, D.A., 2021. Consumer herding behavior in online buying: a literature review. *Int. Rev. Manag. Bus. Res.* 10 (1), 345–360.

Bagozzi, R.P., 1986. Principles of marketing and management. Science Research Associates.

Bagozzi, Richard P., Ayalla A. Ruvio, and Chunyan Xie. 2020. The material self *Int. J. Res. Mark.* 37(4): 661–77. doi:10.1016/j.ijresmar.2020.03.002.

Bagozzi, R.P., Yi, Y., 1988. On the evaluation of structural equation models. *J. Acad. Market. Sci.* 16 (1), 74–94. <https://doi.org/10.1007/BF02723327>.

Bagozzi, R.P., Belanche, D., Casaló, L.V., Flavián, C., 2016. The role of anticipated emotions in purchase intentions. *Psychol. Market.* 33 (8), 629–645. <https://doi.org/10.1002/mar.20905>.

Baumgartner, H., Pieters, R., Bagozzi, R.P., 2008. Future-oriented emotions: Conceptualization and behavioral effects. *Eur. J. Soc. Psychol.* 38 (4), 685–696. <https://doi.org/10.1002/ejsp.467>.

Bearden, W.O., Teel, J.E., 1983. Selected determinants of consumer satisfaction and complaint reports. *J. Mark. Res.* 20 (1), 21–28.

Berki-Kiss, D., Menrad, K., 2022. The role emotions play in consumer intentions to make pro-social purchases in Germany – an augmented theory of planned behavior model. *Sustain. Prod. Consum.* 29, 79–89. <https://doi.org/10.1016/j.spc.2021.09.026>.

Bettiga, D., Lamberti, L., 2020. Future-oriented happiness: its nature and role in consumer decision-making for new products. *Front. Psychol.* 11. <https://doi.org/10.3389/fpsyg.2020.00929>.

Bhattacharjee, A., Sanford, C., 2009. The intention–behaviour gap in technology usage: the moderating role of attitude strength. *Behav. Inf. Technol.* 28 (4), 389–401. <https://doi.org/10.1080/01449290802121230>.

Boldoczki, S., Thorenz, A., Tuma, A., 2020. The environmental impacts of preparation for reuse: a case study of WEEE reuse in Germany. *J. Clean. Prod.* 252, 119736. <https://doi.org/10.1016/j.jclepro.2019.119736>.

Bradley, K., Persson, O., 2022. Community repair in the circular economy – fixing more than stuff. *Local Environ.* 27 (10–11), 1321–1337. <https://doi.org/10.1080/13549839.2022.2041580>.

Brehm, S.S., Brehm, J.W., 2013. Psychological Reactance: A Theory of Freedom and Control. Academic Press.

Brosch, T., Steg, L., 2021. Leveraging emotion for sustainable action. *One Earth* 4 (12), 1693–1703.

Bursztyn, L., Jensen, R., 2017. Social image and economic behavior in the field: Identifying, understanding, and shaping social pressure. *Annual Review of Economics* 9 (1), 131–153.

Carlson, E.D., Engebretson, J., Chamberlain, R.M., 2006. Photovoice as a social process of critical consciousness. *Qual. Health Res.* 16 (6), 836–852.

Carrera, P., Caballero, A., Muñoz, D., 2012. Future-oriented emotions in the prediction of binge-drinking intention and expectation: the role of anticipated and anticipatory emotions. *Scand. J. Psychol.* 53 (3), 273–279. <https://doi.org/10.1111/j.1467-9450.2012.00948.x>.

Carrus, G., Passafaro, P., Bonnes, M., 2008. Emotions, habits and rational choices in ecological behaviours: the case of recycling and use of public transportation. *J. Environ. Psychol.* 28 (1), 51–62. <https://doi.org/10.1016/j.jenvp.2007.09.003>.

Carson, T.P., Adams, H.E., 1980. Activity valence as a function of mood change. *J. Abnorm. Psychol.* 89 (3), 368–377. <https://doi.org/10.1037/0021-843X.89.3.368>.

Celeghin, A., Diano, M., Bagnis, A., Viola, M., Tamietto, M., 2017. Basic emotions in human neuroscience: neuroimaging and beyond. *Front. Psychol.* 8. <https://doi.org/10.3389/fpsyg.2017.01432>.

Cerri, J., Thøgersen, J., Testa, F., 2019. Social desirability and sustainable food research: a systematic literature review. *Food Qual. Prefer.* 71, 136–140.

Chang, C., 2016. Before–after appeals: a dual-route effect model. *Int. J. Advert.* 35 (2), 301–324. <https://doi.org/10.1080/02650487.2015.1022300>.

Chao, C.-M., 2022. What factors determine college students’ green purchase behavior? An empirical investigation of the modified model of goal-directed behavior. *Soc. Sci. J.* 1–17. <https://doi.org/10.1080/03623319.2022.2049556>.

Chao, C.M., Yu, T.K., 2023. How emotions and green altruism explain consumer purchase intention toward circular economy products: a multi-group analysis on willingness to be environmentally friendly. *Bus. Strat. Environ.* <https://doi.org/10.1002/bse.3632>.

Chen, H., Chin, K.L., Tan, C.B.Y., 2021. Selection and validation of emotional videos: dataset of professional and amateur videos that elicit basic emotions. *Data Brief* 34, 106662. <https://doi.org/10.1016/j.dib.2020.106662>.

Chéron, E., Sudbury-Riley, L., Kohlbacher, F., 2022. In pursuit of happiness: disentangling sustainable consumption, consumer alienation, and social desirability. *J. Consum. Pol.* 45 (2), 149–173. <https://doi.org/10.1007/S10603-021-09498-W>.

Chin, W.W., 1998. The partial least squares approach to structural equation modeling. In: Marcoulides (Ed.), *Modern Methods for Business Research*. Lawrence Erlbaum Associates Publishers, pp. 295–336.

Chin, W.W., 2010. How to write up and report PLS analyses. *Handbook of Partial Least Squares* 655–690. https://doi.org/10.1007/978-3-540-32827-8_29.

Cohen, J., 1988. *Statistical Power Analysis for the Behavioral Sciences*. Lawrence Erlbaum Associates.

Cunningham, M.R., 1988. What do you do when you’re happy or blue? Mood, expectancies, and behavioral interest. *Motiv. Emot.* 12 (4), 309–331. <https://doi.org/10.1007/BF00992357>.

Damiano, C., Gayen, P., Rezanejad, M., Banerjee, A., Banik, G., Patnaik, P., Wagemans, J., Walther, D.B., 2023. Anger is red, sadness is blue: emotion depictions in abstract visual art by artists and non-artists. *J. Vis.* 23 (4). <https://doi.org/10.1167/jov.23.4.1>.

Davis, F., 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q.* 13 (3), 319–340. <http://www.jstor.org/stab/le/249008>.

Davis, Fred D., 1993. User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *Int. J. Man-Mach. Stud.* 38 (3), 475–487. <https://doi.org/10.1006/imms.1993.1022>.

De la Torre, F., Cohn, J.F., 2011. Facial expression analysis. *Visual Analysis of Humans* 377–409. https://doi.org/10.1007/978-0-85729-997-0_19.

de Lima, E.B., Costa, C.S.R., Félix, G.R., 2019. Guilt and pride emotions and their influence on the intention of purchasing green products. *Consum. Behav. Rev.* 3 (2), 70–84.

Di Muro, F., Murray, K.B., 2012. An arousal regulation explanation of mood effects on consumer choice. *J. Consum. Res.* 39 (3), 574–584. <https://doi.org/10.1086/664040>.

Diddi, S., Yan, R.N., Bloodhart, B., Bajtelsmit, V., McShane, K., 2019. Exploring young adult consumers’ sustainable clothing consumption intention-behavior gap: a Behavioral Reasoning Theory perspective. *Sustain. Prod. Consum.* 18, 200–209.

Döllinger, L., Laukka, P., Högman, L.B., Bänziger, T., Makower, I., Fischer, H., Hau, S., 2021. Training emotion recognition accuracy: results for multimodal expressions and facial micro expressions. *Front. Psychol.* 12. <https://doi.org/10.3389/fpsyg.2021.708867/FULL>.

Durmaz, A., Dursun, I., Kabadayı, E.T., 2023. Are they actually sustainable? The social desirability bias in sustainable consumption surveys. Dealing with Socially Responsible Consumers: Studies in Marketing 533–560. https://doi.org/10.1007/978-981-19-4457-4_28.

Dwivedi, Y.K., Rana, N.P., Jeyaraj, A., Clement, M., Williams, M.D., 2019. Re-Examining the unified theory of acceptance and use of technology (UTAUT): towards a revised theoretical model. *Inf. Syst. Front.* 21 (3), 719–734. <https://doi.org/10.1007/s10796-017-9774-y>.

Elliott, Mark A., Armitage, Christopher J., Baughan, Christopher J., 2007. Using the theory of planned behaviour to predict observed driving behaviour. *Br. J. Soc. Psychol.* 46 (1), 69–90. <https://doi.org/10.1348/014466605X90801>.

Eroglu, S.A., Machleit, K.A., Davis, L.M., 2003. Empirical testing of a model of online store atmospherics and shopper responses. *Psychol. Market.* 20 (2), 139–150. <https://doi.org/10.1002/mar.10064>.

Escadas, M., Jalali, M.S., Farhangmehr, M., 2020. What goes around comes around: the integrated role of emotions on consumer ethical decision-making. *J. Consum. Behav.* 19 (5), 409–422.

- Escadas, M., Jalali, M.S., Septianto, F., Farhangmehr, M., 2023. Are emotions essential for consumer ethical decision-making: a Necessary Condition Analysis. *Business Ethics, the Environment and Responsibility*. <https://doi.org/10.1111/beer.12619>.
- Fishbein, M., Ajzen, I., 1975. *Belief, Attitude, Intention, and Behavior: an Introduction to Theory and Research*. Addison-Wesley Publishing Company.
- Flavián, C., Gurrea, R., Orús, C., 2019. Feeling confident and smart with webrooming: understanding the consumer's path to satisfaction. *J. Interact. Market.* 47 (1), 1–15.
- Forgas, J.P., 1998. On feeling good and getting your way: mood effects on negotiator cognition and bargaining strategies. *Journal of Personality and Social Psychology* 74 (3), 565–577. <https://doi.org/10.1037/0022-3514.74.3.565>.
- Forgas, J.P., Laham, S.M., Vargas, P.T., 2005. Mood effects on eyewitness memory: affective influences on susceptibility to misinformation. *J. Exp. Soc. Psychol.* 41 (6), 574–588. <https://doi.org/10.1016/j.jesp.2004.11.005>.
- Fornell, C., Bookstein, F.L., 1982. Two structural equation models: LISREL and PLS applied to consumer exit-voice theory. *J. Mark. Res.* 19 (4), 440–452. <https://doi.org/10.1177/00224378201900406>.
- Fornell, C., Larcker, D.F., 1981. Structural equation models with unobservable variables and measurement error: algebra and statistics. *J. Mark. Res.* 18 (3), 382. <https://doi.org/10.2307/3150980>.
- Forti, V., Balde, C.P., Kuehr, R., Bel, G., 2020. *The Global E-Waste Monitor 2020: Quantities, Flows and the Circular Economy Potential*.
- Franěk, M., Petružálek, J., Sefara, D., 2022. Facial expressions and self-reported emotions when viewing nature images. *Int. J. Environ. Res. Publ. Health* 19 (17), 10588.
- Fredrickson, B.L., 1998. What good are positive emotions? *Rev. Gen. Psychol.* 2 (3), 300–319. <https://doi.org/10.1037/1089-2680.2.3.300>.
- Frijda, N.H., 1986. *The Emotions*. Cambridge University Press.
- Gao, Lingling, Bai, Xuesong, 2014. A unified perspective on the factors influencing consumer acceptance of internet of things technology. *Asia Pac. J. Mark. Logist.* 26 (2), 211–231. <https://doi.org/10.1108/APJML-06-2013-0061>.
- Gray, J.M., Montemayor, E., Drennan, M., Widmann, M., Goldey, K.L., 2020. A mental winner effect? Competitive mental imagery impacts self-assurance but not testosterone in women. *Adaptive Human Behavior and Physiology* 6 (4), 467–489. <https://doi.org/10.1007/s40750-020-00149-x>.
- Guillanin, Joseph, 2009. Creative destruction and destructive creations: environmental ethics and planned obsolescence. *J. Bus. Ethics* 89 (SUPPL. 1), 19–28. <https://doi.org/10.1007/s10551-008-9907-9>.
- Hair, J., Ringle, C., Sarstedt, M., 2011. PLS-SEM: indeed a silver bullet. *J. Market. Theor. Pract.* 19 (2), 139–152.
- Hair, J., Sarstedt, M., Ringle, C., Mena, J., 2012. An assessment of the use of partial least squares structural equation modeling in marketing research. *J. Acad. Market. Sci.* 40 (3), 413–433.
- Harth, N.S., Leach, C.W., Kessler, T., 2013. Guilt, anger, and pride about in-group environmental behaviour: different emotions predict distinct intentions. *J. Environ. Psychol.* 34, 18–26. <https://doi.org/10.1016/j.jenvp.2012.12.005>.
- Henseler, J., Ringle, C.M., Sinkovics, R.R., 2009. The Use of Partial Least Squares Path Modeling in International Marketing, pp. 277–319. [https://doi.org/10.1108/S1474-7979\(2009\)0000020014](https://doi.org/10.1108/S1474-7979(2009)0000020014).
- Henseler, J., Hubona, G., Ray, P.A., 2016. Using PLS path modeling in new technology research: following guidelines. *Ind. Manag. Data Syst.* 116 (1), 2–20. <https://doi.org/10.1108/IMDS-09-2015-0382/FULL/PDF>.
- Hock, M., Ringle, C.M., 2010. Local strategic networks in the software industry: an empirical analysis of the value continuum. *Int. J. Knowl. Manag. Stud.* 4 (2), 132. <https://doi.org/10.1504/IJKMS.2010.030789>.
- Holmes-Rovner, Margaret, Kroll, Jill, Schmitt, Neal, Rovner, David R., Lynn Breer, M., Rothert, Marilyn L., Padonu, Georgia, Talarczyk, Geraldine, 1996. Patient satisfaction with health care decisions. *Med. Decis. Making* 16 (1), 58–64. <https://doi.org/10.1177/0272989X9601600114>.
- Hong, J., Kim, B., Oh, S., 2020. The relationship benefits of auto maintenance and repair service: a case study of Korea. *Behav. Sci.* 10 (7), 115. <https://doi.org/10.3390/BS10070115>.
- Hossain, M.J., Chang, H. J. Julie, Jones, R.P., 2025. I bought it and I feel good! An examination of fit factors and self-evaluation related to confident clothing decisions and psychological well-being. *J. Retailing Consum. Serv.* 84, 104167. <https://doi.org/10.1016/J.JRETCONSER.2024.104167>.
- Houston, M.J., Rotschild, M.L., 1977. *A Paradigm for Research on Consumer Involvement*.
- Hu, L.T., Bentler, P.M., 1998. Fit indices in covariance structure modeling: sensitivity to underparameterized model misspecification. *Psychol. Methods* 3 (4), 424–453. <https://doi.org/10.1037/1082-989X.3.4.424>.
- Huang, C.H., 2021. Using PLS-SEM model to explore the influencing factors of learning satisfaction in blended learning. *Educ. Sci. (Basel)* 11 (5), 249. <https://doi.org/10.3390/EDUCSCI11050249>, 2021.
- Hulland, J., 1999. Use of partial least squares (PLS) in strategic management research: a review of four recent studies. *Strateg. Manag. J.* 20 (2), 195–204. [https://doi.org/10.1002/\(SICI\)1097-0266\(199902\)20:2<195::AID-SMJ13>3.0.CO;2-7](https://doi.org/10.1002/(SICI)1097-0266(199902)20:2<195::AID-SMJ13>3.0.CO;2-7).
- Hummel, K., Jobst, D., 2024. An overview of corporate sustainability reporting legislation in the European union. *Account. Eur.* 21 (3), 320–355. <https://doi.org/10.1080/17449480.2024.2312145>.
- Hutcherson, C.A., Gross, J.J., 2011. The moral emotions: a social-functionalist account of anger, disgust, and contempt. *Journal of Personality and Social Psychology* 100 (4), 719–737. <https://doi.org/10.1037/a0022408>.
- Jang, S. Shawn, Namkung, Y., 2009. Perceived quality, emotions, and behavioral intentions: application of an extended Mehrabian-Russell model to restaurants. *J. Bus. Res.* 62 (4), 451–460. <https://doi.org/10.1016/j.jbusres.2008.01.038>.
- Jin, H., Lin, Z., McLeay, F., 2020. Negative emotions, positive actions: food safety and consumer intentions to purchase ethical food in China. *Food Qual. Prefer.* 85, 103981. <https://doi.org/10.1016/j.foodqual.2020.103981>.
- Jin, C., Yang, L., Zhu, C., 2023. Right to repair: pricing, welfare, and environmental implications. *Manag. Sci.* 69 (2), 1017–1036.
- Jonauskaitė, D., Abu-Akel, A., Dael, N., Oberfeld, D., Abdel-Khalek, A.M., Al-Rasheed, A. S., et al., 2020. Universal patterns in color-emotion associations are further shaped by linguistic and geographic proximity. *Psychol. Sci.* 31 (10), 1245–1260.
- Joshi, Y., Rahman, Z., 2017. Investigating the determinants of consumers' sustainable purchase behaviour. *Sustain. Prod. Consum.* 10, 110–120.
- Joshi, Y., Rahman, Z., 2019. Consumers' sustainable purchase behaviour: modeling the impact of psychological factors. *Ecol. Econ.* 159, 235–243. <https://doi.org/10.1016/j.ecolecon.2019.01.025>.
- Kallweit, K., Spreer, P., Toporowski, W., 2014. Why do customers use self-service information technologies in retail? The mediating effect of perceived service quality. *J. Retailing Consum. Serv.* 21 (3), 268–276. <https://doi.org/10.1016/J.JRETCONSER.2014.02.002>.
- Klemm, C., Kaufman, S., 2024. The importance of circular attributes for consumer choice of fashion and textile products in Australia. *Sustain. Prod. Consum.* 45, 538–550.
- Kock, N., 2015. Common method bias in PLS-SEM: a full collinearity assessment approach. *Int. J. e-Collaboration* 11 (4), 1–10. <https://doi.org/10.4018/IJEC.2015100101>.
- Koenig-Lewis, N., Palmer, A., 2014. The effects of anticipatory emotions on service satisfaction and behavioral intention. *J. Serv. Market.* 28 (6), 437–451. <https://doi.org/10.1108/JSM-09-2013-0244>.
- Kwon, J., Ahn, J., 2021. Socio-demographic characteristics and green consumption behavior in developing countries: the case of Malaysia. *Soc. Responsib. J.* 17 (8), 1213–1231. <https://doi.org/10.1108/SRJ-02-2020-0071/FULL/XML>.
- Laitala, K., Klepp, I.G., Haugrønning, V., Throne-Holst, H., Strandbakken, P., 2021. Increasing repair of household appliances, mobile phones and clothing: experiences from consumers and the repair industry. *J. Clean. Prod.* 282, 125349. <https://doi.org/10.1016/J.JCLEPRO.2020.125349>.
- Landmann, E., 2023. I can see how you feel—methodological considerations and handling of Noldus's FaceReader software for emotion measurement. *Technol. Forecast. Soc. Change* 197, 122889.
- Larson, K.L., Edsall, R.M., 2010. The impact of visual information on perceptions of water resource problems and management alternatives. *J. Environ. Plann. Manag.* 53 (3), 335–352. <https://doi.org/10.1080/09640561003613021>.
- Lechner, G., Krafzig, V., Güsser-Fachbach, I., 2024. How can repair businesses improve their service? Consumer priorities concerning operational aspects of repair services. *Resour. Conserv. Recycl.* 204. <https://doi.org/10.1016/j.resconrec.2024.107501>.
- Lerner, J.S., Keltner, D., 2001. Fear, anger, and risk. *Journal of Personality and Social Psychology* 81 (1), 146–159. <https://doi.org/10.1037/0022-3514.81.1.146>.
- Lerner, J.S., Tiedens, L.Z., 2006. Portrait of the angry decision maker: how appraisal tendencies shape anger's influence on cognition. *J. Behav. Decis. Making* 19 (2), 115–137. <https://doi.org/10.1002/bdm.515>.
- Levinthal, D.A., Purohit, D., 1989. Durable goods and product obsolescence. *Mark. Sci.* 8 (1), 35–56. <https://doi.org/10.1287/mksc.8.1.35>.
- Lewinski, P., 2015. Don't look blank, happy, or sad: patterns of facial expressions of speakers in banks' YouTube videos predict video's popularity over time. *Journal of Neuroscience, Psychology, and Economics* 8 (4), 241.
- Lewinski, P., Franssen, M.L., Tan, E.S., 2014. Predicting advertising effectiveness by facial expressions in response to amusing persuasive stimuli. *Journal of Neuroscience, Psychology, and Economics* 7 (1), 1.
- Liang, D., Hou, C., Jo, M.S., Sarigöllü, E., 2019. Pollution avoidance and green purchase: the role of moral emotions. *J. Clean. Prod.* 210, 1301–1310. <https://doi.org/10.1016/j.jclepro.2018.11.103>.
- Lin, C., Bhattacharjee, A., 2010. Extending technology usage models to interactive hedonic technologies: a theoretical model and empirical test. *Inf. Syst. J.* 20 (2), 163–181. <https://doi.org/10.1111/j.1365-2575.2007.00265.x>.
- Llovetas, J., Pansera, M., Smith, A., 2024. On 'the politics of repair beyond repair': radical democracy and the right to repair movement. *J. Bus. Ethics* 1–20.
- Lowe, S., Athwal, A., Tema, A., Yue, L., Allan, L., Wu, F.-W., 2019. Sadness : exploring the impact of emotional manipulation on environmental behaviours. <https://doi.org/10.14288/1.0387170>.
- Maceachren, A.M., Brewer, I., 2004. Developing a conceptual framework for visually-enabled geocollaboration. *Int. J. Geogr. Inf. Sci.* 18 (1), 1–34. <https://doi.org/10.1080/13658810310001596094>.
- Maduku, D.K., 2024. How environmental concerns influence consumers' anticipated emotions towards sustainable consumption: the moderating role of regulatory focus. *J. Retailing Consum. Serv.* 76. <https://doi.org/10.1016/j.jretconser.2023.103593>.
- Mak, V., Terry, E., 2020. Circular economy and consumer protection: the consumer as a citizen and the limits of empowerment through consumer law. *J. Consum. Pol.* 43 (1), 227–248.
- Makov, T., Fitzpatrick, C., 2021. Is reparability enough? big data insights into smartphone obsolescence and consumer interest in repair. *J. Clean. Prod.* 313. <https://doi.org/10.1016/j.jclepro.2021.127561>.
- Mandolfo, M., Bettiga, D., Noci, G., 2023. Advancing user research in naturalistic gambling environments through behaviour tracking. A pilot study. In: *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, pp. 229–245. https://doi.org/10.1007/978-3-031-34668-2_16, 14036 LNCS.
- Marikyan, D., Papagiannidis, S., 2024. Exercising the 'right to repair': a customer's perspective. *J. Bus. Ethics* 193 (1), 35–61.
- Maxham III, J.G., 2001. Service recovery's influence on consumer satisfaction, positive word-of-mouth, and purchase intentions. *J. Bus. Res.* 54 (1), 11–24.

- McKinney, V., Yoon, K., Zahedi, F.M., 2002. The measurement of web-customer satisfaction: An expectation and disconfirmation approach. *Inform. Syst. Res.* 13 (3), 296–315.
- McKnight, P.E., Najab, J., 2010. Mann-whitney U test. The Corsini Encyclopedia of Psychology 1–1. <https://doi.org/10.1002/9780470479216.CORPSY0524>.
- Ménard, Mickael, Richard, Paul, Hamdi, Hamza, Daucé, Bruno, Yamaguchi, Takehiko, 2015. Emotion recognition based on heart rate and skin conductance. In: *Proceedings of the 2nd International Conference on Physiological Computing Systems*. SCITEPRESS - Science and Technology Publications, pp. 26–32. <https://doi.org/10.5220/0005241100260032>.
- Meneses, G.D., 2010. Refuting fear in heuristics and in recycling promotion. *J. Bus. Res.* 63 (2), 104–110. <https://doi.org/10.1016/j.jbusres.2009.02.002>.
- Moons, I., de Pelsmacker, P., 2012. Emotions as determinants of electric car usage intention. *J. Market. Manag.* 28 (3–4), 195–237. <https://doi.org/10.1080/00267257X.2012.659007>.
- Moore, G.C., Benbasat, Izak, 1991. Development of an instrument to measure the perceptions of adopting an information technology innovation. *Inform. Syst. Res.* 2 (3), 192–222. <https://doi.org/10.1287/isre.2.3.192>.
- Morris, W.N., Reilly, N.P., 1987. Toward the self-regulation of mood: theory and research. *Motiv. Emot.* 11 (3), 215–249. <https://doi.org/10.1007/BF01001412>.
- Mrad, M., Semaan, R.W., Christodoulides, G., Prandelli, E., 2025. Give me a second life! Extending the life-span of luxury products through repair. *J. Retail. Consum. Serv.* 82, 104055.
- Mugge, R., Schoormans, J.P.L., Schifferstein, H.N.J., 2005. Design strategies to postpone consumers' product replacement: the value of a strong person-product relationship. *Des. J.* 8 (2), 38–48. <https://doi.org/10.2752/146069205789331637>.
- Nadro, M., Sivarajah, U., Charles, V., Rana, N.P., Surucu-Balci, E., 2024. Fostering sustainable consumer behaviour: unravelling the determinants of repair intentions for smart appliances. *J. Environ. Manag.* 369, 122262.
- Neubig, C.M., Roosen, J., 2024. Can I still eat this? Using implicit and explicit measures to explore consumer behavior toward food products with date labels. *Appetite* 200. <https://doi.org/10.1016/j.appet.2024.107556>.
- O'Neill, S.J., Smith, N., 2014. Climate change and visual imagery. In: *Wiley Interdisciplinary Reviews: Climate Change*, vol. 5. Wiley-Blackwell, pp. 73–87. <https://doi.org/10.1002/wcc.249>. Issue 1.
- Parajuly, K., Kuehr, R., Awasthi, A.K., Fitzpatrick, C., Lepawsky, J., Smith, E., Widmer, R., Zeng, X., 2019. Future E-Waste Scenarios.
- Podsakoff, P., MacKenzie, S., Lee, J., Podsakoff, N., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J. Appl. Psychol.* 88 (5), 879–903. <http://psycnet.apa.org/journals/apl/88/5/879/>.
- Poppelaars, F., Bakker, C., van Engelen, J., 2020. Design for divestment in a circular economy: stimulating voluntary return of smartphones through design. *Sustainability* 12 (4), 1488. <https://doi.org/10.3390/su12041488>.
- Poskus, M.S., Valickiene, R.P., Kuzinas, A., 2019. The effects of descriptive imagery and appeals on emotions and intentions related to pro-environmental behavior. *Sustainability* 11 (19). <https://doi.org/10.3390/su11195257>.
- Raafat, R.M., Chater, N., Frith, C., 2009. Herding in humans. *Trends Cognit. Sci.* 13 (10), 420–428. <https://doi.org/10.1016/j.tics.2009.08.002>.
- Ricciolini, E., Rocchi, L., Cardinali, M., Paolotti, L., Ruiz, F., Cabello, J.M., Boggia, A., Rocchi, L., 2022. Assessing progress towards SDGs implementation using multiple reference point based multicriteria methods: the case study of the European countries. *Springer* 162 (3), 1233–1260. <https://doi.org/10.1007/s11205-022-02886-w>.
- Richards, D.J., Allenby, B.R. (Eds.), 1994. *The Greening of Industrial Ecosystems*. National Academies Press.
- Roseman, I.J., 1991. Appraisal determinants of discrete emotions. *Cognit. Emot.* 5 (3), 161–200. <https://doi.org/10.1080/02699939108411034>.
- Rosenberg, B.D., Siegel, J.T., 2018. A 50-year review of psychological reactance theory: do not read this article. *Motivation Science* 4 (4), 281–300. <https://doi.org/10.1037/MOT0000091>.
- Roskladka, N., Jaegler, A., Miragliotta, G., 2023. From “right to repair” to “willingness to repair”: exploring consumer's perspective to product lifecycle extension. *J. Clean. Prod.* 432 (139705).
- Rozin, P., Lowery, L., Imada, S., Haidt, J., 1999. The CAD triad hypothesis: a mapping between three moral emotions (contempt, anger, disgust) and three moral codes (community, autonomy, divinity). *Journal of Personality and Social Psychology* 76 (4), 574–586. <https://doi.org/10.1037/0022-3514.76.4.574>.
- Sabbaghi, M., Esmailian, B., Cade, W., Wiens, K., Behdad, S., 2016. Business outcomes of product reparability: a survey-based study of consumer repair experiences. *Resour. Conserv. Recycl.* 109, 114–122.
- Saffaryazdi, N., Wasim, S.T., Dileep, K., Nia, A.F., Nanayakkara, S., Broadbent, E., Billingham, M., 2022. Using facial micro-expressions in combination with EEG and physiological signals for emotion recognition. *Front. Psychol.* 13, 864047.
- Sainfort, François, Bridget, C. Booske, 2000. Measuring post-decision satisfaction. *Med. Decis. Making* 20 (1), 51–61. <https://doi.org/10.1177/0272989X0002000107>.
- Scharfstein, D.S., Stein, J.C., 1990. Herd behavior and investment. *Am. Econ. Rev.* 465–479.
- Schneider, C.R., an der Linden, S., 2023. An emotional road to sustainability: how affective science can support pro-climate action. *Emotion Review* 15 (4), 284–288.
- Schoefer, K., Diamantopoulos, A., 2008. The role of emotions in translating perceptions of (In)justice into postcomplaint behavioral responses. *J. Serv. Res.* 11 (1), 91–103. <https://doi.org/10.1177/1094670508319091>.
- Shang, D., Wu, W., 2022. Does green morality lead to collaborative consumption behavior toward online collaborative redistribution platforms? Evidence from emerging markets shows the asymmetric roles of pro-environmental self-identity and green personal norms. *J. Retail. Consum. Serv.* 68, 102993.
- Shaver, P., Schwartz, J., Kirson, D., O'Connor, C., 1987. Emotion knowledge: further exploration of a prototype approach. *Journal of Personality and Social Psychology* 52 (6), 1061–1086. <https://doi.org/10.1037/0022-3514.52.6.1061>.
- Sherman, E., Mathur, A., Smith, R.B., 1997. Store environment and consumer purchase behavior: mediating role of consumer emotions. *Psychol. Market.* 14 (4), 361–378.
- Siedlecka, E., Denson, T.F., 2019. Experimental methods for inducing basic emotions: a qualitative review. *Emotion Review* 11 (1), 87–97. <https://doi.org/10.1177/1754073917749016>.
- Skienziel, T., Rösch, A.G., Schultheiss, O.C., 2019. Assessing the convergent validity between the automated emotion recognition software Noldus FaceReader 7 and facial action coding system scoring. *PLoS One* 14 (10). <https://doi.org/10.1371/JOURNAL.PONE.0223905>.
- Smith, C.A., Lazarus, R.S., 1990. Emotion and adaptation. *Handbook of Personality: Theory and Research* 21, 609–637.
- Sonego, M., Echeveste, M.E.S., Debarba, H.G., 2022. Repair of electronic products: consumer practices and institutional initiatives. *Sustain. Prod. Consum.* 30, 556–565.
- Su, B.C., Wu, L.W., Lin, H., Lin, C.A., 2023. The mediating effect of herd behavior and brand attitude towards the impact of spokesman credibility, source fit, and online word-of-mouth on purchase intention. *Sustainability* 15 (1), 888.
- Sun, Heshan, 2013. A longitudinal study of herd behavior in the adoption and continued use of technology. *MIS Q.* 37 (4), 1013–1041. <https://doi.org/10.25300/MISQ/2013/37.4.02>.
- Svensson-Hoglund, S., Richter, J.L., Maitre-Ekern, E., Russell, J.D., Pihlajarinne, T., Dalhammar, C., 2021. Barriers, enablers and market governance: a review of the policy landscape for repair of consumer electronics in the EU and the U.S. *J. Clean. Prod.* 288. <https://doi.org/10.1016/j.jclepro.2020.125488>.
- Taylor, Shirley, Todd, Peter, 1995. Decomposition and crossover effects in the theory of planned behavior: a study of consumer adoption intentions. *Int. J. Res. Market.* 12 (2), 137–155. [https://doi.org/10.1016/0167-8116\(94\)00019-K](https://doi.org/10.1016/0167-8116(94)00019-K).
- Testa, F., Gusmerotti, N., Corsini, F., Bartoletti, E., 2022. The role of consumer trade-offs in limiting the transition towards circular economy: the case of brand and plastic concern. *Resour. Conserv. Recycl.* 181. <https://doi.org/10.1016/j.resconrec.2022.106262>.
- Tian, Y., Kanade, T., Cohn, J.F., 2001. Recognizing action units for facial expression analysis. *IEEE Trans. Pattern Anal. Mach. Intell.* 23 (2), 97–115. <https://doi.org/10.1109/34.908962>.
- Todeschini, B.V., Cortimiglia, M.N., Callegaro-de-Menezes, D., Ghezzi, A., 2017. Innovative and sustainable business models in the fashion industry: entrepreneurial drivers, opportunities, and challenges. *Bus. Horiz.* 60 (6), 759–770. <https://doi.org/10.1016/j.bushor.2017.07.003>.
- Touré-Tillery, M., Steinmetz, J., DiCosola, B., 2022. Feeling judged? How the presence of outgroup members promotes healthier food choices. *Psychol. Market.* 39 (8), 1504–1510.
- Troebs, C.C., Wagner, T., Heidemann, F., 2018. Transformative retail services: elevating loyalty through customer well-being. *J. Retailing Consum. Serv.* 45, 198–206. <https://doi.org/10.1016/j.jretconser.2018.09.009>.
- van Nes, N., Cramer, J., 2005. Influencing product lifetime through product design. *Bus. Strat. Environ.* 14 (5), 286–299. <https://doi.org/10.1002/bse.491>.
- Vedadi, Ali, Warkentin, Merrill, 2020. Can secure behaviors be contagious? A two-stage investigation of the influence of herd behavior on security decisions. *J. Assoc. Inform. Syst.* 21 (2), 428–459. <https://doi.org/10.17705/1jais.00607>.
- Venkatesh, Morris, Davis, Davis, 2003. User acceptance of information technology: toward a unified view. *MIS Q.* 27 (3), 425–478. <https://doi.org/10.2307/30036540>.
- Vinzi, V.E., Trinchera, L., Amato, S., 2010. PLS path modeling: from foundations to recent developments and open issues for model assessment and improvement. *Handbook of Partial Least Squares* 47–82. https://doi.org/10.1007/978-3-540-32827-8_3.
- Wang, J., Wu, L., 2016. The impact of emotions on the intention of sustainable consumption choices: evidence from a big city in an emerging country. *J. Clean. Prod.* 126, 325–336.
- Werts, C.E., Linn, R.L., Jöreskog, K.G., 1974. Intraclass reliability estimates: testing structural assumptions. *Educ. Psychol. Meas.* 34 (1), 25–33. <https://doi.org/10.1177/001316447403400104>.
- White, C., 2015. The impact of motivation on customer satisfaction formation: a self-determination perspective. *Eur. J. Market.* 49 (11/12), 1923–1940.
- White, K., Habib, R., Hardisty, D.J., 2019. How to SHIFT consumer behaviors to be more sustainable: a literature review and guiding framework. *J. Market.* 83 (3), 22–49. <https://doi.org/10.1177/0022242919825649>.
- Woon, I., Tan, G.-W., Low, R., 2005. A protection motivation theory approach to home wireless security. *ICIS 2005 Proceedings*.
- Xie, C., Bagozzi, R.P., Grønhaug, K., 2015. The role of moral emotions and individual differences in consumer responses to corporate green and non-green actions. *J. Acad. Market. Sci.* 43 (3), 333–356. <https://doi.org/10.1007/s11747-014-0394-5>.
- Xu, Y., Du, J., Khan, M.A.S., Jin, S., Altaf, M., Anwar, F., Sharif, I., 2022. Effects of subjective norms and environmental mechanism on green purchase behavior: an extended model of theory of planned behavior. *Front. Environ. Sci.* 10. <https://doi.org/10.3389/fenvs.2022.779629>.
- Yan, W.J., Wu, Q., Liang, J., Chen, Y.H., Fu, X., 2013. How fast are the leaked facial expressions: the duration of micro-expressions. *J. Nonverbal Behav.* 37 (4), 217–230. <https://doi.org/10.1007/s10919-013-0159-8>.
- Yusuf, S., Hafeez-Baig, A., Soar, J., Teik, D.O.L., 2020. PLS-SEM path analysis to determine the predictive relevance of e-Health readiness assessment model. *Health Technol.* 10 (6), 1497–1513. <https://doi.org/10.1007/s12553-020-00484-9>.

- Zheng, X., Men, J., Yang, F., Gong, X., 2019. Understanding impulse buying in mobile commerce: an investigation into hedonic and utilitarian browsing. *Int. J. Inf. Manag.* 48, 151–160. <https://doi.org/10.1016/j.ijinfomgt.2019.02.010>.
- Zhou, G., Yuan, S., Xing, H., Jiang, Y., Geng, P., Cao, Y., Ben, X., 2023. Micro-expression action unit recognition based on dynamic image and spatial pyramid.
- J. Supercomput. 79 (17), 19879–19902. <https://doi.org/10.1007/S11227-023-05409-7>.
- Zillmann, D., 1988. Mood management: using entertainment to full advantage. In: *Communication, Social Cognition, and Affect (PLE: Emotion)*. Psychology Press, pp. 147–171. <https://doi.org/10.4324/9781315743974-8>. Psychology Press.