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A Synergy Effect of Consumer Orientation and Disruptive Information on Choice in Remanufactured Products

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Abstract: Consumers typically exhibit loyalty unless swayed by decisions rooted in rational choice theory, encompassing preferences, information, costs, and gains. Convincing newness-oriented consumers to shift beliefs and embrace 'like new' products, especially those drawn to novelty, is difficult. While consumer orientation might seem tied to purchase intention, this study delves into the potential of disruptive information to encourage consumers to revise their perceptions of remanufactured products that may have previously escaped their consideration. Doing so aims to enhance consumers' openness to embracing a circular economy. The research was conducted with a sample size of 1200 Japanese consumers. Remanufactured batteries were used as an illustrative example. The findings suggest that educating consumers through infographics could increase the acceptance of remanufactured batteries. We observed that when infographic information and consumer orientation work together, they produce a synergy effect, resulting in more impact than expected if they were considered separately. This approach could influence purchasing decisions and promote sustainability by emphasizing the economic and environmental benefits.

Keywords: sustainable consumption; consumer perception; infographics; remanufactured batteries; electric vehicle; Japanese consumers; newness-oriented consumers

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1. Introduction

In recent years, growing concerns over environmental degradation and resource depletion have underscored the pressing need for sustainable consumption practices [1]. As consumers become increasingly conscious of their ecological footprint, the demand for environmentally friendly products has surged [2]. This paradigm shift in consumer behavior has prompted researchers and practitioners to delve deeper into the factors influencing individuals' choices towards eco-friendly alternatives [1].

Remanufactured products strongly appeal to a specific segment of highly environmental and price-conscious consumers [3]. Driven by a commitment to sustainable living and a keen awareness of ecological consequences, these individuals find remanufactured products to be a seamless embodiment of their values, acknowledging the substantial resource conservation and waste reduction associated with such choices [4].

Atasu et al. [5] identify two distinct types of consumers in the context of remanufacturing: NOCs and FOCs. The "Newness oriented" consumers (hereafter called NOCs) are characterized by their preference for the latest products with cutting-edge features and designs [6]. They prioritize novelty and perceive remanufactured goods as potentially outdated or less fashionable [7]. Conversely, "functionality-oriented" consumers (hereafter called FOCs) prioritize a product's functional attributes and utility over its newness [5,8]. Valuing both the economic advantages and reliability of remanufactured goods, these

consumers prioritize quality and longevity, often considering their environmental benefits as an additional incentive [5].

For the FOCs, the decision to opt for remanufactured products is relatively straightforward, driven by their emphasis on practical utility and economic value [5]. However, the NOCs favor novel, new products, potentially overlooking remanufactured alternatives [5]. Hence, the challenge lies in devising strategies to effectively transition this latter group of consumers towards embracing remanufactured offerings, necessitating a nuanced approach to cater to their preferences and motivations.

Upon adopting products, consumers tend to maintain loyalty unless influenced to change. As the rational choice theory suggests, this stems from decisions rooted in rational calculations, even if inaccurately assessed, considering preferences, information, costs, and benefits [9]. Thus, attempting to shift consumer beliefs and opt for non-new or 'like new' products is generally challenging for NOCs. Nonetheless, consumers are open to adopting beliefs, and as the cognitive dissonance theory suggests, they can remove dissonant conditions and then add new consonant cognitions after receiving information about products that align with existing ones and do not conflict with their current beliefs [10]. In this context, NOCs might harbor worries regarding emission gases and acknowledge the advantages of emission reduction. However, their preference still leans toward selecting new products. Nevertheless, upon being presented with infographic details about remanufactured products, they could effectively eliminate the conflicting factors influencing their choice of remanufactured products [11].

In this context, employing diverse forms of infographic information, including video, may reshape the perceptions of NOCs towards remanufactured products, subsequently influencing their purchasing behavior [12–14]. The visual depiction of the remanufacturing process can bridge the knowledge gap, enlightening consumers about the environmental benefits and resource conservation entailed in choosing remanufactured products [4]. Furthermore, these visual narratives can highlight the equivalency of performance and longevity between remanufactured and new products, thus diminishing apprehensions regarding functional attributes. Within this framework, infographics may significantly impact consumer behaviors regarding remanufactured products, particularly among those unfamiliar with the environmental advantages and reliability they offer.

While one might expect a direct correlation between consumer orientation and purchase intention, our study introduces a novel factor: the role of disruptive information in purchase behavior. In this study, we investigate if we could modify consumer behavior to align with their moral beliefs, adopting more sustainable practices. More specifically, we examined whether infographics influence the relationship between consumer orientation and perception toward remanufactured products. Our research illuminates unexplored areas, potentially uncovering how information presentation shapes choices in remanufactured products.

This study is structured as follows: First, we review past research on functionality orientation and information availability, then present the research questions. Second, we explain the research method. Third, we provide the results of data analyses. Finally, we offer a discussion and conclusion of the study.

2. Literature Review and Research Hypotheses

Consumer orientation in remanufacturing refers to an individual's attitudes, values, and preferences about products undergoing remanufacturing processes [5]. This orientation can vary based on environmental consciousness, value-seeking behavior, and perceptions of quality and functionality. Consumers who prioritize sustainability might have a more positive orientation toward remanufactured products due to their reduced environmental impact [15]. Consumer behaviors in remanufacturing encompass consumers' actions when considering, purchasing, and using remanufactured products [8]. This includes researching, evaluating quality, comparing prices, and ultimately making a decision [8,15]. Behaviors may also extend to post-purchase actions, like product maintenance and disposal

practices [16]. In the context of remanufacturing, consumer orientation and behaviors are intricately connected factors that play a significant role in shaping the adoption and success of remanufactured products [5,8,15].

Consumers tend to remain loyal to their product choices unless influenced to change. Rational choice theory suggests that loyalty is rooted in rational calculations, considering preferences, information, costs, and benefits [9,17]. Shifting consumer beliefs towards non-new or 'like new' products can be challenging for NOCs. However, consumers are open to adopting new beliefs that encourage change when new information complements existing beliefs [10].

Transparent communication and positive remanufactured product experiences are pivotal in influencing trust, consumer decisions, and the acceptance of novel offerings. Consumer orientation, shaped by an awareness of remanufactured products [5], can be positively influenced by remanufacturers providing clear information about the process, thus guiding informed purchasing decisions. Similar to understanding the benefits of organic products [8], educating consumers about the intricacies of remanufacturing is essential. Collaborative industry efforts, educational campaigns, and targeted marketing are crucial in increasing awareness and adoption [18], highlighting the environmental advantages and financial benefits of remanufacturing [7,8].

Visual content, encompassing videos, images, and infographics, is a highly effective strategy for marketing remanufactured goods and influencing consumer behavior [13]. These graphic elements simplify intricate information [14,19] and compellingly convey the quality and benefits of remanufactured products. Through compelling narratives, videos and images evoke emotions [13,14,20] and vividly illustrate the transformation from used to remanufactured items, accentuating their sustainability. Infographics facilitate the presentation of comparative insights, highlighting the positive environmental impact of remanufactured goods. Furthermore, visual content educates consumers about circular economy principles, fostering trust by showcasing the craftsmanship and innovation inherent in remanufacturing processes. Given their high shareability, visual materials resonate across social media platforms, broadening awareness [11]. Catering to diverse learning styles and making lasting impressions, visual content emerges as a potent tool to nurture consumer acceptance [13,14] and drive the adoption of remanufactured goods or have a synergy effect [21] on their behaviors, ultimately propelling sustainability goals.

Japanese consumers are often characterized as newness-oriented, strongly preferring to embrace novel and innovative products [5,22]. This consumer segment actively seeks and shows enthusiasm for new releases and cutting-edge offerings [5]. Their inclination toward technology, appreciation for trends, and desire to experience the latest products contribute to their status as newness-oriented consumers. This behavior shapes their purchasing decisions and influences the dynamics of the consumer market in Japan as they play a pivotal role in driving the demand for new products because of their confidence and trust in their quality, safety, and innovation [18,23,24]. We established the following hypothesis:

Hypothesis 1 (H1). *There is an interaction effect between consumer orientation and the infographic information on trust in remanufactured products.*

Moreover, contemporary consumer behavior is deeply influenced by a plethora of communication channels. These platforms prove instrumental in informing, educating, and fostering consumer trust, influencing decisions [25] to choose remanufactured goods. Employing user-friendly websites, consumers gain invaluable insights into the advantages, quality, and environmental benefits of utilizing remanufactured products, equipping them with the requisite information for informed purchasing [26]. In this context, social media channels serve as conduits for disseminating engaging content, success stories, and interactive posts that underscore the value of remanufactured products and promote emission reduction, creating a sense of community and sparking meaningful discussions that elevate consumer confidence [11,18]. We established the following hypothesis:

Hypothesis 2 (H2). *There is an interaction effect between consumer orientation and the infographic information on CO_2 emissions reduction when considering remanufacturing product purchases.*

Cognitive dissonance theory posits that individuals experience psychological discomfort when holding contradictory beliefs and attitudes or engaging in behaviors conflicting with their values [10]. Cognitive dissonance theory is relevant to sustainability by shedding light on the psychological processes influencing consumers' attitudes and behaviors toward sustainable practices [27]. For example, when individuals are aware of the importance of sustainable actions [28,29] (e.g., reducing emission gas) but engage in unsustainable behaviors (such as not considering this in their purchasing decisions), cognitive dissonance arises due to the inconsistency between their beliefs and actions. To reduce this discomfort, people might rationalize their behavior by downplaying the significance of the issue or seeking information that supports their actions [9]. In their 2020 study, Weder et al. [27] delved into individuals' perceptions of sustainability, examining how they connected with sustainability-related communications and integrated the concept into their personal experiences.

Consumers with a functionality-oriented mindset significantly influence their purchasing behavior, prioritizing practicality, value, and efficiency in their decisions. They meticulously research products, emphasize utilitarian features, assess long-term value, avoid unnecessary features and trends, and focus on product quality and performance to guide their choices [5]. For these consumers, selecting remanufactured goods is driven by emission reduction motives [8]. Remanufacturing extends product lifecycles, reducing material demand and emissions from energy-intensive processes, thus mitigating climate change impacts [18]. We established the following hypothesis:

Hypothesis 3 (H3). *There is an interaction effect between consumer orientation and the infographic information on the purchase intention of remanufactured products.*

Consumer loyalty is often rooted in rational calculations, driven by preferences, information, costs, and benefits [9]. Encouraging consumers to switch to non-new products is challenging. However, cognitive dissonance theory suggests that consumers can change their beliefs when presented with information that aligns with their existing views. In the context of environmentally friendly choices like remanufactured products, consumers may have concerns about emissions. Yet, providing informative infographics can help remove conflicting factors and influence their choice toward sustainability [11]. There are several important factors in consumers' perception of choices of remanufactured products. Among these, this study focuses on trust in remanufactured products, emissions reduction when considering remanufactured product purchases, and purchase intention of remanufactured products. This study aims to validate the validity of these hypotheses. Figure 1, presented below, visually portrays the connections among the variables within this study. It particularly highlights the interplay between consumer orientation (NOCs/FOCs) and the presence of an infographic (Yes/No) in influencing the choice of remanufactured products.

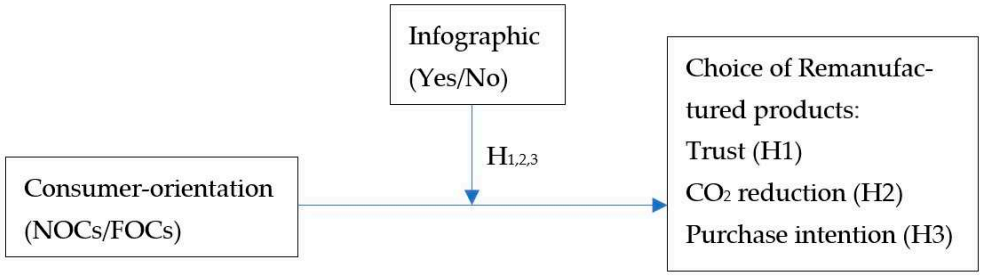

Figure 1. The relationships between variables.

Table 1 succinctly lists selected literature that forms the framework structuring our research and outlining the key components and their relationships in this research.

Table 1. Key Research for the Research Framework.

Framework [Researchers]	**Brief Description of Research**
Consumer orientation [Atasu et al. (2010)]	Atasu et al. [5] provide theoretical insights that significantly contribute to our understanding of customer profiles in the context of remanufactured products. They delineate two fundamental customer segments: the first group is characterized by a strong preference for novelty, while the second group prioritizes functionality. This distinction offers a comprehensive perspective on remanufacturing, encompassing aspects such as its historical sales trends, market structure, potential risks associated with cannibalization, limitations in the supply chain, and the dynamic influence of product life cycles. Their research enriches our comprehension of the multifaceted realm of customer preferences and the dynamics of remanufactured product markets.
Effect of infographics [Chandra (2023)]	Chandra [19] investigates how infographics enhance digital marketing campaigns, particularly in strengthening brand communication and reputation. Utilizing a qualitative approach, it finds that visually engaging infographics, easily shareable on social media, broaden marketing campaign reach and effectiveness. It concludes that by incorporating infographics, businesses could efficiently convey marketing messages, improve brand reputation, and impact consumer behavior cost-effectively.
Dependent variables in this research [Wang et al. (2018)]	The study by Wang et al. [18] investigates the impact of green attributes (energy saving, material saving, and emission reduction) and green certification on consumer perceptions of remanufactured auto parts in China. The research, using structural equation modeling, shows that information about energy saving, material saving, and emission reduction positively influences consumer perception of remanufactured products. Green certification interacts with the relationships between these attributes and trust. This study contributes to understanding how firms can shape consumer perceptions of remanufactured products, benefiting the discourse on remarketing these items and providing guidance to practitioners seeking to enhance the value of green certification and environmentally friendly features of remanufactured products.
Interaction effect in remanufacturing research [Li et al. (2018)]	Li et al. [21] address the interaction between remanufacturing and product quality improvements for sustainability. It finds conflicting results in past research: remanufacturing positively impacts product quality, but industry quality improvements may negatively affect remanufacturing. The study's stylized model reveals that changing manufacturing costs due to quality improvements is the main reason for these contradictions. When quality improvement significantly raises costs, companies may adopt remanufacturing when introducing new products, which is environmentally beneficial. Conversely, a small cost impact may lead to discontinuing remanufacturing, which is never environmentally advantageous. The study also highlights conditions where remanufacturing and non-remanufacturing manufacturers make different quality improvement decisions based on manufacturing costs. The impact of remanufacturing on quality improvement varies with low or high manufacturing costs. The research characterizes conditions favoring product quality improvement from an environmental perspective.

Table 1. *Cont.*

Framework [Researchers]	Brief Description of Research
Consumer behavior in remanufacturing research [Matsumoto et al. (2017)]	Matsumoto et al. [23] conducted a survey involving 440 U.S. and 300 Japanese respondents, focusing on individuals aged 18 to 70 who owned and primarily drove a car. They ensured the sample's distribution mirrored that of licensed drivers in their respective countries. Respondents rated their agreement on 17 items, covering four constructs: knowledge of remanufactured auto parts, perceived benefits, perceived risks, and price consciousness. The survey aimed to understand consumer perceptions. Items and scales for measuring these perceptions were adapted from previous studies with necessary modifications for cross-cultural relevance. Statistical analysis included independent-sample t-tests to compare the responses of U.S. and Japanese consumers. The study concludes that the remanufactured product market typically consists of three customer segments: those concerned with innovation, product functionality, and environmental impact. In Japan, there is a significant number of consumers who trust and are open to using remanufactured products when their environmental benefits are apparent.
Cognitive dissonance [Weder et al. (2020)]	The study by Weder et al. [27] introduces a concept to explain sustainability-related cognitive dissonance and explores individual perceptions of sustainability and moral conflicts, contributing to environmental communication research. The study engaged 35 interviewees from diverse cultural backgrounds to narrate sustainability-related life events. The research focused on analyzing the complete stories, linking them to individuals' backgrounds to understand motivations and moral conflicts regarding sustainable behavior. This paper discusses and critiques this theoretical concept and the innovative research approach in environmental communication to gain deeper insights into individual perceptions of sustainability, moral conflicts, and cognitive challenges related to sustainability issues.
Rational choice theory [Turaga et al. (2010)]	Turage et al. [17] provide theoretical insights to enrich our comprehension of the rational choice models used to elucidate environmentally responsible behaviors, such as recycling and the preference for eco-friendly products. Their research delves into the intricate relationship between these models and their broader implications for both the theoretical frameworks and practical applications within ecological economics. Through their examination, the paper not only sheds light on the mechanisms underlying pro-environmental choices but also offers valuable guidance for shaping ecological economic theories and practices in a sustainable direction.

3. Methodology

3.1. Scale of Measurement

In our series of analyses using Analysis of Variance (ANOVA), three dependent variables were employed, which were adapted from Wang et al. [18]. Below, we provide an overview of the variables employed in this study.

1. Independent variables:
    - Infographic: This variable represents the presence or absence of an infographic related to remanufactured products. It is a categorical variable that can be manipulated by providing participants with either a visual infographic or no infographic.
    - Consumer orientation: This variable refers to the individual's inclination toward sustainable consumption practices. It is a categorical variable: NOCs to FOCs.
2. Dependent variable:
    - Choice of remanufactured product: This variable represents the participant's decision to select a remanufactured product when given a choice. It is a continuous variable that assesses their intention to choose a remanufactured product.

These items encompass trust in remanufactured products, as indicated by the statement "Remanufacturing electric vehicle parts is our responsibility to address environmental issues"; consideration for emission reduction articulated as "When contemplating the purchase of remanufactured parts, I would factor in the reduction in CO_2 emissions compared to new parts"; and the intention to acquire remanufactured products, expressed as "I would opt for remanufactured parts as replacement parts for my electric car because they are more environmentally friendly". We assessed these three items using a seven-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (7). As independent variables, we utilized consumer orientation (FOCs vs. NOCs) and exposure to infographic information (viewed video vs. did not view video). The internal consistency of the dependent variable, trust, was demonstrated with a Cronbach's alpha of 0.955.

3.2. Data Collection

The study then conducted an online survey in January 2021 with the assistance of a professional web survey company. The sample consisted of 1200 Japanese citizens aged 18 years or older. The questionnaire was divided into three parts. The first part captured respondents' demographic information. The second part contained questions to determine respondents' orientation towards newness and functionality when evaluating a product. Lastly, the third part focused on respondents' choice of remanufactured EV parts.

In this study, remanufactured batteries were employed as components for electric vehicles (EVs). In the future, electric vehicle (EV) batteries will hold immense importance due to their pivotal role in combating climate change, reducing fossil fuel dependency, and integrating renewable energy sources. These batteries enable environmentally friendly transportation, increase energy efficiency, create economic opportunities, improve air quality, align with global climate goals, and enhance consumer savings. Additionally, EV batteries offer resilience through backup power capabilities during emergencies. As the world strives for a sustainable and low-carbon future, the significance of EV batteries extends far beyond transportation, shaping a cleaner, more energy-efficient, and economically viable future.

Japan represents a diverse and dynamic EV market, with a wide range of EV models from various manufacturers available to consumers. The presence of established automakers, such as Nissan and Toyota, alongside innovative newcomers, adds complexity to the consumer landscape, making it an intriguing subject for our study. Additionally, Japan's commitment to sustainability and environmental consciousness aligns with the overarching theme of our research, making it a relevant and insightful location for our survey. Purposeful sampling was employed to ensure a specific participant profile, following Patton's approach [26]. This technique involved selecting individuals who met the criteria for being newness-oriented consumers (NOCs). Respondents were provided with an explanation of remanufactured EV parts as "used parts that are collected, disassembled, inspected, cleaned, reassembled, and finally inspected again before being sold". All 1200 respondents were asked to complete three items, as summarized in Table 1, to determine their inclination towards newness or functionality [5]. According to Statista [30], approximately three percent of passenger cars sold in Japan were electric vehicles. In market research, product development, and marketing strategy, seeking feedback and insights about products that consumers have not yet purchased is common. This practice enables businesses to make informed decisions, customize their approaches, and align their offerings with consumer expectations. Ultimately, it leads to more effective product launches and successful marketing campaigns. By actively seeking feedback, businesses can better understand their target market and improve their overall strategies.

A total of 600 respondents who scored 1 or 2 for all three questions were categorized as NOCs and included in the study. A total of 600 respondents who scored 3 or 4 were classified as FOCs. Respondents who did not provide any responses or gave inconsistent answers (e.g., selecting 1 or 2 for one question and 3 or 4 for another) were also eliminated from the study. It should be noted that we pretested our questionnaire to identify any

potential issues with wording and formatting that could impact data quality. Table 2 reports respondents by consumer orientation and infographic.

Table 2. Respondents by consumer orientation and infographic information.

		Administration of Infographic Information	
		Viewed Video	**Did not View the Video**
Consumer orientation	NOCs	300	300
	FOCs	300	300

Using web surveys as a data collection tool offers advantages such as cost-efficiency, wide accessibility, responsive data collection, ease of administration, anonymity, customization, and real-time data validation. However, it has limitations, including limited accessibility for some populations, restricted question types, and security concerns. The decision to employ a web survey in this study was justified based on the target audience and available resources, with careful consideration of the method's strengths and weaknesses to ensure data validity and reliability.

Summary statistics about gender, age, and residential area are presented in Table 3. The sample maintains an equitable distribution between male and female respondents. Each age category within the sample population is proportionately represented. The sampling approach adopted in this study aligns with Japan's population distribution in regions (such as Hokkaido and Tohoku, Kanto), as the Japanese Statistics Bureau documented in 2017 [31].

Table 3. Summary of demographic statistics of respondents.

Demographic	**Category**	**Frequency**
Gender	Male	600
	Female	600
Age	18 to 29	300
	30 to 39	300
	40 to 49	300
	Over 50	300
Sample by area	% in the total sample in the study	% in total population in Japan [1]
Hokkaido and Tohoku	9.7	11.2
Kanto	43.4	34.1
Chubu	15.1	16.9
Kinki	19.5	17.7
Chugoku and Shikoku	5.8	8.8
Kyushu	6.6	11.3

[1] Source: Japan Statistics Bureau [31].

It should be noted that participant anonymity was diligently upheld during the survey, with clear assurances provided at the questionnaire's start. These assurances guaranteed the separation of personal identities from their responses during analysis. To encourage engagement, incentives were thoughtfully used and communicated upfront to participants. It is important to note that the survey was conducted independently without any sponsor involvement. This approach was chosen to safeguard the integrity and impartiality of the data collection process, maintaining its credibility. For participant selection, purposeful sampling techniques were employed. As detailed in the study, the recruitment process focused on identifying individuals who met the criteria for being newness-oriented consumers (NOCs) based on their preferences for newness or functionality. Our efforts were concentrated on reaching a diverse cohort of Japanese citizens aged 18 years and older. Table 4 summarizes the steps applied in the methods.

Table 4. Steps applied in the methods: Exploration, research design, and research execution.

Exploration	Research Questions	Literature Review	Hypotheses
	Does consumer orientation solely determine consumer behavior, or does the influence of consumer orientation vary based on the degree of infographic presence? Is there any way to influence the behaviors of newness-oriented consumers?	• Consumer orientation [5] • Effect of infographics [19] • Information and consumer behaviors [18] • Cognitive dissonance in sustainability issues [27] • Rational choice theory in environmentally responsible behavior [17] • Interaction effect in remanufacturing research [21]	There is an interaction effect between consumer orientation and the infographic information on trust (H1), emission reduction (H2), and purchase intention (H3) in remanufactured products.
Research design	Operationalization	Research method	Sampling
	Adaptation of reliable scale measurement (Wang et al., 2018) [18].	Quantitative methods are to be used since this research involves the analysis of numerical data.	Sample size, location, and conditions (Section 3.2).
Research execution	Pretest	Data collection	Data analysis
	Identification and enhancement of any wording issues in the questionnaire to ensure the quality of the data.	Data was gathered from diverse regions across Japan to mitigate data bias. (n = 1200).	Analysis of Variance (ANOVA) to examine interaction effects.

4. Results

The results for trust in remanufactured products are presented in Table 5 and Figure 2. After confirming data normality using Skewness tests (which fell within the specified range of −2 to 2) and Kurtosis tests (which fell within the criteria range of −7 to 7) for the test variables, a series of two-way ANOVA analyses were executed to investigate the potential interaction effect between consumer orientation and infographic information on three dependent variables: trust in remanufactured products, consideration for emission reduction, and purchase intention for remanufactured products. ANOVA offers several advantages over content analysis. Firstly, ANOVA allows for rigorous statistical testing and examining differences between multiple groups, providing quantitative significance measures. Additionally, ANOVA enables generalizability by utilizing random sampling and statistical inference, allowing us to conclude a relatively large population (n = 1200 in our study). It also simultaneously compares multiple groups or conditions, identifies significant differences, and highlights standout groups.

Table 5. Interaction between consumer orientation and infographic video on "trust in remanufactured products".

Source	Sum of Squares	DF	F-Value [3]
Consumer orientation [1]	24.65	1	13.72 ***
Infographic video [2]	52.08	1	28.97 ***
Orientation × Infographic	6.16	1	3.43 *
Error	2149.89	1196	

[1] NOCs (Newness-oriented consumers); FOCs (Functional-oriented consumers). [2] Viewed infographic video (Yes, No). [3] *** Significant at $p < 0.01$; * Significant at $p < 0.1$.

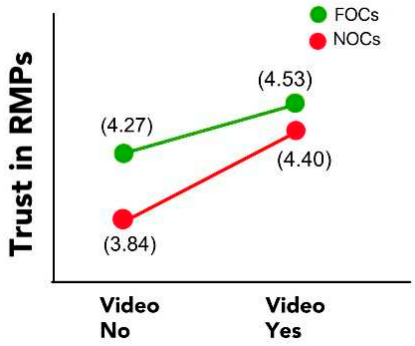

Figure 2. Interaction effect between consumer orientation and infographic video on "trust in remanufactured products".

While this study detected an impact of consumer orientation, as evidenced by $F(1, 1196) = 13.72$, $p < 0.01$, the influence of the infographic video was even more noticeable, as indicated by $F(1, 1196) = 28.97$, $p < 0.01$. Participants exposed to infographic videos about remanufactured products reported a higher level of "trust in remanufactured products" than those who were not exposed. Notably, the ANOVA results unveiled a significant interaction effect, as denoted by $F(1, 1196) = 3.43$, $p < 0.1$. See Table 5 for detailed information. The means regarding "trust in remanufactured products", categorized by consumer orientation and exposure to infographic video, are detailed in Table 6 and visually represented in Figure 2. These findings suggest that Hypothesis 1, as mentioned earlier, received support.

Table 6. Means of "trust in remanufactured products" by consumer orientation and infographic video.

Consumer Orientation	Infographic Video	Means of "Trust in Remanufactured Products" [1]
NOCs	Yes	4.40
	No	3.84
FOCs	Yes	4.53
	No	4.27

[1] A seven-point Likert scale anchored by "strongly disagree" (1) to "strongly agree" (7).

The results of "consideration for emission reduction" are displayed in Table 7 and Figure 3. This study identified a notable influence of consumer orientation, indicated by a significant effect ($F(1, 1196) = 20.81$, $p < 0.01$). Likewise, a comparable effect of the infographic video was observed ($F(1, 1196) = 14.60$, $p < 0.01$). Notably, the ANOVA results unveiled a significant interaction effect ($F(1, 1196) = 3.22$, $p < 0.1$), as detailed in Table 7. The means reflecting "consideration for emission reduction" based on consumer orientation and infographic video are presented in Table 8 and visually depicted in Figure 3. These results suggest that Hypothesis 2 received support.

Table 7. Interaction between consumer orientation and infographic video on "consideration for emission reduction".

Source	Sum of Squares	DF	F-Value [3]
Consumer orientation [1]	45.63	1	20.81 ***
Infographic video [2]	32.01	1	14.60 ***
Orientation × Infographic	7.05	1	3.22 *
Error	2622.34	1196	

[1] NOCs (Newness-oriented consumers); FOCs (Functional-oriented consumers). [2] Viewed infographic video (Yes, No). [3] *** Significant at $p < 0.01$; * Significant at $p < 0.1$.

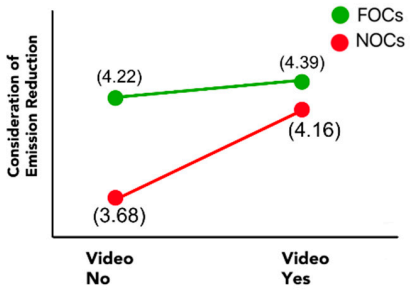

Figure 3. Interaction effect between consumer orientation and infographic video on "consideration for emission reduction".

Table 8. Means of "consideration for emission reduction" by consumer orientation and infographic video.

Consumer Orientation	Infographic Video	Means of "Consideration for Emission Reduction" [1]
NOCs	Yes	4.16
	No	3.68
FOCs	Yes	4.39
	No	4.22

[1] A seven-point Likert scale anchored by "strongly disagree" (1) to "strongly agree" (7).

Table 9 and Figure 4 depict the outcomes related to the "purchase intention of remanufactured products". In this study, a significant influence of consumer orientation was evident, demonstrated by a pronounced effect ($F(1, 1196) = 29.09$, $p < 0.01$). Similarly, a corresponding impact stemming from the infographic video was noted ($F(1, 1196) = 18.01$, $p < 0.01$). Moreover, the ANOVA outcomes disclosed a substantial interaction effect ($F(1, 1196) = 5.70$, $p < 0.05$), as delineated in Table 9. The mean values of "purchase intention of remanufactured products", contingent on consumer orientation and exposure to the infographic video, are outlined in Table 10 and visually depicted in Figure 4. Hypothesis 3 was supported.

Table 9. Interaction between consumer orientation and infographic video on "purchase intention of remanufactured products".

Source	Sum of Squares	DF	F-Value [3]
Consumer orientation [1]	49.61	1	29.09 ***
Infographic video [2]	30.72	1	18.01 ***
Orientation × Infographic	9.72	1	5.70 **
Error	2039.619	1196	

[1] NOCs (Newness-oriented consumers); FOCs (Functional-oriented consumers). [2] Viewed infographic video (Yes, No). [3] *** Significant at $p < 0.01$; ** Significant at $p < 0.05$.

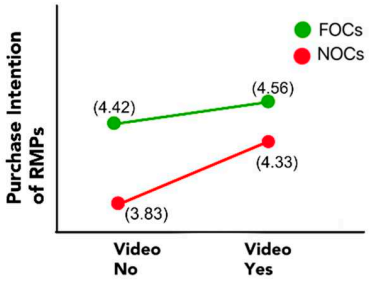

Figure 4. Interaction effect between consumer orientation and infographic video on "purchase intention of remanufactured products".

Table 10. Means of "purchase intention of remanufactured products" by consumer orientation and infographic video.

Consumer Orientation	Infographic Video	Means of "Purchase Intention of Remanufactured Products" [1]
NOCs	Yes	4.33
	No	3.83
FOCs	Yes	4.56
	No	4.42

[1] A seven-point Likert scale anchored by "strongly disagree" (1) to "strongly agree" (7).

Independent samples t-tests indicated no significant differences between NOCs who viewed the infographic video and FOCs who did not view the video in terms of "trust in remanufactured products" (t = 1.139, df = 598, p = 0.128), "consideration of emission reduction" (t = −0.512, df = 598, p = 0.305), and "purchase intention of remanufactured products" (t = −0.793, df = 598, p = 0.214). No statistical differences emerged between FOCs who viewed the video and those who did not (e.g., Purchase Intention (t = 1.278, df = 598, p = 0.101)). This aligns with FOCs valuing both economic advantages and reliability of remanufactured goods [5].

5. Discussion

The study investigated the interaction effects of consumer orientation and infographic information on trust in remanufactured products, consideration for emission reduction, and purchase intention for remanufactured products. The study results provide valuable insights into how consumer attitudes, information presentation, and psychological theories influence these crucial factors in consumers' perception of remanufactured products.

5.1. Trust in Remanufactured Products

The first hypothesis (H1) proposed an interaction effect between consumer orientation and infographic information on trust in remanufactured products. The results of the study supported this hypothesis. Participants exposed to infographic videos about remanufactured products reported a higher level of trust in remanufactured products than those not exposed. This finding is consistent with the literature, emphasizing the role of transparent communication and positive remanufactured product experiences in influencing trust and consumer decisions.

5.2. Consideration for Emission Reduction

Hypothesis 2 (H2) posited an interaction effect between consumer orientation and infographic information on emission reduction considerations when considering remanufactured product purchases. The results of the study supported this hypothesis as well. Consumer orientation and exposure to infographic videos notably influenced participants' concern for emission reduction. Consumers exposed to information about the environmental benefits of remanufactured products may have experienced less cognitive dissonance when considering these products, as the information aligned with their value for sustainability. The findings of this study imply consumers with an orientation toward functionality (FOCs) may have been influenced by the rational assessment of the emission reduction benefits of remanufactured products presented in the infographic information.

5.3. Purchase Intention of Remanufactured Products

The third hypothesis (H3) proposed an interaction effect between consumer orientation and infographic information on the purchase intention of remanufactured products. The study's results supported this hypothesis, revealing that consumer orientation and exposure to infographic videos significantly influenced participants' purchase intention for

remanufactured products. Infographics, as a form of visualization, can provide a powerful tool for businesses to legitimize their decisions in the eyes of stakeholders.

5.4. Theories of Cognitive Dissonance and Rational Choice

The results of our study provide a nuanced perspective on the intricate relationship between consumer orientation, infographic information, and key factors influencing the perception and adoption of remanufactured products. This discussion seeks to further elaborate on our findings while connecting them with relevant theoretical frameworks, such as the Cognitive Dissonance Theory and Rational Choice Theory, in order to gain a deeper understanding of the dynamics at play.

Our findings resonate strongly with the Cognitive Dissonance Theory, which posits that individuals experience psychological discomfort when holding contradictory beliefs and attitudes or engaging in behaviors conflicting with their values [10]. This theory is particularly relevant in the context of sustainability, as it sheds light on the psychological processes influencing consumers' attitudes and behaviors towards sustainable practices [24]. When individuals are aware of the importance of sustainable actions, such as reducing carbon emissions, but engage in unsustainable behaviors, cognitive dissonance arises due to the inconsistency between their beliefs and actions.

In our study, the consideration for emission reduction when contemplating the purchase of remanufactured products is a key aspect influenced by both consumer orientation and exposure to infographic information. Consumers who prioritize sustainability and have a more positive orientation towards remanufactured products may experience less cognitive dissonance when choosing these products, as the information presented in the infographics aligns with their values for environmental responsibility. Thus, our study provides empirical evidence that supports the Cognitive Dissonance Theory in the context of consumer choices related to remanufactured products.

Our study provides valuable insights into the complex interplay between consumer orientation, infographic information, and the perception and adoption of remanufactured products. As we navigate an increasingly sustainability-focused landscape, these insights are pivotal in shaping strategies for sustainable consumption and advancing environmental goals.

6. Conclusions

This study has provided valuable insights into the role of consumer orientation and infographic information in influencing trust, consideration for emission reduction, and purchase intention of remanufactured products. The findings are consistent with theories like Cognitive Dissonance Theory and Rational Choice Theory, highlighting the relevance of psychological processes and rational decision-making in consumer behavior.

These insights have practical implications for remanufacturers and marketers, emphasizing the need for targeted communication strategies that align with consumer orientations and leverage the principles of these theoretical frameworks. There are some limitations of this study. First, it underscores the potential of visual content, grounded in these theories, to educate consumers and promote the adoption of remanufactured products, contributing to sustainability goals and environmental benefits. Additionally, it is important to acknowledge that the scope of this paper is limited to a single-point cross-sectional analysis. Conducting a longitudinal study and incorporating international comparisons, i.e., the survey across multiple countries, would significantly enhance the depth of understanding regarding consumer orientation and the impact of disruptive information over time and across diverse cultural and geographical contexts. Still, such endeavors were beyond the scope of this particular research. Furthermore, we solely focused on static infographics. The analysis did not encompass animated infographics or consider elements like voices and sounds, which could potentially offer supplementary layers of insight into the dynamics explored in our research. Exploring these additional components in future investigations might yield a more comprehensive understanding of the subject matter. The authors im-

plemented procedures, including conducting a thorough analysis of the videos to identify biased information and ensure the inclusion of diverse perspectives. The authors aimed to ensure the study provides reliable and objective insights into consumer perceptions while taking appropriate measures to prevent undue influence from corporate messaging. However, the limitations and challenges of capturing and measuring such influences in a complex consumer landscape are acknowledged.

Future research in this domain could delve deeper into the interplay between these theoretical frameworks and consumer behavior, exploring how cognitive dissonance and rational choice interact in shaping consumer attitudes and behaviors in the context of sustainability and remanufactured products. Additionally, future research endeavors could delve into experimental studies that empirically identify which specific static and animated infographic components capture the most attention and exert the most significant influence on consumer preferences. This investigation could provide valuable insights into designing and optimizing information presentation techniques in marketing and communication strategies.

Overall, this study contributes to the growing body of knowledge on consumer behavior and the theoretical underpinnings that influence it in the context of sustainability and remanufacturing.

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