Sustainable Branding and Consumer Brand Perceptions in the Automotive Industry

The Role of Sustainability in Consumer Brand Evaluation in the Automotive Industry

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Abstract

Aim

This study investigates the influence of sustainability in determining customer brand perceptions in the automobile sector. While previous research has frequently focused on single-brand cases or electric vehicle (EV)-specific markets, this study examines the impact of sustainability on other brand-related factors such as price, perceived quality, design, trust, and innovativeness across multiple car brands with varying manufacturing strategies.

Methods

A quantitative survey was conducted to assess consumer impressions of four automobile brands: two that only produce electric vehicles, and two that provide electric and internal combustion engine versions. Prior to data collection, a brief pre-test allowed participants to identify the most well-known and environmentally conscious automobile manufacturers. The final poll (N = 163) included Likert-scale items that assessed characteristics such as brand image, loyalty, and major brand assessment qualities. Each brand was evaluated using the same thematic parts, and participants rated brands across these categories. Statistical analyses were carried out to determine the relative impact of each aspect on brand image.

Results

Exploratory factor analysis confirmed six core dimensions—Sustainability, Design & Innovation, Pricing, Trust & Quality, Brand Image, and Brand Loyalty—across all four brands. In regression models predicting Brand Image, Design & Innovation ($\beta = .33$ to $.63$, $p < .001$) and Trust & Quality ($\beta = .33$ to $.55$, $p < .001$) emerged as consistently strong predictors for all brands. Pricing was significant for BYD ($\beta = .41$, $p < .001$) and Mercedes-Benz ($\beta = .20$, $p < .05$), while Sustainability significantly influenced only Volvo's Brand Image ($\beta = .15$, $p < .05$)

and Tesla's to a marginal degree ($\beta = .15$, $p < .10$). For Brand Loyalty, Design & Innovation again showed robust effects ($\beta = .30$ to $.57$, $p < .001$) alongside Trust & Quality ($\beta = .22$ to $.48$, $p < .001$); Sustainability only significantly boosted loyalty for Volvo ($\beta = .33$, $p < .001$). Overall, Mercedes-Benz led in mean brand evaluations, followed by Volvo, Tesla, and BYD.

Conlcusion

Sustainability's role in shaping consumer brand evaluations is secondary to core attributes of design excellence, product quality and /trustworthiness, and – depending on the brand – price. Only Volvo's identity as an environmentally focused manufacturer translated "green" efforts into a stronger image and loyalty, while in other marques, sustainability had negligible or inconsistent effects. Thus, although environmental performance remains a differentiator for certain brands, automakers must prioritise innovative design and build consumer trust to drive brand strength across both EV-only and mixed-power portfolios.

Key-words: Sustainability, Brand Image, Automotive Industry, Electric Vehicles, Hybrid Vehicles, Brand Evaluation, Consumer Perception

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Introduction

Since the invention of the first car in 1886, the automotive industry has become an indispensable part of human life. Despite the countless advantages and unprecedented comfort levels, private vehicles have brought drastic consequences that humanity did not account for. According to Degirmenci & Breitner (2017), the transportation industry contributes to 23% of the global carbon dioxide (CO_2) emissions, with road transport being the largest contributor, responsible for around 74.5% of the sector's total emissions in 2018 (Orsato and Wells, 2007). Given the urgency of the current situation, numerous scholars, including Pai et al. (2023), have proposed that the national leaders should develop and implement specific policies to reduce the greenhouse gases (GHGs) produced by the automotive industry to combat climate change.

Consequently, governments worldwide have taken rigorous measures to develop alternative energy sources and new technology to minimise fossil fuel dependency. Hybrids and electric vehicles (EVs) are frequently recognised as promising solutions, owing to their ability to reduce CO_2 emissions when operated under appropriate charging conditions substantially (Iodice et al., 2010). Nevertheless, the genuine sustainability of EVs is a popular topic for debate. Recent life-cycle assessments illustrate that the environmental benefits of EVs' usage can be negated or even reversed by battery production processes and electricity mixtures dominated by fossil fuels (Pipitone et al., 2021). These unresolved doubts shift focus from engineering and technical challenges to the socio-economic and reputational ones.

As technology advances and social expectations evolve, the obstacles keep shifting. Park et al. (2018) highlighted that issues previously considered primary, such as vehicle weight and limited battery capacity, have become secondary to more pressing ones, particularly high vehicle costs and consumer scepticism regarding manufacturers' real commitment to sustainability

(Jansson et al., 2017). Consumers' evaluation of automotive brands extends beyond product performance and aesthetics to include the environmental impact of the vehicles and the brand's broader commitment to sustainability (Jansson et al., 2017). For instance, if the public perceives the brand's sustainability narrative as vague or inconsistent, they may become sceptical and distance themselves from the company (Park et al., 2018). Meanwhile, branding communications interpreted as genuinely green and aligned with the personal and social values of the consumers can result in a competitive advantage (Kathuria, 2021). The conflicting debates about whether electric vehicles are more sustainable than those running on fossil fuel are not solely technical. They are positioned in the centre of branding and consumer evaluation within the automotive industry. Due to the complexity and constant changes within the automotive niche, numerous brands, particularly those that continue to manufacture many internal-combustion models, prioritise technical innovation or performance over sustainability in their branding.

Consumer perceptions and behaviour are complex phenomena that are extremely difficult to track and predict. Much research has emerged in the last decade, aiming to comprehend and highlight the primary factors influencing consumer brand evaluation in the automotive industry, including price, design, quality, brand trustworthiness and innovativeness. However, very few existing studies have investigated the role of sustainability in the consumer responses toward the brands in the automotive industry (Tanveer et al., 2021). Khan and Fatma (2023) identified that consumers can more easily relate to brands that implement sustainable practices consistent with their values. Nevertheless, most empirical evidence about sustainability's role is obtained from other industries, such as fashion or aviation. Therefore, this paper addresses this knowledge insufficiency by evaluating how prominently perceived sustainability, compared with other brand attributes, shapes consumer evaluation in the automotive context.

In light of the information presented above, this study's primary research question is: “Compared to other factors, what is the role of sustainability in shaping consumer brand evaluation in the automotive industry?”

Given the multifaceted and increasingly prominent role of sustainability as a social, scientific, and economic concept (Orsato and Wells, 2007), this study aims to explore how it shapes consumer brand evaluation within the automotive industry. By examining sustainability alongside other influential factors, this research seeks to determine which attributes consumers prioritise and how these preferences vary across different demographic and psychographic groups. Furthermore, this study is interested in underlining possible differences between the brands that solely produce EVs and those that manufacture automobiles with the internal combustion engine, as well as hybrids and EVs.

The findings of this study can be of high informational and practical value for multiple stakeholders. Automotive manufacturers may use the insights to enhance the credibility and effectiveness of their sustainability strategies, while marketing professionals can better align brand messaging with consumer expectations. Additionally, policymakers who are invested in promoting more environmentally responsible consumption will find relevance in the behavioural patterns uncovered. Academically, this research contributes to ongoing discussions by addressing the underexplored role of sustainability in brand perception beyond the electric vehicle segment. Thereby supporting a more nuanced understanding of how sustainability interacts with other evaluative criteria in consumer decision-making within a rapidly evolving automotive landscape.

Theoretical Framework

This study utilises Suzuki and Dressel's (2002) tripartite sustainability model, which encompasses real, branded, and perceived sustainability, to better comprehend how environmental information is transmitted from manufacturer behaviour to consumer response in the automotive sector. Drawing from existing theories on consumer behaviour, perceived value, and brand image, this framework identifies five additional variables: trust (Mirabi et al., 2015), design (Stylidis et al., 2015), price (Sweeney and Soutar, 2001; Mirabi et al., 2015), innovativeness (Degirmenci and Breitner, 2017), and quality (Ali et al., 2014; Stylidis et al, 2015). Combined with sustainability, these cues shape consumer brand perception, consisting of brand image and brand loyalty (Milheiro et al., 2024). The resulting conceptual model showcases the relationships between the above-mentioned factors and underlines the study's testable hypotheses on sustainability's role in automotive brand evaluation.

Sustainability in the Automotive Industry

As a concept, sustainability is not recent. The first reference appeared in the final report "Our Common Future" issued by the The Brundtland Commission in 1987 (Al-Hallaj, S et al., 2012), stating that sustainability is a "development that meets the needs of the present without compromising the ability of the future generations to meet their own needs". Throughout the years, sustainability emerged as a reframer, reshaping the conventional ways governments, industries, and consumers address issues related to climate change, social inequality, and economic downfall.

According to Lukin et al. (2022), sustainability has gained societal relevance through the United Nations' Environmental Conferences, in which 17 Sustainable Development Goals

(SDGs) were identified, thereby institutionalising this phenomenon as a paramount factor to be considered across all sectors, especially in transportation and mobility.

The transportation industry has been undergoing significant changes due to the need to become more sustainable. According to Park et al. (2018), the International Energy Agency (2017) indicated that about 14% of GHGs were generated solely by the transportation sector worldwide. Jasiński et al. (2021) further underline that due to the high ecological and social footprint, such as water, air and noise pollution, the automotive industry faces severe pressure from policymakers and authorities to adhere to the recent sustainability policies. These regulations require automotive companies to decarbonise processes and operations throughout the entire life cycle, including assembly, disposal and possible recycling (Jasiński et al., 2021).

Given the circumstances and recent developments, sustainability has become a definitive phenomenon in the automotive industry's strategic discourse. Suzuki and Dressel (2002) proposed a tri-variable framework that conceptualises sustainability in this context: real, branded, and perceived sustainability.

Types of Sustainability

The distinction between real sustainability (objective environmental performance), branded sustainability (corporate sustainability messaging), and perceived sustainability (consumer interpretation and belief) is crucial in comprehending the role of sustainability in the automotive industry. These three dimensions are closely interrelated and remarkably influence consumer brand evaluation and consumer trust (OECD, 2000; Suzuki and Dressel, 2002).

Real Sustainability

Despite the increasing regulatory focus on promoting sustainable mobility, a substantial gap persists between real-world environmental performance and the marketed environmental

claims of automotive brands. For instance, in 2018, a 39 % discrepancy between real-world and laboratory-tested emissions persisted (Transport and Environment, 2020a). Although the European Union introduced new regulatory measures in 2021 to mitigate this gap, early evaluations suggest that loopholes continued to exist.

One prominent instance is the "super credit" system, wherein cars with laboratory emissions below 50 grams of CO_2 per kilometre were double-counted toward manufacturers' fleet emission targets (European Parliament and Council of the European Union, n.d.). Another critical loophole concerns plug-in hybrid electric vehicles (PHEVs), which, while classified as low-emission vehicles, often exhibit real-world emissions three to five times higher than their approval values. Studies show that private PHEVs are driven in electric mode only 45–49% of the time, and for company cars, the percentage drops even further to 11–15% (Transport and Environment, 2020b; Plötz et al., 2022). This misalignment between classification and actual usage may undermine the credibility of environmental performance claims and increase consumer scepticism.

In response, the European Commission proposed updates to vehicle classification standards in 2022 to more accurately reflect real-world environmental performance (Transport and Environment, 2022).

Branded Sustainability

As consumers have grown more aware of environmental issues (Degirmenci and Breitner, 2017), companies have started implementing sustainability into the brand and product narratives to promote consumer appeal and strengthen an ecologically proactive reputation (Nasir et al., 2020). The authors define branded sustainability as a strategic illustration of the environmental responsibilities and actions communicated through branding and marketing. In

this way, sustainability becomes not merely a corporate responsibility but a symbolic resource shaping and influencing consumer-brand relationships.

Empirical evidence suggests that sustainability-oriented branding significantly contributes to brand value, with consumers more inclined to support companies perceived as environmentally responsible and socially conscious (Ishaq and Di Maria, 2020). In the automotive industry, this is especially relevant, since the transition to EVs and PHEVs is not solely regulatory but also reputational (Loureiro et al., 2017). For instance, Volvo has been working toward reducing its carbon footprint per vehicle by 40% between 2018 and 2025. The company has published a new claim emphasising its commitment to becoming a climate-neutral company by 2040 (Sustainability Is as Important to Us as Safety | Volvo Cars, n.d.). Similarly, Mercedes-Benz's Ambition 2039 initiative aims for a net carbon-neutral new vehicle fleet by 2039, covering all lifecycle stages (Group, n.d.). Such projects emphasise the brand's long-term environmental vision, supporting the alignment of the brand's identity with the sustainable innovativeness (Loureiro et al., 2017).

Ishaq and Di Maria (2020) identify that from a psychological perspective, branded sustainability encompasses the compatibility between consumers and brands. According to Lukin et al. (2022), there has been an increased demand for environmentally friendly products. The increase was promoted by the desire of consumers to create positive associations with the purchased merchandise. The authors underline that consumers are more likely to exhibit favourable attitudes, stronger emotional engagement, and increased brand loyalty when consumers perceive that a brand shares their ecological and ethical commitments.

However, the strategic potential of branded sustainability is accompanied by ethical risks, most notably, greenwashing. Lukin et al. (2022) stated that brands that exaggerate and

misrepresent their sustainability efforts may achieve short-term consumer attention but ultimately undermine brand credibility and trust. When such discrepancies are exposed, consumers often feel misled, leading to disillusionment and reputational backlash, a phenomenon described as brand hypocrisy (Sajid et al., 2024).

This discrepancy highlights the paradoxical nature of branded sustainability. While it presents vast opportunities for consumers and organisations to favour eco-friendly choices, it can also be particularly harmful when used for the wrong reasons. In the age of informational accessibility, consumers can effortlessly identify inconsistencies between branded messages and a brand's environmental acts. Per observations of Loureiro et al. (2017), any perceived data falsification or manipulation may result in irreparable reputational damage.

Perceived Sustainability

Khan and Fatma (2023) defined perceived sustainability as consumers' cognitive and emotional evaluation of a brand's sustainability practices. Perceived sustainability is shaped by individual values and experiences associated with the brand. According to the authors, in contrast with branded sustainability, which reflects strategic communication of the environmental actions, perceived sustainability encompasses personal significance and credibility that consumers attribute to the brand.

Although organisations are continuously incorporating sustainability into their marketing to attract customers concerned with the environmental practices of the given brand (Sajid et al., 2024), the existing research predominantly emphasises organisational tactics over consumer perception and response. Few studies have examined how perceived sustainability impacts relational outcomes such as engagement and trust, or how consumers develop affective bonds with brands that demonstrate environmental and social responsibility (Degirmenci and Breitner,

2017). Most existing research is sector-specific, such as studies in aviation, and often centres on narrow outcomes like customer satisfaction, thereby overlooking the broader strategic role that perceived sustainability plays in shaping brand equity and consumer behaviour (Sajid et al., 2024).

This study aims to empirically fill the existing gap in the research by assessing and examining the role of sustainability in consumer brand evaluation compared to other brand-related factors in the automotive industry.

Based on the findings above, the following hypotheses were developed:

H1: Sustainability has a positive influence on brand image.

H1a: Sustainability has a positive influence on brand loyalty.

Moreover, the information provided regarding Real Sustainability creates a theoretical background for the following hypotheses:

H1b: Sustainability has a stronger positive influence on brand image for EV-only brands than for brands that produce fossil fuel automobiles and EVs.

H1c: Sustainability has a stronger positive influence on brand loyalty for EV-only brands than for brands that produce fossil fuel automobiles and EVs.

Variables Influencing Consumer Brand Perception in the Automobile Industry

Various studies have been conducted to identify the most essential factors influencing the consumer brand perception and purchase intention. In the following section, each of the factors underlined by the supporting literature will be elaborated upon to explain its relevance and standing in this research.

Consumer trust

Consumer trust is a fundamental element in developing enduring brand relationships. In the context of exchange relationships, Şahin et al. (2013) define trust as "a willingness to rely on an exchange partner in whom one has confidence." Applied to branding, trust reflects the consumer's confidence in a brand's reliability and their willingness to depend on that brand to consistently deliver positive outcomes. This relational confidence enables consumers to feel comfortable engaging in repeated transactions, fostering a stronger propensity to repurchase and reducing their likelihood of switching to competitors.

Hanaysha and Abdullah (2015) emphasise that trust is rooted in the belief that a brand will fulfil its promises and meet consumer expectations. It represents a psychological assurance that the brand is dependable, mitigating perceived risk in the buying process. In this view, trust forms when a brand reliably delivers favourable results, creating a sense of security and emotional alignment with the consumer. Similarly, Delgado-Ballester and Munuera-Aleman (2005) describe consumer trust as "the confident expectations of the brand's reliability and intentions." They assert that trust combined with commitment constitutes an intangible and inimitable asset, functioning as a sustainable competitive advantage.

Empirical studies have consistently underscored the importance of consumer brand trust in shaping consumer behaviour. Nasir et al. (2020) report that consumer trust is a decisive factor in fostering brand loyalty and strengthening a brand's market position. When consumers perceive a brand as trustworthy, they are more inclined to overlook alternative options, pay premium prices, and advocate for the brand through positive word-of-mouth (Loučanová et al., 2021).

Conversely, a lack of trust can significantly undermine brand equity, hindering customer retention and market penetration. Brand trust also enhances consumer willingness to accept risk,

particularly when the product or service involves high involvement or financial commitment – conditions common in the automotive sector (Nasir et al., 2020).

From a behavioural perspective, trust is reinforced through consistent performance, positive emotional associations, and transparent communication (Ishaq and Di Maria, 2020). The development of trust requires ongoing interactions that affirm the brand's credibility, competence, and alignment with consumer values. According to Hanaysha and Abdullah (2015), the more closely a brand's actions, messaging, and perceived identity match consumer expectations and personal beliefs, the higher the level of trust achieved. As such, consumer trust is not solely the result of isolated transactions but a cumulative outcome shaped by sustained experiences, relational satisfaction, and symbolic value alignment.

Based on the findings above, the following hypotheses were developed:

H2: Consumer trust has a positive influence on brand image.

H2a: Consumer trust has a positive influence on brand loyalty.

Perceived Design

Lee (2014) emphasises that product design is a strategic tool to secure market competitiveness and consumer attention, especially in the automotive industry.

Go et al. (2015) integrate human-factors engineering into product design evaluation, underscoring that design must harmonise form with functionality to effectively meet consumer needs. Napoli et al. (2014) categorise design attributes into product properties, ergonomics, and aesthetic delivery, illustrating the multidimensional influence of design on consumer experience. A product with an aesthetically appealing and functionally unique design not only signals quality but also supports the development of symbolic and emotional connections with the brand.

Homburg et al. (2015) further note that product design facilitates communication between the consumer and the brand by conveying operational functionality, symbolic meaning, and emotional resonance. According to the authors, well-designed products enhance consumer satisfaction, stimulate emotional attachment, and strengthen perceived innovativeness, making design a potent driver of brand loyalty and positive consumer brand evaluation within the automotive sector.

The above findings result in the following hypotheses:

H3: Perceived design has a positive influence on brand image.

H3a: Perceived design has a positive influence on brand loyalty.

Perceived Price

Price plays a multifaceted role in consumer behaviour, extending beyond mere financial consideration to incorporate perceptions of fairness, quality, and brand positioning. Hanif et al. (2010) defined price as the amount of money charged for a particular product or service. It is the total value that the customer is willing to exchange for the benefits of owning or utilising the product or service.

Levy and Weitz (2012) stressed that loyal customers are willing to pay a premium for brands they trust and value, demonstrating the role of perceived fairness and value in pricing strategies. Price perceptions significantly impact customer satisfaction, directly and indirectly, through perceptions of fairness and value exchange (Hermann et al., 2007; Lee et al., 2014).

Swani and Yoo (2010) noted that brand image interacts with price perception: high brand prices reinforce premium image positioning, while lower brand prices signal accessibility but may undermine perceived prestige. Mirabi et al. (2015) highlighted that price affects the immediate purchase decision and shapes long-term consumer loyalty and trust.

From an automotive industry perspective, Aghdaie and Yousefi (2011) reported that pricing decisions influence consumers' assessments of brand quality, product competitiveness, and perceived fairness.

Based on the findings above, the following hypotheses were developed:

H4: Perceived price has a positive influence on brand image.

H4a: Perceived price has a positive influence on brand loyalty.

Perceived Innovativeness

Innovativeness refers to a brand's capacity to conceive, develop, and implement novel products or services that deliver unique value to consumers (Hanaysha, 2016). Product Innovativeness, as a key manifestation of innovativeness, involves creating entirely new offerings and enhancing existing ones to better satisfy evolving consumer needs. A brand's reputation and its standing on the market can be strengthened with the ability to produce innovative products consistently.

From a strategic perspective, Innovativeness allows brands to surpass price-based competition by differentiating their offerings through distinctive design, functionality, or utility. Hanaysha and Abdullah (2015) argue that brands recognised for their continuous Innovativeness tend to attract stronger consumer attention and are more likely to be associated with high quality, creativity, and market leadership. Innovative brands often benefit from a first-mover advantage, enabling them to shape consumer expectations, penetrate new market segments, and build a positive brand reputation before competitors can imitate or catch up. This perceived uniqueness and added value are central to how consumers assess brand performance.

Product Innovativeness also plays a significant role in branding within the automotive industry, especially concerning brand equity, brand image, and brand loyalty. Prior studies

demonstrate that innovative product attributes enhance consumer perceptions of a brand's image, creating stronger and more favourable associations (Holland et al., 2011). Consumers tend to interpret Innovativeness as a signal of brand competence and relevance, which in turn contributes to higher consumer trust and loyalty intentions (Hanaysha, 2016). Consequently, Innovativeness has been shown to positively correlate with both attitudinal and behavioural aspects of brand loyalty, as well as with overall brand equity.

Based on the findings above, the following hypotheses were developed:

H5: Perceived innovativeness has a positive influence on brand image.

H5a: Perceived innovativeness has a positive influence on brand loyalty.

Perceived Quality

Perceived quality is defined as consumers' judgments and perceptions of overall excellence or superiority of a product or service compared to others (Santoso and Cahyadi, 2024). Unlike objective quality, which can be measured through performance metrics or engineering standards, perceived quality is subjective. It reflects how consumers interpret a product's overall excellence based on a mix of cues: design, brand reputation, materials, and even past experiences (Ali et al., 2017; Zeithaml, 1988). In this context, it's not just what the product is, but how it's presented and experienced that defines its quality in the eyes of the customer.

Pai et al. (2023) highlight the importance of sensory and symbolic attributes such as visual design, feel, and craftsmanship in shaping perceived sustainability within the automotive industry. Garvin's (1984) framework for understanding quality includes several dimensions that remain relevant today: performance, reliability, durability, aesthetics, and perceived quality, among others. Features such as trim detail, materials used in the interior, or even the user

interface design contribute to how consumers judge whether a product feels well-made (Stylidis et al., 2015; Maxfield et al., 2018).

Researchers have also highlighted how factors like country of origin or brand heritage feed into perceptions of quality (Nguyen, Barrett, and Miller, 2005; Wiedmann et al., 2013). For instance, international brands are often perceived as more premium and reliable than local competitors, regardless of objective parity.

Furthermore, studies have found that consumers use both internal (e.g., personal experience) and external (e.g., advertising, reviews, word-of-mouth) information when assessing the quality of the products of the automotive sphere (Homer, 2008; Ali et al., 2017). Perceived quality isn't static either; it evolves across the customer journey, influenced by initial impressions, usage, and after-sales experiences. A single poor interaction can erode what might have otherwise been a strong brand impression.

Perceived quality is closely connected to broader constructs such as consumer trust and brand loyalty. When a product is seen as high-quality, consumers are more likely to feel that it offers good value, especially if the price seems justified by the design or functionality (Sweeney and Soutar, 2001). In green consumption contexts, for example, people are more willing to support eco-friendly brands if they feel the product meets high performance or aesthetic standards (Ali et al., 2017).

Consequently, the perceived quality of the product is indispensable in building brand equity. A consistent reputation for quality strengthens a brand's image, thereby increasing consumer trust..

The following hypothesis supports the findings above:

H6: Perceived quality has a positive influence on brand image.

H6a: Perceived quality has a positive influence on brand loyalty.

Brand Perception

Brand image and brand loyalty are consistently designated as the two most influential brand constructs in consumer-based brand-equity research (Alhaddad, 2015). The following section of the theoretical framework will elaborate upon the essence of the "brand" phenomenon, as well as brand image and brand loyalty within the automotive industry. It is worth mentioning that this research does not touch upon purchase intention, as it does not fit the scope of the study and would require a completely different target audience and research design.

Brand

Scholars argue that brands have existed for thousands of years, giving rise to the modern interpretation of this concept. In 1960, American Marketing Association issued a definition of brand: "A name, term, sign, symbol or design, or a combination of them, intended to identify the goods or services of one seller or group of sellers and to differentiate them from those of the competitors" (Avis, 2009). Similarly, Coleman (2011) explained brand as: "a name, term, sign, symbol, or design, or combination of them which is intended to identify the goods and services of one seller or groups of sellers and to differentiate them from those of competitors."

However, in the modern academic and business worlds, the concept of brand goes beyond its superficial association with logos, trademarks, or visual identifiers. Martínez (2021) stated that a brand is a system of meanings and interpretations, which amalgamates the promises made by the organisation, its ethical position and purpose, as well as the role it plays within society. The author highlighted that a brand is a symbolic bridge between the organisation and its stakeholders. It influences how consumers perceive, interact, experience and relate to the products and services proposed by the company. Consequently, branding involves the creation of

a unique identity and value through a strategic set of associations and experiences that shape the company's reputation (Martínez, 2021).

Historically, automotive manufacturers – particularly those in Detroit – grasped the importance of branding early on, realising that vehicles could serve as cultural artefacts and symbols of social status. They understood that a successful brand combines technical value with emotional resonance, producing a consistent and recognisable market presence. Technical values such as design, quality and performance are indispensable parts of the products produced within the automotive industry (Pai et al., 2023); however, brand trust, loyalty and societal relevance are the elements that make the brand truly effective (Pai et al., 2023). According to Martínez (2021), by releasing new models annually with distinct, often radical design shifts, these companies in Detroit reinforced brand recognition and desirability. Consumers easily identified the latest model year, reinforcing the association between car ownership and personal identity, prestige, and modernity.

In support of the claims that the brand creates an emotional connection with consumers, Rodrigues et al. (2023) stated that the brand has an identifying function by allowing consumers to distinguish the existing products and/or services through a name, term, sign, symbol, or a combination of these elements. Moreover, the identifiable features of the brand can be adapted according to the wishes and needs of the target audience, thereby reinforcing societal recognition and creating emotional links with it.

In the 21st century, the foundations of automotive branding have transformed according to technological advancements. Vehicles are now expected to be ecologically responsible, ergonomically optimised, digitally integrated, autonomously secure, economically accessible, and aligned with the values of ethical consumption and practical utility (Nasir et al., 2020).

Contemporary consumers do not merely purchase vehicles for transportation or status. They select brands that resonate with their lifestyles, support well-being, and feel authentic. Given this context, a successful and effective brand must embody sustainability, Innovativeness and emotional relevance to resonate with the modern landscape (Martínez, 2021).

Brand Image

Aaker (1991) defines brand image as a set of associations linked to a brand that reside in consumer memory, while Keller (1993) elaborates that it comprises the overall set of brand associations that consumers form, encompassing functional, emotional, and symbolic dimensions (Mirabi et al., 2015). The authors underlined that particularly experiential brands leverage sensory and cognitive stimulation to cultivate memorable brand interactions. Other scholars argue that such stimulation can encourage frequent consumption while risking consumer satiation if not strategically managed. Symbolic brands, by contrast, maintain long-term relevance through identity alignment – by associating with consumers' aspirational self-image or reference groups, they enhance emotional resonance and sustained perceived value.

Furthermore, an extensive body of empirical research confirms the centrality of brand image in influencing consumer decision-making. Mirabi et al. (2015) stated that positive brand associations have been linked to increased loyalty, willingness to pay premium prices, and heightened brand advocacy. The authors elaborated that brand image contributes significantly to long-term firm performance by fostering brand loyalty and consumer trust. Brand image is not only shaped by corporate messaging but is also influenced by the broader informational ecosystem. As Nadzri et al. (2016) note, brand image is constructed through interactions between individual information cues, third-party discourse, and marketplace reactions, ranging from nonverbal behaviour to peer reviews and observed product usage. Within the automotive sector,

where products are high-involvement and identity-laden, national auto players face unique challenges in crafting a strong brand image (Nadzri et al., 2016). The authors state that although various car brands set performance standards for the entire industry, the performance of national auto manufacturers depends on how well they produce quality cars, consumers' articulation of the brand, and how they sell their brand.

Based on the conclusion made by the authors, brand image shapes the consumer's interpretation of the product's value and helps to create and maintain an emotional connection with a brand in the automotive industry.

Brand Loyalty

Brand loyalty reflects a consumer's commitment to consistently repurchase a preferred brand, reinforcing a stable and enduring consumer-brand relationship over time (Kotler and Armstrong, 2003; Hanaysha and Abdullah, 2015). However, Akin (2017) criticised the definition above, stating that brand loyalty and repetitive purchasing should not be used in the same context, because consumers can keep purchasing products from the same brand due to financial incapability and lack of alternatives. The author proposed that brand loyalty represents a genuine preference for a specific brand, supported by positive consumers' attitudes.

Various researchers state that brand loyalty can create benefits such as reduced marketing costs, positive word of mouth, business profitability, increased market share, and a competitive advantage on the market (Loureiro, Sarmento, et al., 2017). Furthermore, brand loyalty causes positive communication among consumers and reduces the consumers' resistance to competitive strategies, contributing to the process that enables companies to reach more consumers.

From a psychological standpoint, brand loyalty encompasses attitudinal and behavioural dimensions (Loureiro, Sarmento, et al., 2017). The attitudinal component refers to a consumer's

positive emotional attachment and intention to remain with the brand, while the behavioural aspect reflects repeated purchase patterns and resistance to switching despite external incentives or situational pressures (Griffin, 2003; Nasir et al., 2020).

Fournier et al. (1998) defined brand loyalty as the emotional or psychological attachment consumers form toward a brand within its product class. Building on this, Hanaysha and Abdullah (2015) conceptualise brand loyalty as the manifestation of a value-laden relationship between the consumer and the brand, in which the brand assumes a symbolic role in the consumer's life. In this context, loyalty transcends mere transactional satisfaction and evolves into an ongoing relationship based on perceived reliability, trust, and shared identity (Akin, 2017). Particularly in the automotive industry, where products often serve as extensions of personal identity and lifestyle, brand loyalty becomes a critical asset.

The formation of brand loyalty is heavily influenced by cognitive processing and evaluative judgments. As Nasir et al. (2020) note, loyalty is not an automatic response but the result of extensive decision-making and perceived value creation. Zehir et al. (2011) emphasise that brands cannot assume consumer loyalty as given; rather, it must be earned and nurtured through consistent quality, meaningful engagement, and trust-building efforts.

In the automotive sector, loyalty assumes added complexity due to the high-involvement nature of purchases, the long product life cycle, and the symbolic value in vehicle ownership. Consumers loyal to automotive brands often exhibit brand-specific preferences that persist even in the presence of superior alternatives (Akin, 2017). This loyalty is shaped not solely by product performance but also by the emotional connection fostered through marketing, customer service, brand heritage, and social identity cues. As such, brand loyalty in the automotive context functions as a key factor between brand image and consumer trust, ultimately contributing to a

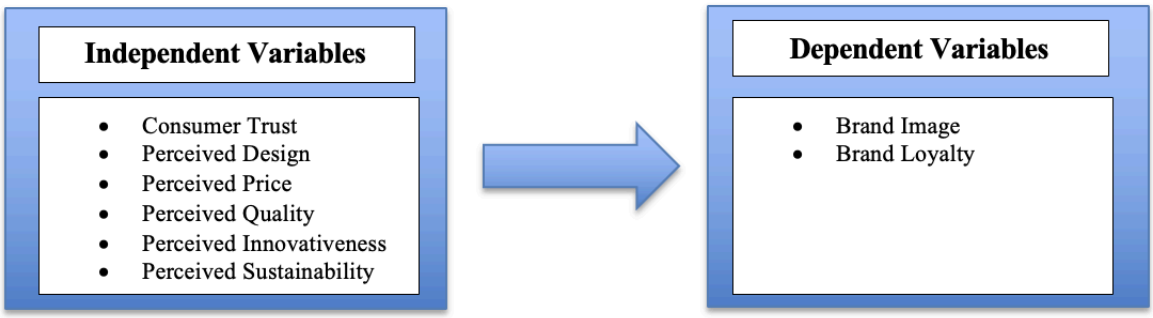
firm's long-term profitability, market share, and brand equity. A table representing the scientific sources and concepts described in them is presented in Appendix A.

Conceptual Model

Based on the findings of the performed literature review, brand evaluation can be broken down into the categories of brand image and brand loyalty. To measure the role of sustainability in consumer brand evaluation, the following factors were identified: consumer trust, perceived design, innovativeness, price, and quality. Below, a conceptual model can be found:

Figure 1

Conceptual Model



Methods

Research Design

This study utilised a quantitative survey analysis to answer the following research question: “Compared to other factors, what is the role of sustainability in shaping consumer brand evaluation in the automotive industry?” and test the developed hypotheses 1 to 6, each directly linked to a specific section in the questionnaire. This research method is the most effective and efficient given the context of this investigation. The systematic data collection from

a vast and diverse population through a standardised questionnaire is particularly suitable for measuring people's opinions and attitudes (Nardi, 2018).

The final questionnaire evaluated customer perceptions about the impact of sustainability, design, perceived quality, price perception, trust, and innovativeness on brand image and loyalty across four car brands. The majority of components were derived from known scales in the current literature, but various novel items were created to align with the specific focus of this research.

Procedure

Prior to the data collection, this research was granted ethical approval from the Ethics Committee of Humanities and Social Sciences (HSS) at the University of Twente. Approval was received on May 15th, 2025 (application number 251241). This guaranteed that participation in the survey posed no physiological or physical harm to the participants. At the start of both questionnaires, participants were presented with the informed consent form (Appendix C and E). The form included the information regarding the context and purpose of the research, complete anonymity of the participants, and their ability to withdraw from the survey at any time.

An online survey platform, Qualtrics, was utilised to create the pre-test and the final surveys. The University of Twente uses Qualtrics as standard software to facilitate students and researchers in creating online questionnaires for their projects. This platform offers a variety of key features, such as real-time reporting and team collaboration, the ability to export the data in multiple formats, and survey assistance within the app (Qualtrics | BMS - BMS Datalab, n.d.).

The pre-test survey was first distributed to a small sample to identify the four car brands. After the results were obtained and analysed, the final questionnaire was finalised and disseminated through various social media channels, such as Instagram, WhatsApp and

Telegram, to maximise the engagement and reach a diverse population. Both surveys were distributed via anonymous links, ensuring no sensitive and identifiable information was collected about the participants.

Instruments

Before developing the primary survey, a short pre-test questionnaire was created and distributed to identify which automotive brands participants considered the most familiar and sustainable (Appendix C). The pre-test brand list was compiled using information from a variety of industry sources, including J.D. Power (2024), Carlo (2025), Narioka (2025), and Brand Finance (2025) (Appendix D). These sources were chosen to ensure the inclusion of market-leading and sustainability-relevant automobile brands in global and regional settings. Based on the results, four car brands were selected to be included in the final questionnaire. The selection included two car brands producing solely EVs and two manufacturing EVs, PHEVs, and vehicles with internal combustion engines. The chosen car brands were: Mercedes-Benz, Volvo, BYD, and Tesla. Conducting this pre-test assisted in obtaining insights about how sustainability is perceived across different manufacturing strategies.

The final survey instrument comprised several key sections. It began with an informed consent form, outlining the purpose of the study, ensuring anonymity, and stating the participant's right to withdraw at any time (Appendix E). The following section referred to the demographic question, regarding the participants' age, gender, educational background, employment status, residency, and vehicle ownership. The core of the questionnaire consisted of four identical sets of items, each corresponding to one of the selected car brands. These sets were divided into four thematic sections (Appendix F):

1. Brand Perception, measuring brand image and brand loyalty.

2. Trustworthiness and Quality, analysing perceived quality and consumer trust.
3. Design and Innovativeness, estimating the perceived innovativeness and design.
4. Sustainability and Pricing, exploring perceived sustainability and price.

Each section contained multiple statements rated using a 5-point Likert scale: “Strongly Disagree” (1), “Somewhat Disagree” (2), “Neither agree nor disagree” (3), “Somewhat agree” (4), “Strongly Agree” (5). This scale was utilised to ensure comparability and ease of interpretation.

The items used in the survey were primarily adapted from validated academic sources, with minor adjustments to fit the automotive brand context of the study. Brand image was measured using survey items adapted from Tan (2022). These items assessed the participants’ overall impressions of each brand’s status, performance, and ability to meet consumer expectations. Example items included: “I consider [Brand] a leading company in the automotive industry” and “I think that [Brand] offers products that are worth the money.”

Brand loyalty was assessed through items adapted from Milheiro et al. (2024), which focused on emotional attachment, willingness to recommend, and price-insensitive preference. Example statements included: “I feel connected to the [Brand] brand” and “If I were given the choice between [Brand] and another car brand at a lower price, I’d choose [Brand].”A scale was adapted from Şahin et al. (2011) to evaluate consumer trust. For instance, items included: “I trust [Brand] to prioritise customer satisfaction” and “[Brand] is transparent in its dealings with customer issues.” Furthermore, Pai et al. (2023) provided a scale to evaluate perceived quality. The statements addressed technical and experiential aspects of automotive quality, such as durability, reliability, and comfort. Sample items included: “I believe the vehicles produced by [Brand] meet high-performance standards”, and “I associate [Brand] with improving comfort and

quality in daily mobility." Lastly, to measure perceived sustainability, several survey statements were adapted from Sun and Lee (2024) and Khan and Fatma (2023). These statements reflected the brand's environmental responsibility, product sustainability, and differentiation through green practices. Examples included: "I believe [Brand] genuinely cares about reducing environmental harm" and "I perceive [Brand]'s products as green and harmless to humans." Statements regarding price, innovativeness and design were constructed specifically for this study due to the lack of existing literature.

The final section of the questionnaire presented a comparative rating mechanism provided by Qualtrics. Participants were asked to rate their overall brand evaluation on a 10-point scale. This provided a more holistic understanding of how consumers perceive the selected brands.

The survey allows for an in-depth investigation of the sustainability and other factors influencing consumer brand evaluation within the automotive industry by integrating the existing and newly developed scales. Refer to Appendix D and F for a detailed overview of the pre-test and final questionnaire.

Respondents

The research concentrates on evaluating the role of sustainability compared to other factors in shaping consumer brand evaluation in the automotive industry. As stated above, participants were recruited via social media channels to reach a larger audience. Respondents had to be 18 years or older to participate in the survey. No other requirements were posed to ensure the applicability of the findings across a wider demographic. The purpose of this sampling approach was to gather as many insights as possible about the factors influencing consumer

brand evaluation within the automotive industry, and to better comprehend what role sustainability plays in this context.

In total, 177 participated in this study. After cleaning the data and removing the participants with missing values, 163 respondents remained. The clean data set presented a balanced distribution of genders, with 84 females and 79 males. The average recorded age was 27 years. The educational background of the sample was diverse. 45% of the participants identified as having obtained a Bachelor's degree. Followed by 27% who had completed secondary education or held a high school diploma. Furthermore, 17% of respondents held a Master's degree, while 6% had completed vocational or technical training. A small proportion of 3% selected "Other", and the remaining 1% reported having earned a Doctorate or PhD.

The answers given for the employment status were similarly varying. The largest group of people in the sample identified as students, covering 44%. The second largest group consisted of 35% of respondents stating full-time employment. Participants working part-time and self-employed each represented 7% of the sample. Two groups of participants scored 3% each, identifying unemployment or selecting "Other". Lastly, only one respondent reported being retired, contributing to the 1% share of the sample.

In total, 26 countries were represented in the survey. 56.4% (n=92) of the respondents were from the Netherlands. 13 representations included Belarus (8%) and 5 the United Arab Emirates (3.1%), while the remaining countries each contributed between 0.6% and 2.5% of the total sample 9 (n=52).

85 respondents indicated they do not possess a private vehicle, accounting for 52.1% of the sample. The remaining 78 participants stated affirmative car ownership, encompassing 47.9%. Among the 78 respondents who claimed automobile ownership, 70.5% (n=55) indicated

that they drive a petrol or diesel vehicle powered by an internal combustion engine. Hybrid vehicle drivers accounted for 16.7% (n=13) of the responses, while 12.8% of (n=10) participants stated they own an electric vehicle (EV). Among the 85 respondents who stated that they do not own an automobile, the majority preferred hybrid vehicles (60.2%, n = 50). Petrol or diesel vehicles were the second most preferred option, chosen by 27.7% (n=23), followed by electric vehicles at 10.8% (n=9). One respondent (1.2%)

Provided the information above, the sample offered a varied and equitable basis for examining customer attitudes towards car brands, emphasising sustainability and associated brand perceptions. The table below provides a detailed overview of the demographic information:

Table 1

Demographics overview

Characteristics	n	%
Age		
Mean Age	26.9	
Gender		
Male	79	48.5
Female	84	51.5
Education		
Secondary school / Highschool diploma	45	27.6
Vocational or technical education	10	6.1
Bachelor's degree	74	45.4
Master's degree	28	17.2
Doctorate / PhD	2	1.2
Other (please specify)	4	2.5
Employment		
Employed full-time	56	34.4
Employed part-time	12	7.4
Self-employed	12	7.4
Student	72	44.2
Unemployed	5	3.1

Retired	1	0.6
Other (please specify)	5	3.1
Car Ownership		
Yes	78	47.9
No	85	52.1
Country of Residence		
Netherlands	92	83.6
Belarus	13	11.8
UAE	5	4.5

Note. N = 163

Data Analysis

The survey data was exported from Qualtrics and uploaded to RStudio, an integrated development environment for R, a programming language for statistical data analysis and visualisation (‘RStudio’, 2025). The first step was to clean the data from the missing values, potential bots and duplicates. All the necessary columns containing characters were converted to numeric values to correspond to the 5-point Likert scale. “Strongly Disagree” was coded as 1, “Somewhat Disagree” as 2, “Neither agree nor disagree” as 3, “Somewhat agree” as 4, and lastly “Strongly Agree” as 5. To make the analysis easier and faster, all columns with relevant data were recoded as short descriptive labels for each brand. For example, column Q9_1 was named “Leading Company” across all brands, preparing the dataset for the factor analysis. This step ensured the improved readability of the tables and plots created later.

As a next step, an Exploratory Factor Analysis was performed per car brand to identify which items belong to which constructs, using a maximum likelihood estimation with varimax rotation to extract four, five, six, and seven factors. A six factor solution for each brand was selected because it presented an acceptable fit (RMSEA ≈.06-.08; TLI >.89), explain> 75% of the variance, and separated the primary theoretical constructs relevant for this study – Brand

Image, Brand Loyalty, Trust and Quality, Design and Innovativeness, Sustainability, and Pricing – each defined by multiple loadings $|\lambda| \geq .40$. Building up on this, a reliability analysis was conducted by computing composite factor scores. The values of Cronbach's α, ranging from 0.79 to 0.95, confirmed the reliability and consistency of the items.

The next step involved performing descriptive statistics. This type of data analysis allows for deeper insights about the opinions and responses of the participants by calculating and summarising means and standard deviations of each construct. Additionally, Pearson correlations (all $p < .01$) were calculated among the six constructs for each brand to identify and comprehend the interrelationships among the constructs. This step is crucial in preparing the data and obtaining the necessary information for the following regression analysis.

Multiple regression analyses were calculated to answer the research question and test hypotheses H1 to H6. These steps were performed using the independent variables Price, Sustainability, Perceived Quality and Trust, Innovativeness and Design, as well as the demographics of age, gender, employment type, highest attained education level, and auto ownership. The dependent variables, brand image and brand loyalty, were the subjects of all regression analyses, reporting standardised coefficients, t‑values, p‑values, R^2, and variance‑inflation factors (< 2.3).

Factor Analysis

Exploratory Factor Analysis was conducted on the items related to each brand to identify the underlying dimensions of consumer perceptions. Initially, parallel analysis suggested four dimensions. To determine the structure of the constructs (Brand Image, Brand Loyalty, Sustainability, Design, Innovativeness, Pricing, Consumer Trust and Quality), four-, five-, six- and seven-factor solutions were manually tested. The four- and five-factor models did not

provide a clear structure of the constructs, collapsing Sustainability with Pricing and Design with Trust. The seventh dimension of the seven-factor solution, Innovativeness and trust, was inadequately defined and ambiguous. This dimension functioned as a duplicate of the existing constructs of Innovativeness and Trust, which were merged. The six-factor model achieved the optimal equilibrium between theoretical clarity and statistical fit for the present study. Empirically, the six‑factor model yielded satisfactory fit indices (RMSEA ≈ .06, TLI > .90, low RMSR, and the lowest BIC among 4 – 7‑factor solutions) and a clean, simple structure once a .40 loading threshold was applied. Most importantly, it maintained Sustainability and Pricing as distinct dimensions, allowing for a direct comparison of the impact of environmental commitments against the other factors. This model aligns perfectly with the central research question regarding the unique role of sustainability in influencing consumer brand evaluation compared to the rest of the variables. Therefore, EFA ensured that each component is empirically coherent (all items load heavily on one factor and minimally on others) and substantively relevant, guaranteeing that it captures how these six factors influence customer assessments in the automotive sector. Given the results of EFA, the earlier developed hypotheses were modified and reformulated in the following way:

H1: Sustainability has a positive influence on brand image.

H1a: Sustainability has a positive influence on brand loyalty.

H2: Consumer trust and quality have a positive influence on brand image.

H2a: Consumer trust and quality have a positive influence on brand loyalty.

H3: Perceived design and innovativeness have a positive influence on brand image.

H3a: Perceived design and innovativeness have a positive influence on brand loyalty.

H4: Perceived price has a positive influence on brand image.

H4a: Perceived price has a positive influence on brand loyalty.

Reliability Analysis

A reliability analysis was performed using Cronbach's alpha (α) for each factor across all four brands to ensure that each construct was measured consistently. Cronbach's alpha measures the scale's internal consistency and is expressed as a number between 0 and 1 (Tavakol and Dennick, 2011). Values above 0.70 are generally considered acceptable, above 0.80 good, and above 0.90 excellent. All factors across each brand have predominantly achieved good or excellent values. A detailed table, providing an overview of all α-values per construct per brand, can be found below:

Table 2

Alpha values

Construct	Mercedes-Benz (α)	Volvo (α)	BYD(α)	Tesla (α)
Brand Image	0.83	0.83	0.89	0.91
Brand Loyalty	0.89	0.86	0.91	0.94
Design and Innovativeness	0.92	0.87	0.94	0.95
Trust and Quality	0.86	0.87	0.95	0.95
Sustainability	0.86	0.89	0.94	0.88
Pricing	0.79	0.81	0.90	0.88

Additionally, an analysis creating "alpha if item deleted" tables and 95 % confidence limits was performed to ensure the high correlation of items to their constructs. Consequently, no single item removal would have significantly enhanced any scale, demonstrating that all elements contributed favourably to their respective structures while avoiding redundancy. The six-factor systems produced consistent and dependable measures, as seen by high alpha coefficients and stable item-deletion diagnostics, making them suited for further analyses.

Results

The results chapter discusses the procedures and outcomes of descriptive, correlation, and regression analyses. Appendix B provides an overview of the tested hypothesis.

Descriptive Analysis

After successfully performing reliability analysis, descriptive statistics were utilised to calculate the means, standard deviations, and score ranges for each of the six brand‑evaluation constructs – Brand Image, Brand Loyalty, Design and Innovativeness, Pricing, Sustainability, and Trust and Quality for Mercedes-Benz, Volvo, BYD, and Tesla. The table below illustrates the differences between the brands by showing their means and standard deviations.

Table 2

Descriptive Statistics of Brand-Evaluation Factors by Brand

Brand	Factor	n	M	SD	Min	Max
Mercedes-Benz	Brand Image	162	3.83	0.79	1.00	5.00
	Brand Loyalty	162	3.22	1.05	1.00	5.00
	Design and Innovativeness	154	3.56	0.89	1.25	5.00
	Pricing	154	3.55	0.75	1.00	5.00
	Sustainability	154	2.91	0.85	1.00	5.00
	Trust and Quality	154	3.66	0.64	1.75	5.00
Volvo	Brand Image	147	3.53	0.85	1.00	5.00
	Brand Loyalty	147	3.11	0.97	1.00	5.00
	Design and Innovativeness	145	3.13	0.97	1.00	5.00
	Pricing	145	3.18	0.74	1.25	5.00
	Sustainability	145	2.86	1.02	1.00	5.00
	Trust and Quality	145	3.64	0.66	1.00	5.00

BYD	Brand Image	141	2.85	1.02	1.00	5.00
	Brand Loyalty	141	2.35	0.96	1.00	5.00
	Design and Innovativeness	140	2.76	0.85	1.00	5.00
	Pricing	140	2.95	1.01	1.00	5.00
	Sustainability	140	2.74	1.05	1.00	5.00
	Trust and Quality	140	2.70	0.99	1.00	5.00
Tesla	Brand Image	137	3.32	1.20	1.00	5.00
	Brand Loyalty	137	2.75	1.32	1.00	5.00
	Design and Innovativeness	136	3.04	1.18	1.00	5.00
	Pricing	136	2.96	1.30	1.00	5.00
	Sustainability	136	3.07	1.27	1.00	5.00
	Trust and Quality	136	3.43	1.13	1.00	5.00

Note. n = sample size; M = mean; SD = standard deviation. N = 141 (BYD), N = 162 (Mercedes-Benz), N = 137 (Tesla), N = 147 (Volvo). Slight variations in n across specific factors ($136 \leq n \leq 154$) reflect occasional item non-response. All ratings were collected on a 1 – 5 Likert‑type scale (1 = strongly disagree; 5 = strongly agree).

Given the results, the following conclusions for each brand can be made:

Mercedes-Benz consistently scores the highest on such factors as Brand Image (M = 3.83), Trust and Quality (M = 3.66), Design and Innovativeness (M = 3.56), and Pricing (M = 3.55). However, the Sustainability rating (M = 2.91) is the lowest.

Volvo scored somewhat lower on Brand Image (M = 3.53) and Trust and Quality (M = 3.64), with the following scores on Design and Innovativeness (M = 3.13) and Pricing (M = 3.18). Similarly to Mercedes, Volvo's Sustainability score is relatively low (M = 2.86).

Tesla has gained scores in the middle ranking: Brand Image (M = 3.32), Brand Loyalty (M = 2.75), Pricing (M = 2.96), Design and Innovativeness (M = 3.04), Trust and Quality (M = 3.43). However, across all brands, Tesla has the highest ranking in Sustainability (M = 3.07).

Lastly, BYD ranks lowest across nearly every construct: Brand Image (M = 2.85), Brand Loyalty (M = 2.35), Design and Innovativeness (M = 2.76), Sustainability (M = 2.74), and Trust and Quality (M = 2.70). Only pricing (M = 2.95) approaches the industry mean.

The information above provides a basis for several conclusions. While sustainability is crucial for Tesla (M = 3.07), it consistently remains the weakest among other brands. In contrast, Brand Image and Trust and Quality receive the strongest overall ratings (Image means range 2.85–3.83; Trust and Quality means range 2.70–3.66), suggesting that traditional perceptions of prestige and reliability remain robust. Notably, Pricing is viewed most favorably for Mercedes-Benz (M = 3.55, SD = 0.75) and least favorably for BYD (M = 2.95, SD = 1.01), indicating divergent value perceptions across market segments.

Table 3

Descriptive Statistics for Overall Brand Rating

Brand	N	Mean	SD	Min	Max
Mercedes-Benz	163	6.62	2.07	1	10
Volvo	163	6.12	2.04	1	10
BYD	163	4.62	2.97	0	10
Tesla	163	6.07	2.71	0	10

Note. *n* = sample size; *M* = mean; *SD* = standard deviation. N = 163 for each brand.

Participants on average rated Mercedes highest (M = 6.62, SD = 2.07), followed by Volvo (M = 6.12, SD = 2.04) and Tesla (M = 6.07, SD = 2.71), while BYD received the lowest average score (M = 4.62, SD = 2.97). The larger standard deviation for BYD indicates much greater variability in perceptions of that brand compared to the others. These results suggest that, on a 0–10 scale, Mercedes is perceived most favourably overall, whereas BYD's overall image remains more polarised and on average less positive.

Correlation Analysis

A Pearson correlation analysis was run for each brand on six scores – Brand Image, Brand Loyalty, Sustainability, Trust and Quality, Design and Innovativeness, and Pricing, to examine the interrelation between the constructs. According to the results of the analysis, all correlations were significant at $p < .001$. The table below showcases elaborated outcomes per brand per factor.

Table 4

Correlation Analysis Overview

Brand	Predictor	r with Image	p (Image)	r with Loyalty	p (Loyalty)
Mercedes-Benz	Sustainability	0.28	<.001	0.48	<.001
	Trust	0.57	<.001	0.50	<.001
	Design	0.55	<.001	0.70	<.001
	Pricing	0.52	<.001	0.44	<.001
Volvo	Sustainability	0.54	<.001	0.68	<.001
	Trust	0.73	<.001	0.57	<.001
	Design	0.60	<.001	0.68	<.001
	Pricing	0.32	<.001	0.41	<.001
BYD	Sustainability	0.63	<.001	0.60	<.001
	Trust	0.83	<.001	0.70	<.001
	Design	0.76	<.001	0.69	<.001
	Pricing	0.81	<.001	0.62	<.001
Tesla	Sustainability	0.72	<.001	0.70	<.001
	Trust	0.84	<.001	0.78	<.001
	Design	0.83	<.001	0.75	<.001

Pricing	0.73	<.001	0.70	<.001

Note. ***p < .001.

Given the obtained data, the following conclusions can be made: Mercedes's Brand Image strongly correlates with with Loyalty (r = .69), Trust and Quality (.57), as well as Design and Innovativeness (.55), moderately with Pricing (.52), and more weakly with Sustainability (.28). Loyalty also shows its highest links to Design (.70) and Trust (.50).

Volvo has shown two strongest correlations between Brand Image and Loyalty (r = .70), and Brand Image and Design and Innovativeness (r = .60). A moderate correlation was found between Brand Image and Sustainability (r = .54), while the weakest one was with Pricing (r = .32). Loyalty highly related especially to Sustainability (.68) and Design (.68).

BYD illustrated consistently high correlations: Image – Trust (.83) and Image – Pricing (.81) were the strongest, followed by Image – Design (.76), Image – Loyalty (.69), and Image – Sustainability (.63). Sustainability and Design correlate at .79; Trust and Design at .80.

Lastly, for Tesla, the two strongest correlations were Brand Image and Loyalty (r = .84) and Brand Image and Trust, which have the same value. The second strongest correlation, with a slight difference, was Brand Image and Design and Innovativeness (r = .83), followed by Brand Image and Pricing (r = .73) and Image–Sustainability (r = .72) correlations. Trust and Design interrelate at .77; Sustainability and Pricing at .87.

Therefore, Brand Image and Loyalty correlate strongly (r ~ .69–.84) across all brands. Trust, Design, and Innovativeness present very high correlations with Brand Image (r ≥ .55 for Mercedes-Benz, ≥ .73 for the others), especially for BYD and Tesla. Pricing shows weaker correlations to Brand Image for Mercedes-Benz and Volvo (r = .52/.32). However, for BYD (.81) and Tesla (.73), the correlations for Pricing were significant. Lastly, Sustainability showcases

weak correlation with Brand Image for Mercedes (.28), a moderate one for Volvo (.54), and quite high for BYD (.63) and Tesla (.72).

Regression analysis

After the necessary exploratory statistics were calculated, multiple regressions were conducted to establish the relationships between the dependent and independent variables by calculating the p-values. Regression analysis is essential for obtaining the data to confirm or reject the developed hypotheses and investigate the conceptual model.

A series of brand-specific multiple regressions predicting two dependent variables, brand image and brand loyalty, from six empirically derived factors (sustainability, design and Innovativeness, pricing, trust and quality), while controlling for key demographics (gender, age, education), employment status, and whether the respondent currently owns a vehicle. All predictors and outcomes were standardised so that reported β-coefficients reflect changes in standard deviations. Table 5 depicts a detailed overview of the results of a regression analysis per brand for the dependent variable, brand image, below.

Table 5

Standardised Regression Coefficients (dependent variable: Brand Image)

Factor	Mercedes	Volvo	BYD	Tesla
(Intercept)	0.02	–0.07	0.01	0.01
Sustainability	–0.15·	0.15*	–0.13	0.15
Design and Innovation	0.33***	0.17*	0.22*	0.63***
Pricing	0.20*	–0.08	0.41***	–0.19·
Trust and Quality	0.33***	0.51***	0.44***	0.55***

R^2	0.43	0.43	0.38	0.39
F (df1, df2)	F(4,149)=28.55***	F(4,145)=26.72***	F(4,135)=22.45***	F(4,131)=24.13***
N	154	146	141	136

Note. Standardized β-coefficients; · p < .10; * p < .05; ** p < .01; *** p < .001.

The model accounted for 42% of the variance in brand image for Mercedes (R^2 =.42, F(9, 144) = 11.9, p <.001). The most significant positive predictors were Trust and Quality (β =.33, p <.001) and Design and Innovativeness (β =.26, p <.001). Pricing had a moderate effect (β =.15, p =.02), while Sustainability's effect was minor and not conventionally significant (β = –.11, p =.07). Model fit was not significantly influenced by gender, age, education, employment status, or vehicle ownership.

Volvo's Brand image was similarly shaped by Trust and Quality (β = .51, p < .001), Design and Innovativeness (β = .17, p = .007), and a smaller positive Sustainability effect (β = .14, p = .02), yielding R^2 = .40 (F(9, 134) = 10.5, p < .001). The demographics, employment status or vehicle ownership did not influence the regressions.

The two EV manufacturers, BYD and Tesla, followed the same pattern, with Trust and Quality being the primary influencers of the Brand Image (BYD β = .44, p < .001; Tesla β = .55, p < .001). Design and Innovativeness indicted a positive effect (BYD β = .22, p = .02; Tesla β = .63, p < .001), with BYD pricing showing a positive outcome (β = .41, p < .001) and Tesla pricing a small negative one (β = –.23, p = .02). Regarding the Sustainability, both brands indicated that factor did not positively drive image, since its coefficient was small and non‑significant (BYD β = –.13, p = .09; Tesla β = .15, p = .16). Employment status and car ownership were not statistically significant across all four brands, indicating that latent factors

are the primary determinants of consumer evaluations, in addition to these background characteristics.

A parallel set of regressions was conducted for the same factors, with the dependent variable being Brand Loyalty. The analysis produced nearly identical results: Trust and Quality, and Design and Innovativeness emerged as the most robust predictors, while Sustainability and Pricing played minor or non-significant roles. Similarly, controls (demographics, employment, ownership) remained insignificant. Table 6 showcases the elaborate information about the results of this analysis.

Table 6

Standardised Regression Coefficients (dependent variable: Brand Loyalty)

Factor	Mercedes	Volvo	BYD	Tesla
(Intercept)	0.03	–0.07	–0.00	–0.03
Sustainability	0.13·	0.33***	0.07	0.22
Design and Innovation	0.57***	0.30***	0.32*	0.46**
Pricing	0.09	0.13·	0.03	–0.01
Trust and Quality	0.03	0.22***	0.34**	0.48***
R^2	0.51	0.54	0.38	0.40
F (df1, df2)	F(4,149)=38.93***	F(4,142)=41.67***	F(4,136)=21.12***	F(4,131)=23.47***
N	154	147	141	136

Note. Standardized β-coefficients; · p < .10; * p < .05; ** p < .01; *** p < .001.

The regression analysis provided the necessary information and data to assess the hypotheses developed and adjusted earlier.

Based on the results of the analyses, Hypotheses 1 and 1a were only supported for Volvo. However, they were rejected for Mercedes-Benz, Tesla and BYD since no significant results were shown. Hypotheses 2 and 2a were confirmed for each brand, except for Mercedes-Benz's loyalty. Hypothesis 3 was supported only for Mercedes-Benz and Tesla, while Hypothesis 3a was universally confirmed across all brands. Lastly, hypothesis 4 was confirmed only for Mercedes-Benz and BYD. Meanwhile, hypothesis 4a was rejected for all car brands, except Volvo. For a detailed overview of the results of the hypotheses, refer to Appendix B or the table below:

Table 7

Hypotheses Overview

Hypothesis	Merc	Volvo	BYD	Tesla
H1: Sustainability has a positive influence on brand image.	X	✓	X	✓
H1a: Sustainability has a positive influence on brand loyalty.	X	✓	X	X
H1b: Sustainability has a stronger positive influence on brand image for EV-only brands than for brands that produce both fossil‑fuel and electric vehicles	X	X	X	X
H1c: Sustainability has a stronger positive influence on brand loyalty for EV-only brands than for brands that produce both fossil‑fuel and electric vehicles.	X	X	X	X
H2: Consumer trust and quality have a positive influence on brand image.	✓	✓	✓	✓

H2a: Consumer trust and quality have a positive influence on brand loyalty.	X	✓	✓	✓
H3: Perceived design and innovativeness have a positive influence on brand image.	✓	✓	✓	✓
H3a: Perceived design and innovativeness have a positive influence on brand loyalty.	✓	✓	✓	✓
H4: Perceived price has a positive influence on brand image.	✓	X	✓	X
H4a: Perceived price has a positive influence on brand loyalty.	X	✓	X	X

Note. X = hypothesis is rejected, ✓= hypothesis is accepted.

Discussion

The present study is guided by the research question: *"Compared to other factors, what is the role of sustainability in shaping consumer brand evaluation in the automotive industry?"*. Several hypotheses were created and tested across four automotive brands, including conventional (Mercedes-Benz, Volvo) and EV-only manufacturers (BYD, Tesla), to comprehensively investigate this matter. In order to assess the role of sustainability, the influence of Sustainability, Consumer Trust, Perceived Quality, Price, Design and Innovativeness were measured on brand perception, constructed from Brand Image and Brand Loyalty to answer the following question. In this section, findings from the statistical manipulations are utilised to revisit and evaluate each hypothesis.

Primary Findings

The Exploratory Factor Analysis was performed during the initial cleaning and adjustment of the dataset. It revealed a six-factor structure, identifying sustainability and pricing as separate dimensions while combining design with innovativeness and trust with quality. This model was in perfect alignment with the theoretical foundation and conceptual model of this research. Furthermore, all factors demonstrated high correlation values to their constructs during the reliability analysis, as evidenced by the stable item-deletion diagnostics and strong alpha coefficients.

During the study, Mercedes-Benz, Volvo, BYD, and Tesla illustrated fascinating combinations of brand attributes that influenced their brand image and loyalty. The descriptive analysis of the means and standard deviations revealed vital information about customer views of the tested car brands across many dimensions. Mercedes-Benz consistently obtained the highest scores across the majority of the factors; brand image, trust, and quality perceptions were the most prominent dimensions. Volvo received consistent ratings, scoring higher on trust and quality items than Mercedes-Benz; however, sustainability showed a weaker score. Similarly, Tesla received moderate ratings, with notably good opinions related to trust and quality. Noteworthy, sustainability did not achieve a high score despite being a central element in the brand's marketing strategies. Finally, BYD obtained the weakest scores across all analysed dimensions, indicating considerably worse customer impressions overall. These findings highlight conspicuous discrepancies in consumer brand perception. They reveal that, although marketed as environmentally beneficial options, EV-only brands are not perceived as considerably more sustainable than traditional automakers. This insight is aligned with existing literature claiming that the sustainability of EVs is often doubted (Pipitone et al., 2021). The

descriptive analysis provided substantial context and background for the regression analysis and hypothesis testing.

The regression analyses revealed nuanced consumer responses to each brand. To begin with, Mercedes-Benz showcased strong positive perceptions across the majority of the factors. In accordance with the literature, design, innovativeness, pricing, and consumer trust proved to be the most distinguishing attributes in shaping the brand's image (Hanaysha & Abdullah, 2015; Nasir et al., 2020; Lee, 2014; Swani & Yoo, 2010). Furthermore, Mercedes-Benz's brand loyalty was positively affected by pricing, which was in line with Mirabi et al.'s (2015) statement that positive brand associations have been linked to increased loyalty and willingness to pay premium prices. Nevertheless, sustainability did not have a strong effect on the brand's image or loyalty. Its coefficient was small and insignificant, suggesting that consumers did not associate Mercedes-Benz with eco-friendliness. These findings suggest that consumers gave precedence to traditional aspects such as design and innovation rather than the brand's environmental efforts when evaluating it. Therefore, Hypotheses H1 and H1a were rejected for Mercedes-Benz.

Volvo illustrated a significant influence of trust and quality on both brand image and brand loyalty, in accordance with theoretical implications that brands perceived as trustworthy are more likely to gain consumer loyalty (Garretson & Clow, 1999; Yang & Jolly, 2009). This finding cemented Volvo's well-known reputation for safety and reliability, promoting consumer trust and strengthening the brand image (Nasir et al., 2020). In contrast with Mercedes-Benz, sustainability significantly influenced Volvo's brand loyalty and, to a lesser degree, brand image, supporting previous research that environmental initiatives enhance consumer attachment, particularly for brands that strongly communicate their environmental commitment (Loureiro et al., 2017; Sajid et al., 2024). Hypotheses H1 and H1a were supported for Volvo.

BYD showcased a strong influence of pricing on perceptions of brand image and brand loyalty, supporting Swani and Yoo's (2010) implication that affordability may improve public perception of the brand. Sustainability was not perceived as relevant or impactful in brand evaluation, thereby rejecting Hypotheses H1 and H1a for BYD. Overall, BYD was rated the lowest among all brands, a result that may be explained by the novelty of the brand and consumer unfamiliarity.

Tesla produced controversial results during the regression analysis. Innovativeness and design, as well as trust and quality, were the primary influencers of brand image and brand loyalty, aligning with theoretical predictions. Sustainability strongly contributed to brand image, supporting Hypothesis H1, but was not as significant to brand loyalty, thereby rejecting Hypothesis H1a. This finding appeared paradoxical, given that Tesla's marketing campaigns and brand identity were built around sustainability. It may indicate that consumers associated Tesla with environmental consciousness; however, they prioritised innovativeness and product quality. Notably, pricing had a negative effect on brand image and brand loyalty, suggesting that consumers were doubtful about the perceived costs of owning a Tesla vehicle. Therefore, Hypotheses H4 and H4a were not supported.

Across all brands, trust and quality substantially influenced brand image and brand loyalty, confirming the theoretical statements that transparent communication and exceptional product quality are foundational attributes within the automotive industry (Pai et al., 2023; Ishaq & Di Maria, 2020). Consequently, Hypotheses H2 and H2a were supported by every manufacturer except Mercedes-Benz's brand loyalty.

Similarly, design and innovativeness had a strong positive influence on brand image and brand loyalty for each brand, thereby confirming Hypotheses H3 and H3a. This finding was

consistent with innovation and design literature, which emphasises design uniqueness as a key driver of perceived brand modernity and appeal (Hanaysha, 2016; Go et al., 2015).

As shown in Tesla's case, pricing demonstrated a complicated and contradictory trend. Pricing had a beneficial impact on the brand image of Mercedes-Benz and Volvo but not on loyalty. This suggested that perceived price fairness shaped company image but was less important in encouraging repeat-purchase intention. BYD's pricing had a particularly high impact on brand image, demonstrating that cost competitiveness was critical for a growing Chinese EV brand. Overall, Hypotheses H4 and H4a gained partial support: Pricing was important for brand image in most circumstances, but its impact on brand loyalty remained limited.

Lastly, demographic analysis revealed limited influences. Age impacted Mercedes-Benz's brand image, with older participants expressing more favourable perceptions. Education and employment status did not present noteworthy effects, whereas car ownership status had a positive impact on brand loyalty toward Volvo and Tesla. This finding implied that existing vehicle ownership was associated with stronger brand attachment.

The analyses repeatedly highlighted the importance of design, innovation, quality, and trust in creating brand image and loyalty across all marques. Sustainability may not be as relevant for electric-only firms as previously thought. In contrast to Hypotheses H1b and H1c, the construct had minimal impact on BYD and Tesla but had a significant impact on Volvo, a manufacturer with a mix of internal combustion and electric vehicles. Respondents did not associate a firm's commitment to battery-electric drivetrains with higher sustainability impressions or loyalty intentions. Instead, environmental messaging was more effective when delivered by a company transitioning away from fossil-fuel technology.

The analyses estimated the influence of all selected factors on consumer brand perception. The findings largely correlated with the theoretical implications and predictions posed at the beginning of the study. Design and innovativeness, as well as quality and trust, showed the greatest predictive power for all brands.

However, unexpected and contradictory results were obtained regarding the central factor of this study—sustainability. While sustainability had the most pronounced influence on Volvo's and Tesla's brand image and brand loyalty, its overall role was weaker and less significant compared with the other factors. Interestingly, Sustainability may not be as important for electric-only firms as previously thought. It had a small and unsubstantial influence in shaping consumer evaluations of BYD and Tesla. However, Volvo, a manufacturer that produces EVs, hybrids and vehicles with internal combustion engines, presented a high impact of Sustainability on Brand Image and Brand Loyalty. This finding implies that respondents did not correlate the fact that the brand solely produces EVs with more prominent environmental efforts. Instead, consumers perceived Volvo, a brand that is actively transitioning from fossil-fuel-powered vehicles, as more sustainable and trustworthy. This observation encourages further inquiry about how consumers understand corporate sustainability claims.

Theoretical Implications

This research provides empirical evidence about how various factors influence consumer brand evaluations within the automotive industry. The findings identified that sustainability has a minimal effect on brand image and brand loyalty in EV-only manufacturers. Mixed-fleet brands, such as Volvo, presented a higher impact of sustainability on their brand equity, indicating that buyers may value environmental progress more when a smooth and genuine transition to greener alternatives is presented. This research argues that brands that only manufacture battery-driven

vehicles should not be immediately considered more sustainable. Each brand within the automotive industry must be evaluated based on its genuine efforts towards combating climate change. The study argues that there is not one primary factor that can guarantee complete acceptance and full support of the brand. It is a strategic combination of factors that creates a positive consumer perception.

Practical Implications

The study's conclusions and findings attempt to emphasise and enlarge on the notion that consumer brand perception is impacted by a combination of brand traits rather than a single component. It is critical to distinguish between brand image and brand loyalty since it helps to understand which variables influence each component. Vehicle makers and automotive sector stakeholders should consider a variety of practical implications.

Firstly, the automobile industry relies heavily on design and innovation to establish and maintain a favourable brand image and loyalty. This suggests that car manufacturers should invest extensively in new, cutting-edge features in the internal and external design of their models.

Stakeholders should ensure a transparent and caring communication with their consumers, as Trust and Quality are the primary assistants in promoting a positive image within the automotive industry. To promote a positive brand perception, the marketing campaigns can promote the independent safety ratings of their products or include real-life cases, illustrating the durability of their products. By integrating evidence-based and relatable situations in the advertising, vehicle manufacturers can strengthen the existing customer loyalty. As the automotive industry is a competitive market, companies should strive for excellence by introducing quality-assurance methods, such as early defect detection or extending warranty

plans. By improving the quality of the products introduced to consumers, brands can nurture a better relationship with them. Consequently, an improved relationship leads to a positive growth in consumer trust.

The discovery that sustainability improves brand image (and, in Volvo's case, loyalty) – but only for firms with an established eco-centric identity – indicates a conditional approach to "green" positioning. For companies whose primary value proposition already places a strong focus on environmental stewardship (such as Volvo and Tesla), managers should keep making visible investments in lifecycle-based sustainability programs and corporate reporting. These investments not only improve the brand's standing with environmentally conscious customers, but they also instantly result in stronger emotional bonds. However, sustainability promises made by businesses like Mercedes or BYD that have no track record of being environmentally conscious might be seen as "greenwashing," which would reduce their impact on brand equity. These companies should invest in employing sustainable materials to improve the design and quality of their goods. By doing so, the consumers will see the genuine benefits of the environmental efforts of the companies without perceiving them as solely marketing claims.

Given the polar results indicated for price perceptions across the four brands, it is safe to assume that pricing plays a strong strategic role in shaping consumer brand evaluation within the automotive sector. For instance, Mercedes-Benz is an example of a luxury brand, which was confirmed during the analysis. Consumers associated higher prices of the vehicles with an indicator of high status, wealth and exclusivity. Therefore, establishing and maintaining high prices can have a beneficial effect on brand image and loyalty. Marketing professionals should highlight the exclusive benefits and luxurious lifestyle that consumers obtain when purchasing such vehicles to justify the pricing policies. Whereas, Tesla showcased a negative influence of

price on brand image. In such a case, the stakeholders should point out the associated benefits of Tesla ownership. For example, fuel savings, long battery health or innovative technologies. A well-presented balance between economic and functional advantages may attract customers, thereby creating a positive relationship between price and brand image.

Nevertheless, the most critical practical implication that this paper offers does not relate to one specific factor. To ensure that the customers are certain and loyal to a specific car brand, the marketing specialists should nurture a perfect symbiosis of all the factors mentioned above. In the 21st century, consumers are not as easily impressed and manipulated by promotional campaigns. Without technological excellence, environmental consciousness, safety, outstanding design and transparent communications, it will be impossible to build a long-lasting relationship between a brand and a consumer. Therefore, to become the preferred choice of consumers, businesses should put their best effort into perfecting and refining every step and aspect of the created automobiles.

Strengths and Limitations

It is critical to assess the strengths and limitations of the present study to assess the validity of its methods and findings. This study has several noteworthy advantages. First, it provides comparative insights that improve the external validity of the results across a range of market positions by looking at four different car brands: manufacturers that only produce EVs (BYD, Tesla), and those that produce vehicles with internal combustion engines and EVs/hybrids (Volvo, Mercedes-Benz). Second, the thorough construct validation process guarantees that our six theoretically grounded dimensions (Brand Image, Brand Loyalty, Design and Innovativeness, Pricing, Sustainability, Trust and Quality) are theoretically meaningful and statistically significant. This includes exploratory factor analyses testing four through seven factors and

reliability assessments that yield Cronbach's α >0.80 for all scales. Third, the layered analytical approach offers a thorough explanation of mean-level differences and the multivariate dynamics underlying consumer brand assessments by combining descriptive statistics, Pearson correlation matrices, repeated-measures ANOVA for overall brand rankings, and standardised multiple regression models. Lastly, the study answers its main research question on the relative importance of environmental elements against conventional determinants of brand appraisal by separating Sustainability from other factors.

Nevertheless, there are a few limitations that must be acknowledged. To begin with, it was difficult to follow how attitudes change in reaction to company activities or market changes because of the cross-sectional survey methodology, which also makes it impossible to draw conclusions about causality. Secondly, although demographic controls are included in regression models, self-selection bias and unequal demographic representation, which are typical in online questionnaires, may limit the generalisability of results. Furthermore, although useful, the one-item "rank-from-1 to 10" measure of overall brand impression lacks the dependability benefits of multi-item measures. It is worth mentioning that one of the primary limitations of this study is the length of the questionnaire. Due to the complexity of the research, numerous items and factors required separate measuring scales, making it impossible for the survey to be more concise. As a consequence, individuals left the questionnaire without completing it, which explains the variations in the number of people included in the analyses. Lastly, common-method variance may have inflated inter-construct correlations and regression coefficients because all measures were self-reported inside the same instrument.

While acknowledging the existing limitations, this research provides essential information regarding the processes and factors influencing consumer brand evaluation within

the automotive industry. The study provides a strong background for potential research and encourages further investigation within this sphere.

Future Research

Given the findings, limitations and strengths of this study, several guidelines can be identified for future research. Firstly, future research should expand the data collection period. Gathering consumer sentiments over a number of waves (such as quarterly surveys conducted over a period of one to two years) would show whether and how the importance of sustainability changes as electric cars get more sophisticated, charging stations get more widespread, and the public's perception of climate change changes.

Secondly, a shorter questionnaire or a set of shorter surveys should be employed in the potential investigations. A shorter survey, focusing primarily on the most diagnostically powerful items per factor, would minimise respondent tiredness, possibly boosting completion rates and data quality. Moreover, pre-testing item performance with pilot studies can help find and eliminate repetitive questions, thereby improving the answering rates. Notably, obtaining a larger and more diverse sample can assist in achieving more generalizable and significant results. This would allow for more concrete cross-brand comparisons.

Lastly, future research could include using experimental designs to separate the causal effects of particular sustainability claims (e.g., battery recycling versus renewable energy sourcing) and combining objective sustainability metrics (verified emissions or lifecycle assessments) with self-reported perceptions to test for "greenwashing" effects. It may more accurately chart the road from eco-positioning to observable brand effects by combining survey data with behavioural measurements, such as real purchase intentions or test-drive sign-ups.

Conclusion

The purpose of this research was to identify the role of sustainability in shaping consumer brand evaluation. The study was guided by the following Research Question: "*Compared to other factors, what is the role of sustainability in shaping consumer brand evaluation in the automotive industry?"*

According to the results of this investigation, even though automakers are promoting sustainability more and more within the automotive industry, it has less of an impact on how consumers view a brand than elements like design, perceived quality, trust, innovativeness, and price. Sustainability had no appreciable impact on Mercedes-Benz and BYD, but it had a moderate impact on Tesla's image, but not on loyalty, and it only significantly improved Volvo's brand image and loyalty because of its tradition of safety and environmental care. In conclusion, "green" credentials are not enough to promote positive brand equity in the automobile industry; their influence depends on customer expectations and brand positioning, with essential qualities like design quality and consumer trust having a considerably greater impact.

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Appendices

Appendix A: Literature Search Table

Table 1

Summary of Core Constructs and Referenced Literature

Literature	Variable	Definition
Akin (2017); Avis (2009); Coleman (2011); Martínez (2021); Pai et al. (2023); Rodrigues et al. (2023)	**Brand**	A strategic system of identifiers (e.g., name, term, sign, symbol) and symbolic meanings that connect an organisation with consumers by shaping perceptions, values, and emotional resonance. In the automotive industry, brands are not only technical identifiers but also cultural symbols aligned with personal identity, social relevance, and ethical values.
Keller (1993); Aaker (1991); Mirabi et al. (2015); Nadzri et al. (2016)	**Brand Image**	The network of functional, emotional, and symbolic associations consumers hold in memory about a brand, formed through direct experience, marketing communication, and third-party discourse. It affects trust, purchase behaviour, and emotional engagement with the brand.
Kotler and Armstrong (2003); Hanaysha and Abdullah (2015);	**Brand Loyalty**	A consumer's attitudinal and behavioural commitment to a

Akin (2017); Loureiro et al. (2017); Zehir et al. (2011)		brand, marked by repeated purchases and emotional attachment despite alternatives. In the automotive sector, it is a critical asset built on trust, satisfaction, and symbolic identity alignment.
Hanaysha and Abdullah (2015); Şahin et al. (2013)	**Consumer Trust**	The belief that a brand is reliable, honest, and will meet expectations influences consumers' willingness to engage and maintain long-term relationships.
Loučanová et al. (2021); Ishaq and Di Maria (2020)	**Perceived Design**	The visual and functional appeal of a product influences consumer perception through aesthetics, usability, and emotional engagement.
Sajid et al. (2024); Khan and Fatma (2023)	**Perceived Innovativeness**	The extent to which a brand or product is seen as technologically advanced, forward-thinking, or modern.
Nasir et al. (2020); Degirmenci and Breitner (2017)	**Perceived Price**	The consumer's evaluation of the monetary cost of a product relative to perceived benefits, fairness, and value.
Nasir et al. (2020); Loučanová et al. (2021); Nasir et al. (2020)	**Perceived Quality**	The consumer's overall judgment about the excellence or superiority of a product based on experience, reputation, and cues.

Khan and Fatma (2023)	**Perceived Sustainability**	A consumer's belief about how sustainable a product or brand is, based on personal interpretation of brand messaging, practices, and external cues.
Ishaq and Di Maria (2020); Loureiro et al. (2017)	**Branded Sustainability**	The degree to which a company communicates and positions its sustainability efforts as part of its brand identity.
Transport and Environment (2020a); Plötz et al. (2022)	**Real Sustainability**	The measurable environmental impact of a product or process over its lifecycle, including resource use, emissions, and long-term ecological effects.

Appendix B:

Hypotheses Overview

Hypothesis	Merc	Volvo	BYD	Tesla
H1: Sustainability has a positive influence on brand image.	X	✓	X	✓
H1a: Sustainability has a positive influence on brand loyalty.	X	✓	X	X
H1b: Sustainability has a stronger positive influence on brand image for EV-only brands than for brands that produce both fossil‑fuel and electric vehicles	X	X	X	X

H1c: Sustainability has a stronger positive influence on brand loyalty for EV-only brands than for brands that produce both fossil‑fuel and electric vehicles.	X	X	X	X
H2: Consumer trust and quality have a positive influence on brand image.	✓	✓	✓	✓
H2a: Consumer trust and quality have a positive influence on brand loyalty.	X	✓	✓	✓
H3: Perceived design and innovativeness have a positive influence on brand image.	✓	✓	✓	✓
H3a: Perceived design and innovativeness have a positive influence on brand loyalty.	✓	✓	✓	✓
H4: Perceived price has a positive influence on brand image.	✓	X	✓	X
H4a: Perceived price has a positive influence on brand loyalty.	X	✓	X	X

Note. X = hypothesis is rejected, ✓= hypothesis is accepted.

Appendix C: Informed Consent Form for a Pre-test Survey

Dear Participant,

Thank you for your interest in participating in this study!

This research is part of Module 12 of the Bachelor Communication Science program at the University of Twente. The aim of this pre-test study is to gain insight into how people perceive and associate different car brands with sustainability. You will be presented with a list of car brands and asked to indicate your familiarity with them, as well as whether you associate them with sustainable practices.

This research has been approved by the BMS Ethics Committee. Completing the questionnaire will take around 3 minutes of your time. Your responses will remain entirely anonymous and confidential. All collected data will be securely stored and deleted no later than 30/08/2025.

Your participation in this study is completely voluntary. You may choose to withdraw at any point without any negative consequences. There are no known risks associated with participating in this survey.

If you have any questions about this study, please feel free to contact any of the following parties involved:

Researcher: Anna Akulich – a.akulich@student.utwente.nl

Supervisor: Sikke Jansma –s.r.jansma@utwente.nl

Secretary of the Ethics Committee for Humanities and Social Sciences at the Faculty of BMS: ethicscommittee-hss@utwente.nl

After reading the above, do you understand and consent to participating in this study?

Appendix D: Survey Items

Q1: Which car brands are you most familiar with?

Please, select up to 3 brands.

1. Audi
2. BMW
3. BYD
4. Changan
5. Chevrolet
6. Fiat
7. Ford
8. Geely
9. Honda
10. Hyundai
11. Kia
12. Lucid Motors
13. Mazda
14. Mercedes-Benz
15. NIO
16. Nissan
17. Peugeot

18. Polestar
19. Renault
20. Porsche
21. Rivian
22. Skoda
23. Subaru
24. Suzuki
25. Tesla
26. Toyota
27. Volkswagen
28. Volvo
29. XPeng

Q2: Which car brands do you associate with sustainability or eco-friendliness?

Please, select up to 3 brands.

1. Audi
2. BMW
3. BYD
4. Changan
5. Chevrolet
6. Fiat
7. Ford
8. Geely
9. Honda
10. Hyundai
11. Kia
12. Lucid Motors
13. Mazda
14. Mercedes-Benz
15. NIO
16. Nissan
17. Peugeot
18. Polestar
19. Renault
20. Porsche
21. Rivian
22. Skoda
23. Subaru
24. Suzuki

25. Tesla
26. Toyota
27. Volkswagen
28. Volvo
29. XPeng

Appendix E: Informed Consent Form for a Final Survey

Dear Participant,

Thank you for your interest in participating in this study!

This research is part of Module 12 of the Bachelor Communication Science program at the University of Twente. The aim of this study is to gain insight into how individuals evaluate four different car brands based on factors such as sustainability, price, design, quality, Innovativeness, and trust.

This research has been approved by the BMS Ethics Committee. Completing the questionnaire will take approximately 15 minutes of your time. Your responses will remain entirely anonymous and confidential. All collected data will be securely stored and deleted no later than August 30, 2025. Participation is completely voluntary, and you may withdraw at any point without providing a reason and without any negative consequences.

There are no known risks associated with participating in this study.

If you have any questions about the study, please feel free to contact any of the following parties involved:

Researcher: Anna Akulich – a.akulich@student.utwente.nl

Supervisor: Sikke Jansma –s.r.jansma@utwente.nl

Secretary of the Ethics Committee for Humanities and Social Sciences at the Faculty of BMS: ethicscommittee-hss@utwente.nl

After reading the above, do you understand and consent to participating in this study?

Appendix F: Survey Items

Demographics questions:

1. **What is your gender?**
   - ☐ Male

- ☐ Female
- ☐ Prefer not to say
- ☐ Other:

2. **What is your age?**
3. **What is your highest level of completed education?**
   - ☐ Primary school
   - ☐ Secondary school / High school diploma
   - ☐ Vocational or technical education
   - ☐ Bachelor's degree
   - ☐ Master's degree
   - ☐ Doctorate / PhD
   - ☐ Other (please specify): _____
4. **What is your current employment status?**
   - ☐ Student
   - ☐ Employed full-time
   - ☐ Employed part-time
   - ☐ Self-employed
   - ☐ Unemployed
   - ☐ Retired
   - ☐ Other (please specify): _____
5. **Do you currently own a car?**
   - ☐ Yes
   - ☐ No
6. **If yes, what type of car do you currently drive?**
   - ☐ Electric Vehicle (EV)
   - ☐ Hybrid
   - ☐ Petrol / Diesel (Internal Combustion Engine)
   - ☐ Other (please specify): _____
7. **If not, what type of car would you prefer to drive?**
   - ☐ Electric Vehicle (EV)
   - ☐ Hybrid
   - ☐ Petrol / Diesel (Internal Combustion Engine)
   - ☐ Other (please specify): _____

8. **What is your country of residence?**
   [Open text field or dropdown menu]

In the upcoming sections, you'll be asked to share your opinions about 4 different car brands. Your opinions are extremely valuable to us, and we are very interested to see your insights!

Mercedes-Benz:

Please indicate how much you agree or disagree with the following statements.

Brand Perception.

1. I consider Mercedes-Benz a leading company in the automotive industry.
2. Mercedes-Benz offers products with excellent features.
3. I think that Mercedes-Benz offers products that are worth the money.
4. I am certain that the products offered by Mercedes-Benz could fulfil my expectations.
5. I feel connected to the Mercedes-Benz brand.
6. I would recommend Mercedes-Benz to friends or family.
7. If I were given the choice between Mercedes-Benz and another car brand at a lower price, I'd choose Mercedes-Benz.
8. I speak positively about Mercedes-Benz to other people.

Trustworthiness and Quality.

1. I am confident that Mercedes-Benz acts ethically and responsibly in its operations.
2. I trust Mercedes-Benz to prioritise customer satisfaction.
3. I associate Mercedes-Benz with being a trustworthy brand.
4. Mercedes-Benz is transparent in its dealings with customer issues.
5. I believe the vehicles produced by Mercedes-Benz meet high-performance standards.
6. I think Mercedes-Benz offers good long-term value in terms of reliability and durability.
7. I feel that Mercedes-Benz's vehicles help reduce overall transportation-related expenses.
8. I associate Mercedes-Benz with improving comfort and quality in daily mobility.

Design and Innovativeness.

1. I consider Mercedes-Benz's vehicles to have an elegant and visually appealing design.
2. Compared to other car brands, I think Mercedes-Benz's design is distinctive visually.
3. I believe Mercedes-Benz's vehicle design creates a positive impression on others.
4. I prefer the design of Mercedes-Benz's products better compared to other car brands.
5. I see Mercedes-Benz as a leader in Innovativeness within the automotive sector.
6. I think Mercedes-Benz is known for introducing cutting-edge features in its vehicles.
7. Mercedes-Benz immediately comes to mind when I think about Innovativeness in the car industry.
8. Mercedes-Benz's innovative approach makes me more interested than other car brands.

Sustainability and Pricing.

1. I believe Mercedes-Benz genuinely cares about reducing environmental harm.
2. I am confident that Mercedes-Benz produces sustainable cars.
3. I feel that Mercedes-Benz's commitment to sustainability sets the company apart from other automotive brands.
4. I perceive Mercedes-Benz's products as green and harmless to humans.
5. I would be more likely to consider Mercedes-Benz if their vehicles were more affordable.
6. Price plays an important role in evaluating Mercedes-Benz as a car brand.
7. I associate Mercedes-Benz with offering good value for the price.
8. Compared to other car brands, Mercedes-Benz is competitively priced.

Volvo:

Brand Perception.

1. I consider Volvo a leading company in the automotive industry.
2. Volvo offers products with excellent features.
3. I think that Volvo offers products that are worth the money.
4. I am certain that the products offered by Volvo could fulfil my expectations.
5. I feel connected to the Volvo brand.
6. I would recommend Volvo to friends or family.
7. If I were given the choice between Volvo and another car brand at a lower price, l'd choose Volvo.
8. I speak positively about Volvo to other people.

Trustworthiness and Quality.

1. I am confident that Volvo acts ethically and responsibly in its operations.
2. I trust Volvo to prioritise customer satisfaction.
3. I associate Volvo with being a trustworthy brand.
4. Volvo is transparent in its dealings with customer issues.
5. I believe the vehicles produced by Volvo meet high-performance standards.
6. I think Volvo offers good long-term value in terms of reliability and durability.
7. I feel that Volvo's vehicles help reduce overall transportation-related expenses.
8. I associate Volvo with improving comfort and quality in daily mobility.

Design and Innovativeness.

1. I see Volvo as a leader in Innovativeness within the automotive sector.
2. I think Volvo is known for introducing cutting-edge features in its vehicles.
3. Volvo immediately comes to mind when I think about Innovativeness in the car industry.

4. Volvo's innovative approach makes me more interested than other car brands.
5. I consider Volvo's vehicles to have an elegant and visually appealing design.
6. Compared to other car brands, I think Volvo's design is distinctive visually.
7. I believe Volvo's vehicle design creates a positive impression on others.
8. I prefer the design of Volvo's products better compared to other car brands.

Sustainability and Pricing.

1. I believe Volvo genuinely cares about reducing environmental harm.
2. I am confident that Volvo produces sustainable cars.
3. I feel that Volvo's commitment to sustainability sets the company apart from other automotive brands.
4. I perceive Volvo's products as green and harmless to humans.
5. I would be more likely to consider Volvo if their vehicles were more affordable.
6. Price plays an important role in evaluating Volvo as a car brand.
7. I associate Volvo with offering good value for the price.
8. Compared to other car brands, Volvo is competitively priced.

BYD

Brand Perception.

1. I consider BYD a leading company in the automotive industry.
2. BYD offers products with excellent features.
3. I think that BYD offers products that are worth the money.
4. I am certain that the products offered by BYD could fulfil my expectations.
5. I feel connected to the BYD brand.
6. I would recommend BYD to friends or family.
7. If I were given the choice between BYD and another car brand at a lower price, I'd choose BYD.
8. I speak positively about BYD to other people.

Trustworthiness and Quality.

1. I am confident that BYD acts ethically and responsibly in its operations.
2. I trust BYD to prioritise customer satisfaction.
3. I associate BYD with being a trustworthy brand.
4. BYD is transparent in its dealings with customer issues.
5. I believe the vehicles produced by BYD meet high-performance standards.
6. I think BYD offers good long-term value in terms of reliability and durability.
7. I feel that BYD's vehicles help reduce overall transportation-related expenses.
8. I associate BYD with improving comfort and quality in daily mobility.

Design and Innovativeness.

1. I consider BYD's vehicles to have an elegant and visually appealing design.
2. Compared to other car brands, I think BYD's design is distinctive visually.
3. I believe BYD's vehicle design creates a positive impression on others.
4. I prefer the design of BYD's products better compared to other car brands.
5. I see BYD as a leader in Innovativeness within the automotive sector.
6. I think BYD is known for introducing cutting-edge features in its vehicles.
7. BYD immediately comes to mind when I think about Innovativeness in the car industry.
8. BYD's innovative approach makes me more interested than other car brands.

Sustainability and Pricing.

1. I believe BYD genuinely cares about reducing environmental harm.
2. I am confident that BYD produces sustainable cars.
3. I feel that BYD's commitment to sustainability sets the company apart from other automotive brands.
4. I perceive BYD's products as green and harmless to humans.
5. I would be more likely to consider BYD if their vehicles were more affordable.
6. Price plays an important role in evaluating BYD as a car brand.
7. I associate BYD with offering good value for the price.
8. Compared to other car brands, BYD is competitively priced.

Tesla

Brand Perception.

1. I consider Tesla a leading company in the automotive industry.
2. Tesla offers products with excellent features.
3. I think that Tesla offers products that are worth the money.
4. I am certain that the products offered by Tesla could fulfil my expectations.
5. I feel connected to the Tesla brand.
6. I would recommend Tesla to friends or family.
7. If I were given the choice between Tesla and another car brand at a lower price, I'd choose Tesla.
8. I speak positively about Tesla to other people.

Trustworthiness and Quality.

1. I am confident that Tesla acts ethically and responsibly in its operations.
2. I trust Tesla to prioritise customer satisfaction.
3. I associate Tesla with being a trustworthy brand.

4. Tesla is transparent in its dealings with customer issues.
5. I believe the vehicles produced by Tesla meet high-performance standards.
6. I think Tesla offers good long-term value in terms of reliability and durability.
7. I feel that Tesla's vehicles help reduce overall transportation-related expenses.
8. I associate Tesla with improving comfort and quality in daily mobility.

Design and Innovativeness.

1. I consider Tesla's vehicles to have an elegant and visually appealing design.
2. Compared to other car brands, I think Tesla's design is distinctive visually.
3. I believe Tesla's vehicle design creates a positive impression on others.
4. I prefer the design of Tesla's products better compared to other car brands.
5. I see Tesla as a leader in Innovativeness within the automotive sector.
6. I think Tesla is known for introducing cutting-edge features in its vehicles.
7. Tesla immediately comes to mind when I think about Innovativeness in the car industry.
8. Tesla's innovative approach makes me more interested than other car brands.

Sustainability and Pricing.

1. I believe Tesla genuinely cares about reducing environmental harm.
2. I am confident that Tesla produces sustainable cars.
3. I feel that Tesla's commitment to sustainability sets the company apart from other automotive brands.
4. I perceive Tesla's products as green and harmless to humans.
5. I would be more likely to consider Tesla if their vehicles were more affordable.
6. Price plays an important role in evaluating Tesla as a car brand.
7. I associate Tesla with offering good value for the price.
8. Compared to other car brands, Tesla is competitively priced.

Brand Ranking

This is the final question of this survey:

Please rank the following car brands from 1 to 10, where 1 indicates the brand you associate least with sustainability, and 10 indicates the brand you associate most with sustainability.

Appendix G: EFA per Brand

1. **Tesla**

Item	Brand Image	Brand Loyalty	Trust & Quality	Design & Innovation	Sustainability	Pricing
Leading Company		0.51				
Excellent Features	0.47	0.47				
Products Worth the Money	0.45		0.58			
Expectations Fulfilled			0.61			
Connected to the Brand			0.79			
Recommend to Others			0.73			
I'm Loyal to the Brand			0.73			
I'd Pay a Premium			0.57	0.44		
Perceived Reliability					0.72	
Consistent Quality					0.64	
Built to Last					0.66	
Dependable Performance			0.53		0.55	
Strong Warranty		0.72				
Service Network		0.68				
Brand Trustworthiness		0.67				
Ethical Brand Image			0.50		0.48	0.41
Eco-Friendly Materials				0.77		
Low Emissions				0.65		
Sustainable Production				0.65		
Recyclable Parts				0.67		
Innovative Styling	0.51			0.41		0.44
Cutting-Edge Tech	0.52					0.42
Futuristic Design						0.48
Creative Features	0.40				0.40	0.41
Trend-Setting Look						0.69
Design Stands Out						0.67
Eye-Catching Appearance						0.66
Unique Aesthetics						0.71
Reasonable Pricing					0.52	0.41
Good Value					0.63	
Fair Financing						
Attractive Incentives						

2. Volvo

Item	Brand Image	Brand Loyalty	Trust & Quality	Design & Innovation	Sustainability	Pricing
Leading Company		0.47				
Excellent Features	0.50	0.61				
Products Worth the Money	0.44	0.58				
Expectations Fulfilled	0.45	0.43		0.47		
Connected to the Brand				0.82		
Recommend to Others				0.68		
I'm Loyal to the Brand				0.76		
I'd Pay a Premium		0.42		0.58		
Perceived Reliability	0.76					
Consistent Quality	0.68					
Built to Last	0.68					
Dependable Performance	0.55				0.41	
Strong Warranty		0.40			0.60	
Service Network	0.47				0.56	
Brand Trustworthiness					0.70	
Ethical Brand Image					0.63	
Eco-Friendly Materials			0.50			0.57
Low Emissions		0.46				0.56
Sustainable Production						0.63
Recyclable Parts						0.44
Innovative Styling	0.50					0.48
Cutting-Edge Tech	0.41		0.45			
Futuristic Design		0.60				
Creative Features	0.41	0.48				
Trend-Setting Look			0.72			
Design Stands Out			0.71			
Eye-Catching Appearance			0.78			
Unique Aesthetics			0.75			
Reasonable Pricing			0.48			
Good Value		0.71				
Fair Financing		0.80				
Attractive Incentives		0.83				

3. BYD

Item	Brand Image	Brand Loyalty	Trust & Quality	Design & Innovation	Sustainability	Pricing
Leadinf Company	0.52	0.52				
Excellent features		0.65				
Products worth the money		0.71				
Expectations fulfilled		0.49				
Connected to the brand	0.52				0.42	
I recommend to others	0.44	0.41				
I'm loyal to the brand	0.49				0.50	
I'd pay a premium		0.45				
Perceived reliability		0.55	0.48			
Consistent quality		0.72				
Built to last		0.75				
Dependable performance			0.44			
Strong warranty		0.57				
Service network		0.63				
Brand trustworthiness						
Ethical brand image		0.57				
Eco-friendly materials	0.79					
Low emissions	0.83					
Sustainable production	0.81					
Recyclable parts	0.76					
Innovative styling				0.79		
Cutting-edge tech				0.64		
Futuristic design				0.53		
Creative features	0.53			0.45		
Reasonable pricing			0.59			
Good value			0.71			
Fair financing			0.73			
Attractive incentives			0.70			
Trend-setting look						0.63
Design stands out						0.70
Eye-catching appearance		0.51				
Unique aesthetics						

4. Mercedes-Benz

Item	Brand Image	Brand Loyalty	Trust & Quality	Design & Innovation	Sustainability	Pricing
Leading Company						0.64
Excellent features			0.45			0.56
Products worth the money						0.54
Expectations fulfilled			0.41			0.62
Connected to the brand						0.65
I recommend to others						0.80
I'm loyal to the brand						0.68
I'd pay a premium				0.48		0.66
Perceived reliability					0.42	
Consistent quality			0.62			
Built to last			0.76			
Dependable performance			0.45			
Strong warranty			0.78			
Service network			0.52			
Brand trustworthiness					0.58	
Ethical brand image			0.73			
Innovative styling	0.55		0.47			
Cutting-edge tech	0.49					
Futuristic design	0.88					
Creative features		0.52				
Trend-setting look		0.77				
Design stands out		0.64				
Eye-catching appearance		0.79				
Unique aesthetics		0.69				
Eco-friendly materials					0.64	
Low emissions					0.73	
Sustainable production					0.83	
Recyclable parts					0.74	
Reasonable pricing						
Good value						
Fair financing			0.45			0.42
Attractive incentives			0.42			