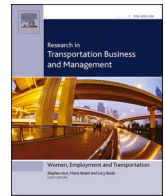


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Airline environmental sustainability actions and CSR impact on customer behavior

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ABSTRACT

Sustainability and Corporate Social Responsibility (CSR) are growing concerns among passengers and airlines. However, the communication of such actions by airline companies is underexplored. Accordingly, this study aims to analyze airlines' CSR and Environmental Sustainability Actions (ESA) communications' impact on customer loyalty, through a Relationship Marketing (RM) perspective. Following a text-mining approach, 6181 Facebook comments were collected. A word frequency matrix was created from the collected data and used as input for PLS-SEM to test raised hypotheses. Results suggest that communication based on ESA and CSR positively affects behavioral loyalty and commitment. RM moderated ESA's communication impact on customer loyalty but not on the relationship between CSR communication and loyalty. These findings suggest that communicating environmental efforts positively affects customer loyalty, providing airline managers with valuable insights that should be considered within communication strategies to enhance return and customer retention.

1. Introduction

Sustainability, defined as preserving present needs while assuring future ones (United Nations, 2021), emphasizes the balance between present and future needs. The aviation sector, contributing significantly to global warming, is now pivoting towards sustainable practices (Grewe et al., 2017) is one of the most significant contributors to and one of the most impacted by the climate crisis. Accordingly, airlines are looking for ways to fly more sustainably to become CO₂-neutral by 2050 (IATA, 2022). These efforts are often channeled through Corporate Social Responsibility (CSR) initiatives. The CSR theory posits that companies have the obligation beyond profitability to benefit society and enhance the quality of community life (Serhan, Abboud, & Shahoud, 2018). In turn, the Relationship Marketing (RM) theory emphasizes the importance of long-term customer relationships (Wongkitrungrueng, Dehouché, & Assarut, 2020). In the aviation sector, RM strategies can be leveraged to communicate and promote CSR initiatives, fostering customer loyalty (Affran, Dza, & Buckman, 2019). Therefore, CSR communication actions are imperative for the survival of airline companies (Y. Kim, Lee, & Roh, 2020), becoming fundamental to influencing

customers' attitudes and perspectives regarding a company. Subsequently, with social media playing an important and defining role in people's lives nowadays, communicating CSR actions on these channels is an opportunity for companies to manage their image, as it constructs the abstract corporate image and reveals tangible actions, generating positive customer perceptions (Ramesh, Saha, Goswami, Sekar, & Dahiya, 2019). Moreover, this phenomenon tends to enhance customer loyalty (Okumus, Kuyucak Sengur, Koseoglu, & Sengur, 2020; Vicente, Sampaio, & Reis, 2020).

Many studies have explored sustainability practices and CSR within the aviation industry. Firstly, while the role of CSR in the aviation industry is well-documented (Y. Kim et al., 2020; Rhou & Singal, 2020) as is its impact on customer loyalty (Lee & Roh., 2019; Phan Thanh & Hoang Anh, 2023), there is limited research on how airlines communicate their CSR initiatives, especially through digital platforms. Secondly, the synergy between CSR communication and RM in the aviation sector remains underexplored. While both theories are well-established independently (J. J. Kim, Steinhoff, & Palmatier, 2021; Mostert & De Meyer, 2010; Serhan et al., 2018), their intersection in the context of aviation is a nascent area of study. Thirdly, despite the growing adoption of CSR

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and Environmental Sustainability Actions (ESA) within the aviation industry and its known outcomes on customers' perceptions (Hwang & Choi, 2018; Lee & Roh., 2019; Sardjono, Kusnoputranto, Soesilo, & Kristanto, 2021) there is a lack of understanding of how the communication of these efforts moderate customer loyalty.

Accordingly, this study aims to understand the impact of airlines Environmental Sustainability Actions and CSR communications on customer loyalty, through a RM perspective. This research is intended to suppress the theoretical gaps with the emerging theory that supports the positive effect of ESA and CSR communication, based on RM principals, with customer loyalty as a behavioral outcome. Online reviews were collected from airlines Facebook posts to achieve this goal. Facebook mass adoption and its real-time features make it a valuable platform for research, either to recruit participants or to collect user-generated data (Rife, Cate, Kosinski, & Stillwell, 2016).

Through text mining, the researchers created a word frequency matrix. This matrix served as the input for data analysis on partial least squares structural equation modeling (PLS-SEM). The outcomes of this study will allow an understanding of how these dimensions can be considered within airlines' marketing strategies from a long-term perspective. Moreover, this study can help provide important information to airlines regarding ESA and CSR from a communication point of view to improve customer behavior.

2. Literature review

2.1. Airlines ESA on customer loyalty

Environmental Sustainability as response to the growing pressure from stakeholders, has been a priority for many industries, including aviation (Naidoo & Gasparatos, 2018). This pressure has led companies to adopt ESA not just to meet stakeholder demands but also to positively influence consumer behavior (Han, Yu, & Kim, 2019).

Morelli (2011) defines *Environmental Sustainability as the need for a balance between current and future needs*. For airlines, this translates into adopting ESA that demonstrates commitment and consistency, often fostering customer loyalty (Ramli, Abdul, & Annuar, 2015).

The Cognitive Consistency Theory (Kruglanski et al., 2018) suggests that customer behavior intention is shaped by their perceptions. In the aviation context, this suggests that customers who view an airline's environmental efforts favorably are more likely to exhibit loyalty. Past research indicates that customers appreciate airlines that prioritize ESA, such as biofuel usage and sustainable aircraft construction (Hwang & Choi, 2021). Moreover, airlines ESA within their CSR strategies have been shown to enhance their overall image (Serhan et al., 2018).

While there is a growing body of literature on the importance of ESA and their impact on corporate image, there remains a gap in understanding the direct relationship between airlines ESA communications and customer loyalty. Most studies have either broadly addressed sustainability practices or focused on the general implications of ESA (Han, 2021; Winter, Thropp, & Rice, 2019). Few have delved into the nuanced relationship between airlines ESA communications and customer loyalty. Exploring this topic is pivotal to understand how the amplification of ESA through communication can influence customer perceptions, meet their expectations and lead to loyalty towards a company, resulting in competitive advantage.

When airlines make changes based on environmental issues, this is recognized and well perceived by passengers, positively affecting their loyalty towards them (Hwang & Choi, 2021). Following this premise, it is proposed that:

Hypothesis 1. Airlines ESA have a positive effect on Customer Loyalty.

2.2. Airlines CSR on customer loyalty

In the modern corporate landscape, CSR is gaining prominence. With rising societal concerns about the corporate role in addressing social issues, CSR becomes especially crucial in sectors like hospitality, which heavily depend on consumer spending and face high product and service substitutability. In such sectors, CSR actions that enhance brand recall and foster customer loyalty are indispensable (Rhou & Singal, 2020).

CSR can be defined as a company's commitment to address social issues, extending its responsibilities beyond mere profitability to encompass broader stakeholder and community interests (Carroll & Shabana, 2010). Over the years, the definition of CSR has evolved, with various models highlighting different dimensions, such as economic, legal, ethical, and philanthropic (Carroll, 1991), or environmental, social, economic, stakeholders and voluntariness (Dahlsrud, 2008).

Several studies have applied these CSR dimensions across sectors, including aviation (Han et al., 2019; Y. Kim et al., 2020; Serhan et al., 2018). There is a difference between required and desired CSR, suggesting that the latter can positively impact customer loyalty when perceived and understood by customers (Y. Kim et al., 2020). Cheng (2011) differentiates between behavioral and attitudinal loyalty, while Oliver (1999) describes a four-stage progression of loyalty. From a communication perspective, CSR activities can enhance customers affective and cognitive connections with a company, fostering loyalty (Ahn, Shamim, & Park, 2021).

In the airline industry, loyalty has been uniquely explored through loyalty programs. Such programs, like Qanta's green loyalty initiative, intertwine CSR, particularly environmental actions, with customer loyalty strategies (Qantas, 2021). Effective communication of CSR efforts, as demonstrated by Turkish Airline's CSR report, can bolster airline image and reputation, leading to increased customer loyalty (Okumus et al., 2020).

While researchers have explored the relationship between CSR and customer loyalty, there is still a gap in understanding the nuanced interplay between airlines' CSR communications and customer loyalty. Most studies have broadly addressed CSR strategies in the aviation sector, considering their direct influence on customer loyalty (Y. Kim et al., 2020; Lee & Roh., 2019), especially in the context of modern challenges and evolving expectations. Studying the communication of CSR actions can bring to light its outcomes on customer behavior towards a company based on how they perceive it and its actions.

Since a successful CSR strategy directly impacts customer loyalty (Lee, Park, Rapert, & Newman, 2012), marketers should consider that when developing CSR strategies and activities (Lee & Yoon, 2018) and, consequently, the best practices for communication. Therefore, let us formulate the following hypothesis:

Hypothesis 2. Airlines CSR will have a positive effect on Customer Loyalty.

2.3. Relationship marketing: a moderator for airlines CSR and ESA on customer loyalty

Building enduring and positive relationships with customers is paramount in the fiercely competitive airline industry. Such relationships foster loyalty and ensure customer retention, which is directly linked to revenue generation (Chonsalasin, Jomnonkwao, Chanpariyavatevong, Laphrom, & Ratanavaraha, 2022).

RM is the strategic approach that focuses on creating and maintaining relations with stakeholders, primarily enhancing customer loyalty (Chou, Chen, & Wong, 2023). RM seeks to bring companies closer to their stakeholders, offering them a competitive edge and influencing customer behavior (Affran et al., 2019). The evolving landscape of CSR and environmental concerns has reshaped markets, corporate strategies, and consumer preferences, with airlines increasingly engaging customers in their sustainability initiatives (Morsing & Schultz, 2006;

Payne & Frow, 2017). Initiatives like Saudia’s participation in Sky-Team’s Sustainable Flight Challenge 2022 (Saudia, 2022) exemplify how airlines can co-create with customers, fostering engagement and loyalty (Saudia, 2022; Singer, 2022).

Research has consistently shown that customers tend to forge stronger, lasting relationships with companies they perceive positively (Barry, Dion, & Johnson, 2008). Such positive perceptions can be enhanced when customers are actively involved in a company’s CSR initiatives (Lee & Yoon, 2018). For instance, KLM’s “Fly Responsibly” campaign (Wilson, 2019), despite its initial controversy, underscores the potential of engaging customers in CSR activities, leading to enhanced loyalty behaviors (Agyei, Suna, Penney, Abrokwah, & Agyare, 2021; Ahmad et al., 2021; Lee & Yoon, 2018).

While the interplay between CSR, ESA, and customer loyalty has been explored, there is a gap in understanding how RM can act as a moderator in this relationship, how RM amplifies or attenuates the influence of CSR and ESA on customer loyalty in the airline industry. Therefore, studying these relationships is of great importance to understanding customers’ expectations, monitoring perceptions around these topics, and enabling companies to adjust to the ever-changing reality.

Globally, a positive image attained through successful CSR strategies and ESA helps companies establish a stronger relationship with the communities and stakeholders, with RM playing a pivotal role especially when customers are part of the process (Chen, Sun, Yan, & Wen, 2020; Lee & Yoon, 2018), having a positive effect on customer loyalty (Khoa, 2020). Considering this, we formed the following hypotheses:

Hypothesis 3a. RM moderates the influence of ESA on Customer Loyalty.

Hypothesis 3b. RM moderates the influence of CSR on Customer Loyalty.

Fig. 1 shows the conceptual model that mirrors the hypotheses previously mentioned:

3. Method

To address this study’s aim, we collected users’ interactions on ESA- and CSR-related posts from airlines’ Facebook pages. A dictionary was

established and analyzed through each keyword frequency. The output was used as input to PLS-SEM to understand the relations between constructs. Social media is one of the most powerful marketing tools, and airlines have extensively explored it. Its fast-growing proportion must be considered within marketing activities (Seo & Park, 2018), which is why it was the selected channel to collect data for this research.

3.1. Sample and data collection

For this study, users who commented on airlines’ Facebook social media posts containing the keywords “sustainability” and/or “sustainable” characterize the sample. The airline industry often recurs to social media as part of their customer engagement strategies (Avram, 2014; Chou et al., 2023; Menon et al., 2019), with Facebook specifically having a faster adoption among airlines from developed countries (Baghirov, Zhang, & Hashim, 2019). As a result, this social media platform was chosen as the data source, considering its demographic and geographically heterogeneous database and the massive number of daily user interactions (Rife et al., 2016).

The researchers established the data collection criteria (Lima, Ramos, & Oliveira, 2024). Only comments on posts from the World’s Largest Airlines on Revenue Passenger Kilometers (RPK) Flown in 2020 (Statista, 2020) were considered (Table 1). These were the criteria chosen because the environmental footprint of airlines depends on many factors, passenger-related issues being one of them. Overall passenger weight – including luggage –affect fuel consumption on commercial aircraft and, consequently, their carbon footprint (Bofinger & Strand, 2013). Besides, we considered only posts from the last five years. Finally, we filtered the posts to assess their relatability to environmental sustainability. For example, posts related to financial sustainability were discarded.

Comments were collected through a web scraper resourcing to the R software package Rvest. A web scraper is a tool or piece of code intended to extract data from a specific web page and, afterward, can be exported in the most convenient format for later analysis (Rita, Ramos, Borges-Tiago, & Rodrigues, 2022). The data was collected on the 14th of March 2022 and a total of 6181 comments were extracted. Middle Eastern and American airlines, respectively Qatar Airways, Emirates and United Airlines, gathered most of the collected comments, suggesting that these airlines more consistently consider environmental sustainability issues within their communications, compared to the remaining ones.

3.2. Data preparation

Following the approach of Ramos, Biscaia, Moro, and Kunkel (2023), we submitted the online reviews to a process that built a term frequency matrix to be used as an input for PLS. Using the R “tm” package, we cleaned the dataset by removing stop words (words with no semantic value such as “and,” “or,” “the”), adverbs, and articles. Additionally, we transformed all the terms into lowercase, and we conducted a stemming

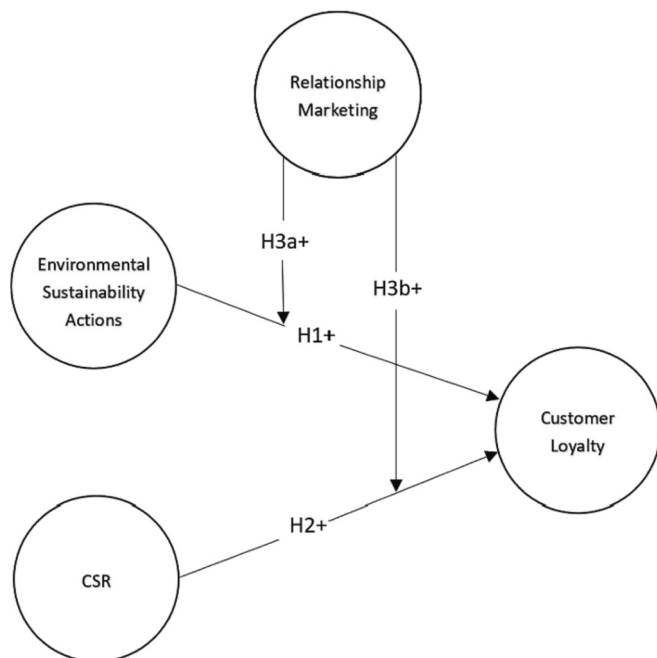


Fig. 1. Conceptual Model.

Table 1
World’s Largest Airlines on Revenue Passenger Kilometers (RPK) Flown in 2020 (Statista, 2020).

Airline	RPKs in Billions
American Airlines	124 B
China Southern Airlines	110.65 B
Delta Air Lines	106.49 B
United Airlines	100.19 B
China Easter Airlines	88.73 B
Southwest Airlines	87.26 B
Emirates	78.75 B
Air China	71.42 B
Ryanair	64.93 B
Qatar Airways	57.17 B

process (i.e., similar words were transformed into a common term: e.g., “loving” or “loved” = “love”). Terms related to each item of the constructs were counted and grouped according to their relatability with these terms, creating a dictionary of the theoretical constructs in the conceptual model (see Fig. 1). To allocate each term to the related item we selected randomly 5% of the collected comments to access the context in which the term was mentioned. This process, used by previous studies (Lima et al., 2024; Piccinelli, Moro, & Rita, 2021; Ribeiro, Ramos, & Moro, 2024), facilitates decision-making and ensures accuracy. Using the approach of Ramos, Rita, and Moro (2019), to eliminate the subjectivity associated with constructing such a dictionary, five independent specialists from different universities and backgrounds - three marketing and two CSR specialists - were invited to validate it. Each of the specialists was briefed about the aim of this study and received relevant information about the data collection and analysis method. By considering the specialists’ inputs, the dictionary was reviewed and adjusted. Additionally, since the environmental dimension is frequently disregarded within CSR strategies (Ayu, Sulistya, Ginaya, & History, 2020) and mainly because of the specificities of ESA in the aviation sector (Sardjono et al., 2021; Winter et al., 2019), the decision was made to study CSR and ESA as separated constructs. Therefore, items related to the CSR construct are focused on the environmental sustainability dimension in a broader sense (non-related to the industry), while ESA items are focused on aviation specific actions within environmental sustainability.

Table 2 showcases the conceptual model constructs, items, and examples of terms associated with each item.

Following this, the dictionary was confronted with the comments collected from Facebook, resulting in a term frequency matrix. A term frequency matrix is a structure that can identify each time a comment reflects a specific item: each line of the matrix represents a comment, and each column represents one of the items mentioned in Table 2. The more an item is referred to in a comment, the stronger the relation between that comment and the item, creating a continuous scale. Fig. 2 summarizes the described methodology.

3.3. Data analysis

The matrix served as the input for data analysis on partial least squares structural equation modeling (PLS-SEM) to assess relations between the data and the model constructs (Ramos et al., 2023). Previous studies have suggested that PLS-SEM is preferred in exploratory analysis with secondary data since it enables the interchange between theory and

Table 2
Items related to each model construct and respective example terms.

Construct	Items	Example Terms
Corporate Social Responsibility	Environmental Responsibilities in Aviation	Ecofriend, preserve, environmentalist.
	Recycling	Plastic, wrapper, paper.
Environmental Sustainability Actions	Resources Saving	Energy, water, power.
	Greenhouse emissions and biofuels	Biofuel, biodiesel, carbon.
	Sustainable Aircrafts	Aerodynamic, efficient, hybrid.
Customer Loyalty	Behavioral Loyalty	Repurchase, Return.
	Commitment: Conative	Commitment, love, compromise.
	Loyalty	Favorite, recommend, advocacy.
Relationship Marketing	Attitudinal Loyalty	Reward, membership, tier.
	Loyalty Programs	Connect, follow, comment.
	Engagement	Care, joy, respect.
	Positive Emotions	Encourage, accept, support.
	Customer Support	

data (Nitzl, 2016), making it the ideal software to perform this research analysis. Additionally, using secondary data, PLS-SEM is ideal for social science research, allowing single-item constructs and formative variables (Hair, Risher, Sarstedt, & Ringle, 2019). In this study, CSR is a single-item measure, and all model relations are formative, meaning constructs result from each item’s cumulative effect. This is particularly relevant for this study since loyalty can appear in many forms. For example, someone can advocate for a determined airline by believing in it as a brand and sharing the same values, yet when the need to buy an airline ticket arises, that airline may not be the choice for several reasons (price, routes, availability, etc.), not translating into behavioral loyalty.

The approach chosen for this analysis was the Confirmatory Composite Analysis (CCA). According to Hair, Howard, and Nitzl (2020), compared to other popular approaches, such as the Confirmatory Factor Analysis (CFA), CCA has several advantages over CFA and other approaches, such as construct validity given by higher item retention and its application to formative models.

Following the CCA approach for formative measures models (J. Hair et al., 2020), we started by examining Convergent Validity (i.e., minimum path coefficient of 0.7 for a strong relationship between a multi-item formative construct and its reflective measure) and Multicollinearity (i.e., [VIF] < 3 to assure multicollinearity absence). Indicators’ weight size and significance were tested using bootstrapping, considering ≤0.05 the statistical significance necessary to determine the indicators contributing to the construct. The significance level selected to evaluate t values was 5% (t = 1.96). Indicators size and significance are measured to assess their bivariate correlation among each other and the respective variable, considering outer loadings values ≥0.50 acceptable. Lastly, predictive validity measures (R²) and relevance (Q²) were performed. The attained results were the basis for the discussion and conclusions of this study (Hair et al., 2020).

4. Results

4.1. Assessment of measures

The word frequency (min-max) for ESA indicators ranged between 0 and 9 (Recycling) and 0–12 (Resource Saving and Sustainable Aircraft). Values between 0 and 3 (Behavioral Loyalty) and 0–18 (Loyalty Programs) were registered for Customer Loyalty. The moderator variant (RM) shows values between 0 and 3 (Customer Support) and 0–5 (Positive Emotions). Lastly, the indicator for CSR (Environmental Responsibility in Aviation) showed a 0–4 word frequency range. Descriptive statistics are presented in Table 3. Following the CCA approach, the algorithm PLS analysis was performed. Starting with path coefficients (β), some items’ values fall below 0.7 (J. Hair et al., 2020). The Resources Saving item shows a negative path coefficient value (β = -0.150), which resulted in its deletion. Based on a combination of theory and item significance, the decision was to keep all remaining items (Hair et al., 2019), given that these indicators contribute to theoretically explaining each variable. Multicollinearity was tested based on VIF external values. Since all values fall below 3 (1.000 < VIF < 1.168), no multicollinearity issues were observed (J. Hair et al., 2020). For validity assessment, outer weights analysis revealed that all items’ p values are significant, except for the Recycling item (p-value = 0.090 > 0.05; t = 1.697 < t-value recommended ≥1.96). Despite this item’s outer loading falling below the suggested criterion of 0.5 (J. Hair et al., 2020) (outer loading = 0.168), it was retained since its removal could affect the construct’s theoretical validity (Ramos et al., 2023). Additionally, the values for Customer Support (0.360), Attitudinal Loyalty (0.279), and Loyalty Programs (0.309) items are lower than the recommended criterion. Since they were statistically significant for the formative measures of RM and Customer Loyalty, just presenting lower loadings, the decision was to maintain them in the model, supported by their importance in past studies (e.g., Cenfetelli & Bassellier, 2009). The Sustainable Aircraft item has a significant influence in explaining ESA

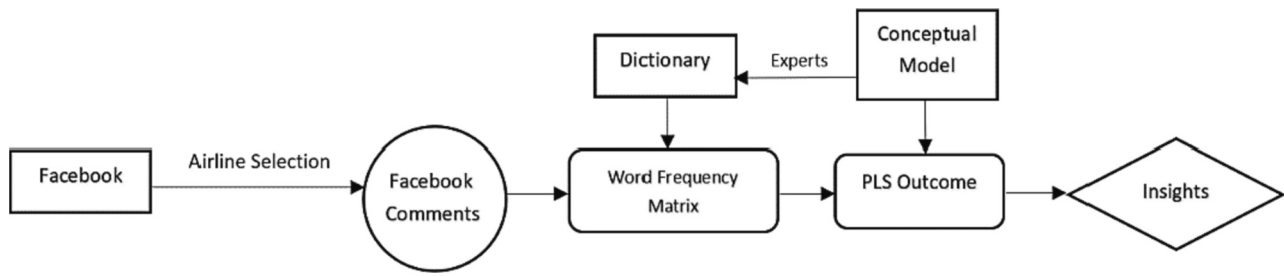


Fig. 2. Methodology Scheme.

Table 3
Items, Descriptive Statistics, Outer Weights, Outer Loadings and correlation matrix.

Variables	Min-Max	M(SD)	Outer Weights	t-values (p-values)	Outer Loadings
Environmental Sustainability Actions					
Recycling	0–9	0.089 (0.053)	0.090	1.697* (0.090)	0.168
Sustainable Aircrafts	0–12	0.756 (0.088)	0.763	8.637* (0.000)	0.882
Greenhouse Emissions and Biofuels	0–10	0.464 (0.118)	0.469	3.955* (0.000)	0.666
Relationship Marketing Engagement					
Engagement	0–5	0.715 (0.065)	0.723	11.178* (0.000)	0.759
Positive Emotions	0–4	0.555 (0.076)	0.558	7.309* (0.000)	0.612
Customer Support	0–3	0.305 (0.081)	0.305	3.769* (0.000)	0.360
CSR Environmental Responsibilities in Aviation					
Environmental Responsibilities in Aviation	0–4	1.000 (0.000)	1.000	N/A	N/A
Customer Loyalty Behavioral Loyalty					
Behavioral Loyalty	0–15	0.470 (0.053)	0.473	8.998* (0.000)	0.732
Commitment: Conative Loyalty	0–18	0.640 (0.045)	0.644	14.315* (0.000)	0.853
Attitudinal Loyalty	0–4	0.198 (0.053)	0.200	3.765* (0.000)	0.279
Loyalty Programs	0–3	0.159 (0.069)	0.157	2.270* (0.023)	0.309

Notes. Min = Minimum; Max = Maximum; M = mean score; SD = standard deviation; β = beta weight; t = t-value; N/A = Not applicable; * = significant at the 0.01 level.

(0.882), while Engagement (0.759) and Positive Emotions (0.612) highly explain RM.

4.2. Structural relationships

All values for internal VIF are below 3, proving no multicollinearity and discarding similarities between items (Hair et al., 2019). Bootstrapping analysis was performed to test relations between latent variables. Table 4 exhibits the correlations among the model variables through path coefficient values (β) ranging from 0.051 and 0.216, revealing insights about relationships between variables and confirmation of this study’s hypotheses. CSR has a significant positive direct effect on Customer Loyalty ($\beta = 0.077, p < 0.000$), as well as ESA on Customer Loyalty ($\beta = 0.216, p < 0.000$), supporting H1 and H2. The indirect effect of ESA on Customer Loyalty via RM was positive ($\beta = 0.084, p < 0.011$), supporting H3a. In turn, CSR negatively impacted

Table 4
Path Coefficients, Indicator Weights, and Explained Variance (R^2) and Predictive Capacity (Q^2) of Mediated Structural Model.

Effect	Path	Coefficients (β)	t-value (p-value)
Direct effect	CSR → Customer Loyalty	0.077***	4.144 (0.000)
Direct effect	Environmental Sustainability Action → Customer Loyalty	0.216***	10.447 (0.000)
Moderating effect	CSR → RM → Customer Loyalty	0.051***	1.469 (0.142)
Moderating effect	Environmental Sustainability Actions → RM → Customer Loyalty	0.084***	2.557 (0.011)

Variable	Explained Variance	Predictive Capacity
Customer Loyalty	$R^2 = 0.172$	$Q^2 = 0.152$

Notes. β = beta weight; t = t-value; *** = significant at 0.001 level; n.s. = not significant.

Customer Loyalty through the moderator RM ($\beta = 0.051, p < 0.142$), revoking H3b.

Jointly, the structural model explained 17.2% ($R^2 = 0.172$) of Customer Loyalty variance. This value reveals a weak explanatory power of the model, which may suggest that other variables not captured through this model may be essential to help explain loyalty. It is also worth noting that results should always be interpreted based on the context (J. F. Hair et al., 2019), and loyalty is a dynamic concept that often varies throughout time depending on situational factors (Biscaia, Correia, Rosado, Ross, & Maroco, 2013). This suggests that the model’s loyalty variance could be higher (or lower) depending on the moment data is collected. Lastly, Q^2 values for the endogenous variable (Customer Loyalty) were over 0. Hence, predictive relevance was established. The value ($Q^2 = 0.152$) reveals a moderate predictive relevance for the model (J. F. Hair, Ringle, & Sarstedt, 2013). All relationships between model variables were significant, apart from the moderation effect of RM between CSR and Customer Loyalty. This study’s structural model supports that airline communications about ESA and CSR positively influence Customer Loyalty. Additionally, RM moderates the effect of ESA on Customer Loyalty. Fig. 3 summarizes the structural results of the model.

5. Discussion

This study aims to assess the impact of ESA and CSR-related communications on customer behavior - particularly in Customer Loyalty - considering the moderating effect of RM, through a combination of text mining and a structural equation model approach, distancing itself from traditional methodologies. This research’s secondary database was composed of 6181 social media users’ comments, posteriorly structured, and applied to a conceptual model to test the relationship between CSR, ESA, and Customer Loyalty, with RM as a moderator.

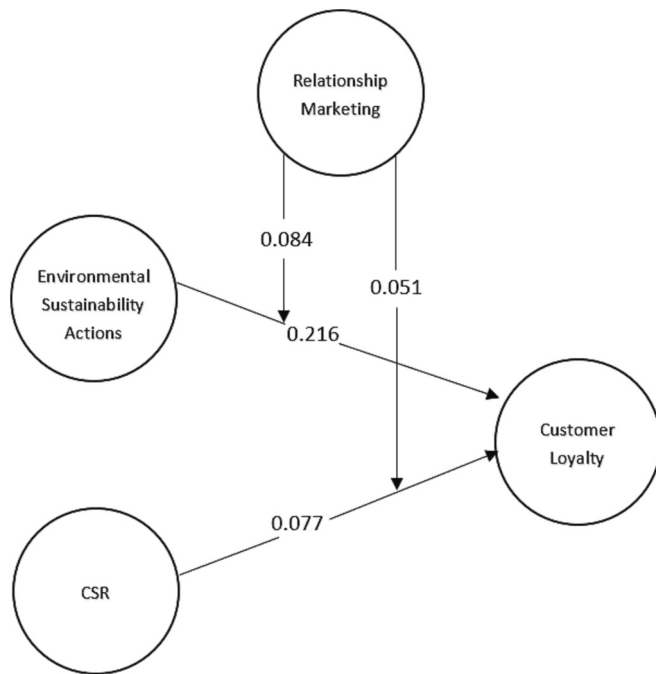


Fig. 3. Summary results of the structural model (significance level of 5%).

The results indicate that airlines communication on ESA positively affects Customer Loyalty, validating H1 ($\beta = 0.216$, p -value = 0.000), especially in the dimensions of Commitment and Behavioral Loyalty. Through marketing and communication strategies, companies can reinforce their commitment to environmental issues and disclose efforts to tackle them, ultimately positively influencing customers' purchase intentions and strengthening customer loyalty (Ramli et al., 2015). This finding is consistent with previous studies on customer loyalty and customers' perceptions of airlines environmental actions (Hwang & Choi, 2021; Vicente et al., 2020; Winter et al., 2019), corroborating the idea that communicating these efforts is critical and can be determining to business development (Ramli et al., 2015).

CSR positively influences Customer Loyalty, supporting H2 ($\beta = 0.077$, p -value = 0.000). As consumers are aware of social and environmental issues and require companies to participate, CSR communication strategies are essential to establish quality relationships with stakeholders (Morsing & Schultz, 2006), leading to customer loyalty. Although this study focuses solely on the environmental dimension of CSR as per subdivided by Dahlsrud, 2008, these findings suggest that involving customers in CSR strategies, publishing CSR reports, disclosing to the community and having a solid loyalty program are some ways airlines can enhance customer loyalty and overall image (Y. Kim et al., 2020; Lee & Roh., 2019; Okumus et al., 2020; Rhou & Singal, 2020). According to the results, CSR has a higher effect on Behavioral Loyalty and Commitment. This is particularly important because customers always proceed to an integrated appraisal of the service or product during the decision-making process. This includes dimensions such as product offering, overall performance and pricing (Cheng, 2011). When purchasing an airline ticket, the main criteria are availability (routes, schedules, seats) and pricing, the rest being secondary. Customer loyalty can often depend on how much visibility CSR actions get (Pérez & del Rodríguez Bosque, 2013), so communicating them can have a decisive role in the decision-making process.

RM positively mediates the relationship between ESA and Customer Loyalty, confirming H3a ($\beta = 0.084$, p -value = 0.011). When customers become aware of airlines environmental efforts, this likely generates a positive sustainability perception, positively influencing customer behavior related to loyalty and commitment (Chen et al., 2020). This aligns with the outcomes of this study, revealing that engagement

weighs the most in explaining RM (outer loading = 0.759) and reinforcing its importance. Airlines are working towards customer loyalty by creating valuable relationships with stakeholders (Ahn et al., 2021) and building proximity with customers through co-creation and active involvement in the value chain (Payne & Frow, 2017). In a reality where travelers are becoming increasingly aware and concerned about environmental issues and are willing to pay more to travel in an environmentally friendly airline (Han et al., 2019), RM can play a significant role in maintaining customer loyalty.

In turn, the moderation effect of RM in the relationship between CSR and Customer Loyalty was insignificant, revoking H3b ($\beta = 0.051$, p -value = 0.142). This result differs from previous studies that prove customer involvement in CSR actions enhances loyalty through a positive image and perception of companies' CSR strategies (Lee & Yoon, 2018) and, reversely, creates stronger and lasting relationships between companies and stakeholders (Barry et al., 2008). However, this result can be explained by considering companies' different CSR communications approaches. The level to which the customer is involved can affect the outcomes since it can shift and influence customers' expectations and perceptions (Morsing & Schultz, 2006). This means that although companies are communicating their CSR efforts, they are not continuously involving customers in specific areas that are part of airlines CSR strategies but go beyond the aviation scope, such as support of external environmental projects, fair-trade consumption, or projects that promote daily green habits.

6. Conclusion

This study explores the relationships between CSR, ESA, and Customer Loyalty, with RM as a moderator, from a communication point of view, which needs to be improved in the existing literature. The results suggest that communicating CSR strategies and ESA is essential to increase Customer Loyalty, especially in Behavioral Loyalty and Commitment. On the other hand, RM does not influence CSR's effect on Customer Loyalty but positively moderates the relationship between ESA and Customer Loyalty. These results satisfactorily answer the questions proposed by this study and provide essential insights to airlines and the aviation industry in general. This further reinforces the notion that social issues – in this case, in the environmental field – should be within the scope of all corporate strategies and activities, going beyond the economic dimension.

6.1. Theoretical implications

From a theoretical perspective, this study establishes to academia by extending and complementing previous literature on CSR (Lee & Roh., 2019; Okumus et al., 2020), environmental sustainability (Hwang & Choi, 2018; Winter et al., 2019) and customer loyalty (Han et al., 2019; Y. Kim et al., 2020) in the aviation sector. Additionally, this study innovates by being performed from a communication perspective. By filling this gap, it was possible to retrieve findings based on the impact of this type of communication rather than the actions, providing both theoretical and practical contributes of relevance to this matter.

6.2. Managerial implications

The current study reinforces that ESA-related communications, especially around sustainable aircraft topics, have a direct impact on customer loyalty. Therefore, this finding provides airline managers with relevant insights on how to coordinate marketing and communication activities and strategies. Consistent multichannel communication of these actions, such as fleet renewal for sustainability reasons, aircraft innovative characteristics, and usage of SAF, positively positions airlines from a business development perspective while promoting customer loyalty. In addition, environmental loyalty programs are a growing trend in airline strategy, serving as a tool to establish closer relationships

with frequent flyers through sustainability while working towards loyalty.

Another relevant contribution refers to CSR communications. Airlines communication managers should include CSR efforts in their communication plans, opting for the proper channels and approaches. Institutional websites, strategic partnerships, and CSR reports are some examples. These channels allow airlines to expose their CSR efforts in a transparent and structured way, while reducing the risk of skepticism often associated with means like advertising. Additionally, airline companies should pay closer attention to the format and approach of these communications, considering customization, segmentation and strategy adaptation to the different channels and public.

Lastly, building quality stakeholder relationships is pivotal to leveraging these desired outcomes. Airline managers should consider RM principles to better monitor and understand the impact of ESA and CSR communications on customers and whether these satisfy their needs and expectations, a customer-centric process.

6.3. Limitations and future research

Limitations to the current study should be considered when analyzing it. This study was based on the elaboration of a dictionary subsequently validated by an external panel of marketing and CSR experts. Hence, limitations associated with human bias and possible subjectivity should be considered when interpreting results.

Sampling criteria only considered airlines part of the World's Largest Airlines on Revenue Passenger Kilometers (RPK) Flown in 2020 (Stastita, 2020). Since we are referring to a global industry, culture plays an important role in airline strategies, determining environmental and social approaches (Kuo, Kremer, Phuong, & Hsu, 2016). For this reason, future studies on a wider number of airlines can provide insight into pattern identification and cultural variations influencing airlines' marketing strategies. Furthermore, exploring airlines from different geographical locations can lead to variations in findings in customer CSR and ESA perceptions, complementing the current study's findings.

Data for this study was collected solely from Facebook, which has limitations associated with the existing content on the platform and what users mentioned in their comments. Therefore, future studies considering a questionnaire with items absent from our conceptual model might reveal other valuable insights, as well as including the possibility of clustering the sample into groups that can further be compared to identify tendencies in behavior (i.e. data groups based on geographical location for a cross-cultural research), something that consists in a limitation of the method used in this study. Additionally, exploring other social media platforms and combining them with primary data, such as surveys, could also be considered for future studies. This combination of secondary and primary data may contribute to a broader understanding of the domains and characteristics of airlines' CSR and ESA communication that have a greater impact on customers and their loyalty, complementing in the ones on the current study. Furthermore, considering the different levels of adoption and usage of the platform across the globe, future studies should focus on the ways and formats in which airlines engage with users in the digital sphere, considering the outcomes from an RM perspective. Understanding the best approaches to promote quality customer relationships can contribute to the existing literature on RM.

Author statement

Authors have seen and approved the final version of the manuscript being submitted. They warrant that the article is the authors' original work, hasn't received prior publication and isn't under consideration for publication elsewhere.

CRedit authorship contribution statement

Inês Galhoz: Conceptualization, Investigation, Methodology, Writing – original draft. **Ricardo Filipe Ramos:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Writing – review & editing. **Rui Bisciaia:** Conceptualization, Investigation, Methodology, Supervision, Validation, Writing – review & editing.

Declaration of competing interest

None.

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