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Human Signals, Machine Insight: Fostering Generosity through AI-Driven Charity Advertising

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1. Introduction

Non-profit organizations operate on a foundation of public trust and stakeholder support. For this reason, widespread engagement through fundraising is imperative. However, securing visibility proves increasingly difficult within a saturated media ecosystem that juxtaposes dominant digital channels with persistent traditional tools. Moreover, the current digital environment, characterized by platform volatility and evolving privacy standards, adds layers of complexity to the conversion funnel, hindering the progression from exposure to donation. In this context, charities increasingly rely on evidence-based communication strategies and media channel orchestration to convert attention into sustained support. These findings are corroborated by recent market analyses, most notably the M+R Benchmarks Report 2025. This study, delivered by the namesake US-based consultancy and regarded as the global standard for non-profit performance analysis, outlines the current landscape, highlighting a dual strategic paradigm. On one hand, there is a universal adoption of digital channels; on the other, the efficacy of consolidated offline methods and specific digital channels persists. In the online sphere, social media presence is now ubiquitous: Facebook and Instagram remain the dominant platforms, with adoption rates of 99% and 98%, respectively (M+R, 2025). However, investment in these channels for direct fundraising often proves ineffective. Revenue generated by Facebook Fundraisers has contracted drastically by 42%, now accounting for a marginal 0.2% of total online revenue. In parallel, social media advertising demonstrates a low Return on Ad Spend (ROAS): TikTok, for instance, records a ROAS of just $0.03, with an extremely high average cost per donation ($1,040). Regarding offline and high-efficiency channels, data indicate that tools offering proven returns or greater traceability remain crucial. Direct Mail demonstrates stability and relevance, posting a 3% increase in revenue. Within digital advertising, search advertising remains the most profitable channel, achieving a ROAS of $2.23. Also significant is the growth of hybrid channels combining digital with the traditional television experience, such as Connected TV (CTV). This channel saw a massive increase in spending (+84% in 2024), now accounting for 15% of advertising budgets dedicated to fundraising (M+R, 2025).

This marked divergence between the low financial efficiency of social media and the reliability of traditional channels defines the complex challenge non-profits face. Despite the vast potential audience on social platforms, conversion rates remain low, necessitating the development of strategies capable of bridging the gap between reach and actual donation. In this fragmented, multi-channel context, this thesis, structured as a collection of papers, aims to achieve three main objectives:

- To review the state of the art in charity advertising to identify predominant emotional and persuasive drivers and their concrete impact on engagement and intention to donate.
- To analyze the social media landscape to determine which creative choices in visual composition (e.g., facial expressions, presence of text overlay) have the greatest impact on engagement and how these elements interact.
- To define optimal budget allocation strategies, supporting marketing managers in orchestrating the most effective media mix to maximize the return on communication investments.

Specifically, the thesis is developed as follows:

- Chapter 2 presents a systematic review of the literature to map how discrete emotions and their complex configurations (e.g., *mixed affect*) operate as antecedents, mediators, or moderators of prosocial outcomes. The analysis distills emerging theoretical implications and provides principles for effective message design in charity advertising.
- Through the application of interpretable machine learning models, chapter 3 estimates and interprets the specific contribution of visual creative elements, particularly text overlays and face visibility, to social engagement metrics translating these computational insights into practical creative guidelines.
- Chapter 4 addresses the budget allocation challenge by developing an advanced econometric forecasting framework. The model quantifies cross-channel advertising effects (e.g., TV, Social

Media, Online/Wb Ads.), evaluating carry-over effects and seasonality, while enabling rigorous scenario simulations (*"what-if" analysis*) to inform optimal investment decisions.

- Chapter 5, integrates the key findings across the three studies, offering a holistic perspective on the intersection of emotion, creativity, and media planning. It outlines the theoretical contributions of this work to the nonprofit marketing literature and provides a consolidated strategic framework for practitioners. Finally, it discusses the limitations of the current research and proposes avenues for future scholarly inquiry.

2. Does the end justify the means? The persuasive power of emotions in charity advertising: A systematic literature review

2.1 Introduction

Understanding how to foster donor persuasion is a strategic priority for nonprofit organizations (NPOs) in today's competitive environment. Despite their widespread reliance on emotional appeals, many NPOs struggle to design campaigns that effectively drive prosocial actions such as donating, volunteering, and sharing.

Emotions impact how people process information and behave, indicating that the effectiveness of advertising messages hinges on the emotions they provoke in us (Edell et al., 1987). To enhance the strategic development of advertising content and achieve better marketing outcomes, studying the role of emotions in advertising is thus essential (Poels & Dewitte, 2019).

The practical importance of understanding emotional appeals is also reflected in real-world perspectives. First, prosocial behavior requires emotional engagement: diverting time or money to help others implies high emotional involvement in their cause. Second, emotions are crucial for boosting engagement and a sense of connection to a cause, motivating people to act. Recently, even Instagram/Threads chief Adam Mosseri, considering the engagement of posts, declared how establishing account value is more important than follower counts, which can be gamed, manipulated, and so on (Hutchinson, 2024). Third, successful charity campaigns often contribute to building long-term relationships with their supporters by creating a strong emotional bond and fostering loyalty and continued support. Finally, emotional charity advertisements are more likely to be shared on social media, amplifying their reach and potentially increasing support for the cause (Berger & Milkman, 2012).

Although the central role of emotions in encouraging people to donate has been widely researched, there is conflicting evidence and a lack of clear guidelines to help nonprofit organizations (NPOs) design their promotional campaigns. For instance, while some studies highlight the effectiveness of negative appeals—such as guilt (Hibbert et al., 2007), sadness (Small & Verrochi, 2009), or anger (Vitaglione &

Barnett, 2003)—others emphasize the role of positive emotions, including hope, happiness, and pride (Burt & Strongman, 2005; Septianto et al., 2018). These contradictions highlight the need for actionable insights to guide NPOs in leveraging emotional appeals effectively. Our approach to addressing these issues is both timely and necessary: a critical review of the literature not only synthesizes existing knowledge but also identifies key takeaways that can help NPOs navigate the complexities of designing emotionally resonant campaigns. In this regard, several articles called for additional research on the role of emotional persuasion in stimulating donations in the charity sector (Pham & Septianto, 2019) and on examining a wider range of negative appeals to understand which can drive action while minimizing reactance (Yousef et al., 2022). This literature review aims to analyze the existing state of the art on the most relevant emotions linked to prosocial behaviors such as donating, sharing, cooperating, comforting, helping, and volunteering. By focusing on the emotional aspects of charity advertising, this study enriches existing contributions (e.g., Wymer & Gross, 2021) and synthesizes such shreds of evidence in a theoretical model to clarify the roles emotions play—as antecedents, mediators, or moderators—in fostering prosocial behavior. Ultimately, it aims to advance theoretical understanding and practical application by identifying effective emotional strategies and outlining an agenda for future research.

The remainder of the paper is structured as follows. Section 2 explains the research methodology. Section 3 presents the main findings through descriptive and theoretical results. Section 4 provides a general discussion, offers insights into the findings' theoretical and managerial implications, and suggests future research directions. Finally, Section 5 reports conclusions and limitations.

2.2 Methodology

The systematic literature review method was chosen to accurately address the research objectives, reduce the potential bias in article selection, and attain reliable results while minimizing interpretive subjectivity (Moher et al., 2009). This choice was also driven by the aim to examine whether the results and research techniques used in the selected articles are consistent with each other or whether discrepancies exist in their results due to differences in their cultural context (Davis et al., 2014), the observed sample, and the chosen communication method of the advertisements (text or image). Moreover, a rigorous systematic review was the most appropriate to summarize and evaluate a narrow area of research—the role of emotions in charity advertising (Snyder, 2019). The seven stages of the review were as follows: identification of research questions, definition of exclusion and inclusion criteria, data collection, article selection, data extraction and synthesis, and presentation of results. In the data collection stage, a search strategy was followed (Snyder, 2019) to identify the relevant articles on the effects of emotions in stimulating donor intention and behavior. The keywords, target databases, and the inclusion and exclusion criteria were determined. Keyword identification was the first step (Tranfield et al., 2003). The following search string was chosen: (emotion* AND in AND charity AND advertis*) OR (emotion AND in AND charity AND donation*).

All the proposed document types were included (*i.e.* articles, minimum five pages length conference papers and proceedings[1], and literature reviews) by applying the above string to their titles, abstracts, and keywords. Three databases were then chosen: Web of Science (WoS), Scopus, and EBSCO. WoS has a rigorous journal selection procedure based on publication standards, expert opinions, regular appearances, and the quality of citation data, making it the most reliable database (Garfield, 1990). Scopus was chosen since it is the largest peer-reviewed literature database (Guerrero Chanduví et al., 2015), and EBSCO was chosen to ensure no relevant article was overlooked. The aim was to select all the contributions that addressed emotional charity advertising, including those focused on the effects of

[1] Conference papers and proceedings accounted for 2.53% of the final sample.

images and message-framing characteristics on emotions, charity advertising, and donations. Contributions that examined the role and persuasive impact of emotions elicited by specific features in appeals for donations were thus selected. Moreover, to be included in the final selection, the articles had to elucidate how the distinct elements in an advertising message (e.g. altruistic vs egoistic framing, expressions of sadness vs happiness, and so on) influence prosocial behaviours (such as the intention to donate and the amount donated).The articles fulfilling one of the following conditions were excluded:

- They are not academic publications or grey literature (reports, policy literature, working papers, newsletters, government documents, and speeches).
- They are not in English.
- They focused not on charity donations but only on purchasing cause-related products.
- They did not consider behavioral outcomes as a dependent variable or did not investigate behavioral responses (in the case of qualitative research articles).
- They did not consider the emotional valence of advertisements.
- They only considered emotion-inducing prosocial behaviors in a non-advertising context.

No exclusion criteria were applied based on the period: the aim was to observe the trends in approaches to the research topic and observe any changes at the theoretical level over 18 years (2005–2023) owing to varying cultural contexts and digital transformation. It is worth noting that although no time-related exclusion criteria were imposed, all retrieved and eligible articles were published after 2005. This is due to the results generated by the search string applied across the three databases rather than a deliberate theoretical restriction on the time span.

To identify, screen, and include the relevant studies and report our findings, the protocol flow, based on the PRISMA approach (Moher et al., 2009), was used (Figure 1).

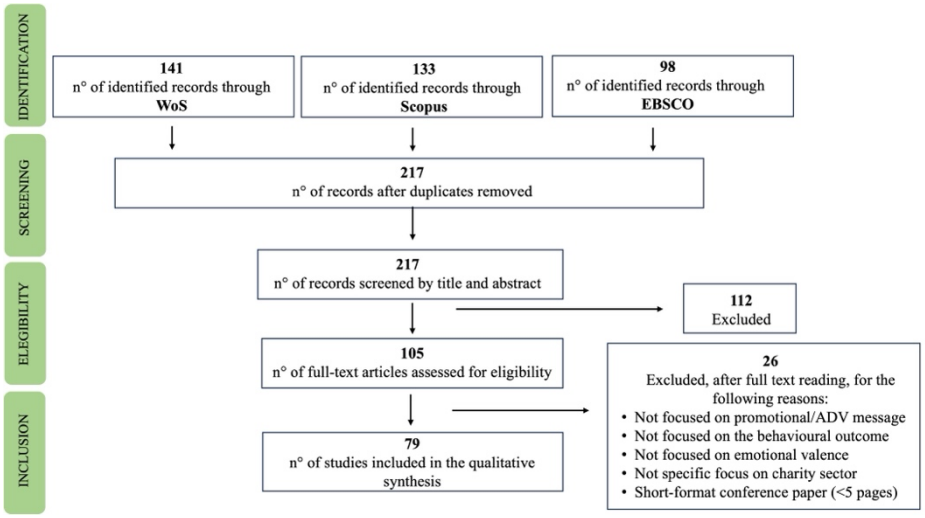


Figure 1 PRISMA flow diagram

We identified 372 articles in the databases. After detecting and excluding 155 duplicate articles, the total was reduced to 217. After the initial screening, based on titles and abstracts, 105 articles were included, which were examined using text analysis to pinpoint their key ideas and viewpoints about the effectiveness of charity advertisements based on emotional cues. After the secondary screening, which involved a full-text reading of the articles, 26 were excluded, and the final total was 79.

2.3 Findings

2.3.1 Descriptive results

Regarding the annual research trend (Figure 2), a growing interest in emotional advertising in the charity sector can be observed during the reporting period. Between 2005 and 2015, a maximum of three articles per year were published. From 2016, the contributions increased, ranging between 8 and 6 per year, except for 2018. The highest number of articles were published between 2019 and 2023.

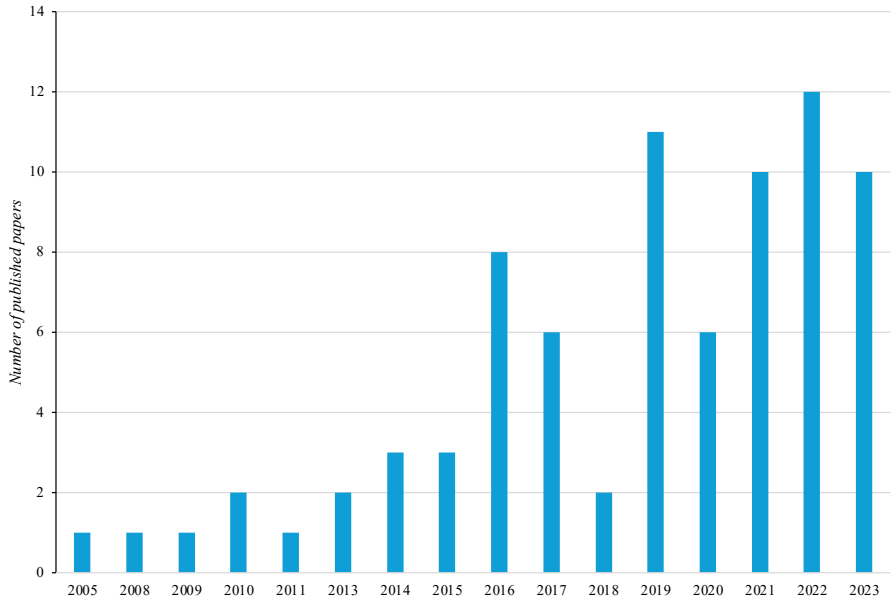


Figure 2 Contributions per year

The 79 selected articles were published by 54 sources, with the top contributors being the Journal of Nonprofit & Public Sector Marketing (6.3%), the Journal of Consumer Behavior (6.3%), and the Journal of Advertising Research (5%), followed by the Journal of Advertising, the Journal of Business Research and the International Journal of Nonprofit and Voluntary Sector Marketing (3.75%).

Concerning the source distribution of the analyzed studies, most papers are published in advertising and nonprofit-focused journals, reflecting the core emphasis of this research area. However, contributions also range from psychology (e.g., Frontiers in Psychology) to technology (e.g., Computers in Human

Behavior) and broader business and marketing fields (e.g., Journal of Business Research, European Journal of Marketing, International Journal of Research in Marketing), underscoring the interdisciplinary nature of the topic and its relevance across multiple fields. Table 1 lists the contributions with the most citations according to WoS and Scopus[2].

Title	Source	Authors	Number of citations (Scopus)
The Face of Need: Facial Emotion Expression on Charity Advertisements	Journal of Marketing Research	(Small & Verrochi, 2009)	385
Guilt and giving: A process model of empathy and efficacy	Psychology & Marketing	(Basil et al., 2008)	239
Charitable organizations' storytelling influence on donors' emotions and intentions	Journal of Business Research	(Merchant et al., 2010)	128
The donor is in the details	Organizational Behaviour and Human Decision Processes	(Cryder et al., 2013)	112
My words for your pizza: An analysis of persuasive narratives in online crowdfunding	Information & Management	(Majumdar & Bose, 2018)	81
Attitudes and Donation Behaviour When Reading Positive and Negative Charity Appeals	Journal of Nonprofit & Public Sector Marketing	(Erlandsson et al., 2018)	81
Pulling on the Heartstrings: Examining the Effects of Emotions and Gender in Persuasive Appeals	Journal of Advertising	(Kemp et al., 2013)	79
Testing the prosocial effectiveness of the prototypical moral	Journal of Experimental	(Van de Vyver &	77

[2] Citation counts were retrieved in January 2024.

emotions: Elevation increases benevolent behaviours and outrage increases justice behaviours	Social Psychology	Abrams, 2015)	
What Really Makes a Promotional Campaign Succeed on a Crowdfunding Platform? Guilt, Utilitarian Products, Emotional Messaging, and Fewer but Meaningful Rewards, Drive Donations	Journal of Advertising Research	(Chen et al., 2016)	71
Guilt Regulation: The Relative Effects of Altruistic Versus Egoistic Appeals for Charity Advertising	Journal of Advertising	(Chang, 2014)	66

Table 1 Ranking of contribution per citation (top ten)

Concerning methodology, the majority of the selected articles used quantitative approaches: laboratory and field experiments, neuromarketing techniques, and AI models for data extraction and analysis.

The laboratory and field experiments were designed using emotion induction techniques, evaluated using questionnaires, and subjected to rigorous statistical analysis, including correlation, univariate, bivariate, and multivariate techniques (*i.e.* SEM, logistic and multiple regression, and analysis of variance). Few articles used neuromarketing methods, such as eye tracking and electroencephalogram (EEG), to capture immediate physiological and neurological measures.

AI-powered comprehensive data scraping and analysis methods remain a niche with great potential. Empirical research on digital and crowdfunding platforms or social media employs these advanced techniques for insightful data extraction and analysis. Only two studies employ qualitative research methods, specifically Qualitative Content Analysis (QCA) and semi-structured interviews.

Concerning sampling, the studies relied on MTurk or Prolific for participant selection, suggesting that these platforms are favored for collecting diverse and representative samples. Alternatively, the sample

collection procedure comprised enrolling graduate or undergraduate university students. Table 2 illustrates the articles' distribution based on their methodology.

Methodology	Authors	Percentage
Laboratory and Field Experiments	(Bennett, 2005); (Basil et al., 2008); (Small & Verrochi, 2009); (Ford & Merchant, 2010); (Merchant et al., 2010); (Power et al., 2011); (Cryder et al., 2013); (Kemp et al., 2013); (Chang, 2014); (Kandrack & Lundberg, 2014); (Lwin & Phau, 2014); (Baberini et al., 2015); (Bennett, 2015); (Van de Vyver & Abrams, 2015); (Bjälkebring et al., 2016); (Chen et al., 2016); (Choi et al., 2016); (Cockrill & Parsonage, 2016); (Lunardo & Bezençon, 2016); (Randle et al., 2016); (Saunders et al., 2016); (Sudhir et al., 2016); (Albouy, 2017); (Cao & Jia, 2017); (Van Doorn et al., 2017); (Xu, 2017); (Erlandsson et al., 2018); (Majumdar & Bose, 2018); (Bae, 2019); (Bartsch & Kloss, 2019); (Best & Costello, 2019); (Goenka & Van Osselaer, 2019); (Hudson et al., 2019); (Kandaurova & Lee, 2019); (Nisa, 2019); (Pham & Septianto, 2019); (Zhou & Xue, 2019); (Septianto & Tjiptono, 2019); (Choi et al., 2020); (Fitzgerald et al., 2020); (Li & Atkinson, 2020); (Nelson et al., 2020); (Septianto et al., 2020); (Bae, 2021); (Choi & Park, 2021); (Homer, 2021); (Kim & Childs, 2021); (Lim et al., 2021); (Yousef et al., 2021); (Speckemeier & Tsivrikos, 2021); (Septianto & Paramita, 2021); (Tong et al., 2021); (Chang et al., 2022); (Chung & Braun, 2022); (Li & Yin, 2022); (Mesler & Simpson, 2022); (Pittarello & Kogut, 2022); (Septianto et al., 2022); (Xu, 2022); (Xiao et al., 2022); (Yousef et al., 2022); (Bae, 2023); (Esterzon et al., 2023); (Rahim et	84,81%

	al., 2023); (Waites et al., 2023); (Walewijns et al., 2023); (Sung et al., 2023)	
Eye-Tracking and EEG	(Alonso Dos Santos et al., 2017); (Huang et al., 2021); (Martinez-Levy et al., 2022); (García-Madariaga et al., 2023); (Sandoval & García-Madariaga, 2023)	6,33%
AI-Models for Data extraction and analysis	(Lee & Park, 2019); (Lee & Park, 2020); (Jang & Chu, 2022); (Kwon et al., 2022); (Hou et al., 2023)	6,33%
Qualitative methodology	(Dean & Wood, 2017); (Liu et al., 2023)	2,53%

Table 2 Article distribution based on methodology.

2.3.2 Theoretical foundations

To investigate the persuasive power of emotions, the reviewed studies had common theoretical frameworks as their foundations. Among the most frequently cited theories was the Prospect Theory, one of the many behavioral economics theories developed to explain how people choose between options that carry risk and uncertainty. The theory offers a framework for understanding how emotionally charged persuasive communications are processed (Tversky & Kahneman, 1992) and explains how message framing (positive/gain vs negative/loss) influences audience behavior. Tversky and Kahneman (1992) demonstrated that individuals make different choices depending on whether an advertising message emphasizes a gain or loss in a given scenario. Individuals' attitudes, beliefs, ideas, and behaviors can all be impacted by shaping how they interpret a message through a positive or negative appeal (Tversky & Kahneman, 1992).

Another theoretical perspective often adopted was the Perceived Efficacy Theory (Warren & Walker, 1991), which postulates that donors are aware of specific beneficiary needs and that, as the number of happy beneficiaries rises, so too will the donors' perceived efficacy, leading to an increase in their donation intention.

The theory of Emotional Contagion was also common (Hatfield et al., 1993), according to which a person's facial expression can incite viewers to experience vicarious feelings (Hatfield et al., 1993), which can affect, in turn, a consumer's intention to donate (Hackenbracht & Tamir, 2010).

According to the Identified Victim Effect, another premise used by various investigations (Dickert & Slovic, 2009; Kogut & Ritov, 2005), donors are more likely to give to a single, identifiable beneficiary, because an identified (as opposed to the unidentified) beneficiary is depicted more concretely and elicits higher emotions in a donor (Kogut & Ritov, 2005).

Another fundamental tenet was the Dimensional Theory of Emotions, according to which three primary dimensions—valance, arousal, and dominance—are used to categories emotions (Lane et al., 1999). Emotions can be positive or negative, high or low aroused, and dominating or under control. This theory was used in studies that examined positive and negative emotional appeals.

The Empathy-Helping Hypothesis was also used in many studies. It posits and empirically validates that individuals are predisposed to act altruistically when they feel empathy for those in need (Bagozzi & Moore, 1994; Batson, 1987; Fisher, 2014).

2.3.3 Thematic results

This study aimed to examine which emotions, when elicited or represented within charity appeals, can stimulate prosocial behavior (*i.e.* donations of time or money). A distinction was made between the emotions "represented" in the advertisement (for example, through the facial expressions of the beneficiaries) and the emotions stimulated and evoked in the audience. Emotions such as sadness or happiness typically belong to the first case. In the second case, on the other hand, different emotions can be manifested, such as guilt, pride, and compassion. The reviewed studies analyzed the elicitation of these emotions differently: either as a direct cause of the prosocial behavior or, in most cases, as a mediator or moderator between the independent variables (such as message framing) and the dependent variable (the prosocial behavior).

This study aimed to go beyond understanding whether positive or negative emotions are more effective, recognizing that mixed emotions often stimulate prosocial behavior more than single emotions. Moreover, it aimed to narrow the field by identifying the emotions that have been the most studied to date, under what conditions, and how they can be elicited to persuade more donors. The moderating factors of the relationship between the represented emotions and prosocial behavior were also identified, and the framework developed by Wymer and Gross (2021) was extended by grouping emotions (e.g. antecedents, mediators, or moderators) according to the following categories:

- The emotions represented in the advertising stimuli (*i.e.* antecedents),
- The emotions evoked by an advertisement explain the effects of prosocial behaviour (*i.e.* mediators).
- The emotions and other factors that moderate the effects (directly and/or indirectly) of advertisements on prosocial behavior (*i.e.* moderators).

Figure 3 visually summarizes these groupings, illustrating how emotions function as antecedents, mediators, or moderators within the studied framework. This classification was adopted to provide a clear and systematic understanding of the emotional pathways and their interactions within the broader framework.

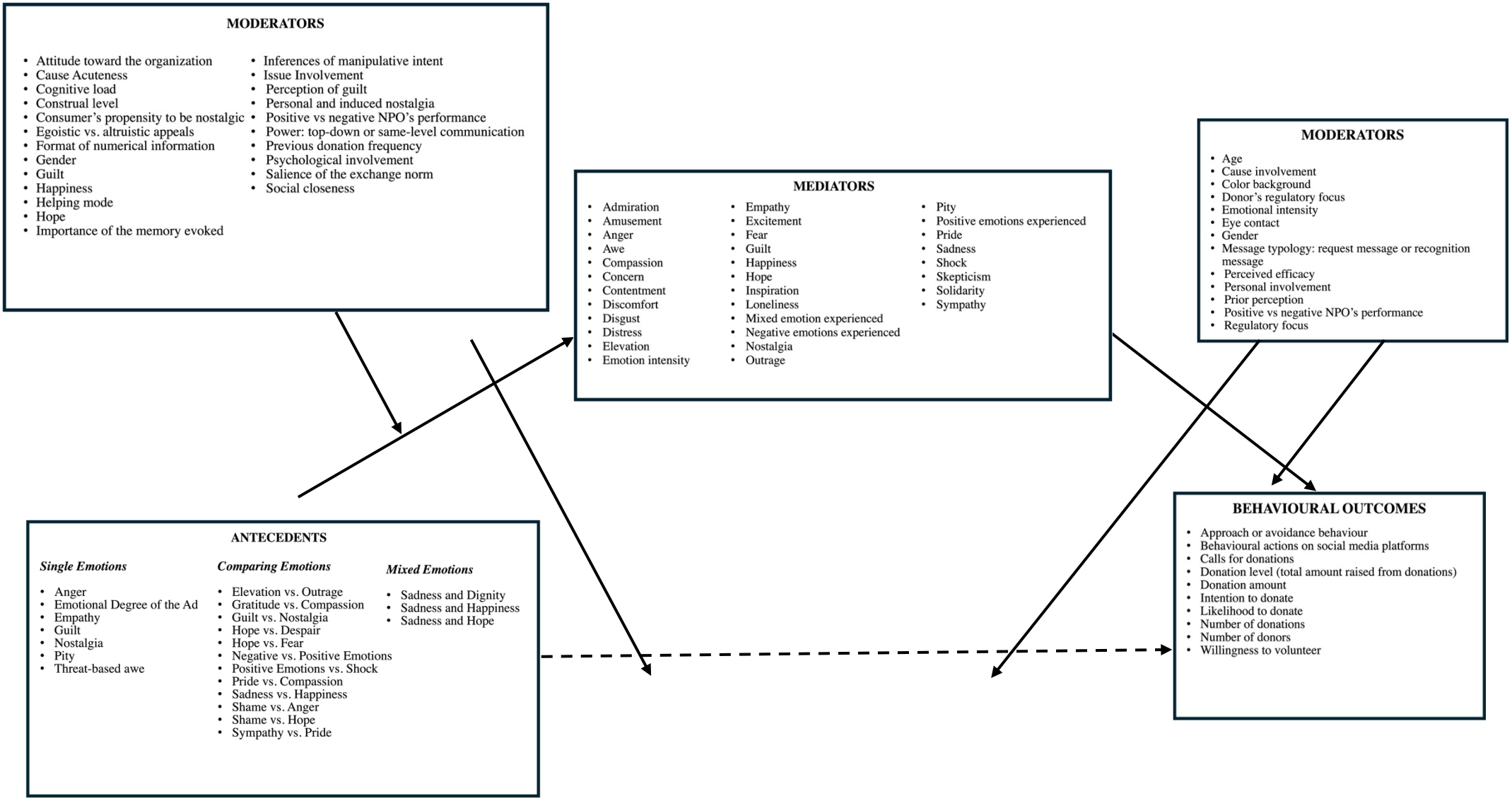


Figure 3 The different roles of emotions in charity advertising

2.3.3.1 Emotions as antecedents of prosocial behavior

This section presents a comprehensive overview of the emotions in the analyzed articles that we identified as the antecedents of prosocial behavior. The main antecedents are the emotions represented within the advertisement. To structure our analysis and facilitate a more critical interpretation of the literature, we propose classifying emotions into three main categories: single, contrasting, and mixed. This classification reflects a deeper conceptual trajectory in emotional charity advertising. The single emotion category includes all those emotions analyzed as triggers that interact with other non-emotional factors to activate prosocial behavior. Contrasting emotions (e.g., guilt vs nostalgia, hope vs fear) belong to another strand of the literature, which highlights how different emotions compete with each other, depending on message structure and contextual variables, in triggering prosocial behavior more or less effectively. Finally, mixed emotions belong to a third strand of research that deals with more sophisticated emotional experiences, in which opposing emotions (e.g. sadness and hope) are integrated into a single narrative, often increasing the donor's perceived impact and emotional involvement.

The adoption of this structure is intended to demonstrate the evolution of literature from the study of elementary emotional triggers to the analysis of complex emotional synergies. This provides a more profound comprehension of the emotional configurations that are most effective in promoting prosocial behaviour. This perspective also underscores a fundamental paradigm shift, transcending the conventional positive-versus-negative dichotomy. By directing attention towards the configuration of emotions, as opposed to the mere presence or absence of emotional valence, this approach facilitates a more profound delineation on the mechanisms through which emotional appeals function and the strategic exploitation thereof to promote prosocial behavior with greater efficacy.

2.3.3.1.1 Individual emotions and their intensity in advertising

In the literature on charity advertising, individual emotions are the most basic unit of emotional persuasion analyzed. Single emotions induce prosocial behavior by acting as emotional triggers. However, their effectiveness varies considerably depending on the context, the intensity of emotion, and how donors perceive themselves.

Anger. Can anger be considered an activator of prosocial behavior? Van Doorn et al. (2017) explore this question by examining whether and when anger-eliciting appeals can increase donations to charities that support women victims of human trafficking or natural disasters. Their findings suggest that anger can motivate intention to donate, but only when it serves a specific restorative purpose (e.g., helping women start a new life) rather than merely alleviating suffering. This evidence highlights that anger, although often perceived as a negative emotion, can activate prosocial behavior when channeled into restoring justice. This suggests that anger does not simply cause emotional discomfort but acts as a mobilizing force that, under the right conditions, transforms moral outrage into concrete restorative action.

Emotional Degree of the Ad. If certain emotions are more powerful in motivating people to act, it is equally worth exploring whether the emotional intensity of an advertisement makes its message more persuasive. According to Albouy (2017), the emotional degree of the ad (EDA), which has been manipulated at low, moderate, and high levels, is a critical antecedent in determining the effectiveness of charitable campaigns. A higher EDA generates more intense negative emotions (fear, guilt, sadness, and shock), which positively mediate the impact of the advertisement on persuasive results. The EDA directly influences the perceived intensity of negative emotions by increasing positive attitudes towards the ad and intentions to help (e.g., donate or sign a petition). Rather than the specific emotion per se, the perceived intensity of emotional stimulation leads individuals to engage more deeply with the ad's content. High EDA activates more substantial affective elaboration, heightens perceived personal relevance, and accelerates the urgency to act. Thus, the effectiveness of an emotional appeal is not solely a function of emotional valence (positive vs negative) or the specific emotion per se but is significantly shaped by the magnitude of emotional experience triggered in the viewer.

Empathy. Empathy is one of the most extensively researched emotions in charity advertising, as it is found to be the catalyst for prosocial behavior. Empathy prompts individuals to feel a sense of anticipatory guilt resulting from not conforming to the social norm of helping those in need (Basil et al.,

2008). Moreover, research shows that empathy plays a crucial role in making charitable appeals more effective: fostering a stronger emotional connection with beneficiaries reduces emotional distancing. It strengthens the intention to donate (Basil et al., 2008). When people feel closer to the condition of those in need, helping becomes a more natural and immediate response. In this way, it operates as a gateway emotion in prosocial contexts.

Guilt. The guilt individuals feel when comparing their privilege to the struggles of others can increase their generosity. For this reason, much research has focused on exploring the impact of this emotion on prosocial behavior. Therefore, much research has focused on exploring the impact of this emotion on prosocial behavior. Notably, guilt-inducing ad stories have a more substantial effect on giving when paired with self-benefit appeals (e.g., "Giving makes you happy") rather than other-benefit ones (e.g., "Your contribution can help others"). By highlighting the personal benefits that come from the act of generosity, egoistic appeals can increase the belief that giving will bring happiness (Chang, 2014), mitigating the donor's guilty emotional state when one encounters the suffering of others. In this way, guilt leverages the psychological discomfort of self-perceived moral failure, giving people a way to restore a positive self-image through prosocial action. In giving, donors simultaneously help others and themselves, gaining external prosocial rewards and internal emotional relief by affirming personal morality.

Nostalgia. Nostalgic appeals evoke higher emotion and donation intentions than non-nostalgic appeals (Ford & Merchant, 2010). This effect is moderated by a consumer's propensity to be nostalgic and the significance of the evoked memory. Specifically, nostalgia-based charitable appeals work best when they evoke a donor's significant memories (Ford & Merchant, 2010). Given the memory dimension that evokes this emotion, nostalgia-based appeals are exceptionally functional for NPOs with collective memory, such as schools, museums, and sports institutions. In summary, nostalgia can re-establish a significant association between the donor's personal history and the present mission of the cause. This

temporal connection fosters a sense of belonging and a simultaneous moral obligation to the cause, thus encouraging donors to support institutions representing shared values or identities.

Pity. Pity-eliciting appeals increase the intention to donate via sympathy. This mechanism is a function of the potential donor's perception of the victim's responsibility for their condition (Lunardo & Bezençon, 2016). When the victim is not considered responsible for their condition, pity elicits sympathy, which increases the intention to donate. In contrast, pity negatively affects sympathy and, consequently, the intention to donate if the victim is considered responsible for their suffering (Lunardo & Bezençon, 2016). This evidence can be linked to the tendency of human beings to find a cause, a reason for suffering, by identifying someone responsible for it. When victims are perceived as responsible for their misfortune, a moral judgment inhibits the empathetic response typically activated by pity.

On the other hand, if the cause of the negative condition is attributable to an external cause independent of the beneficiary, pity can activate a sense of moral duty to help. This mechanism is particularly crucial for organizations that support socially marginalized people (e.g. homeless and drug addicts), who are often mistakenly held responsible by public opinion for their disadvantaged condition. Crafting appeals that emphasize the external, uncontrollable causes of suffering can be critical in preserving the effectiveness of pity-based emotional appeals.

Threat-based Awe. The role of awe has also been intensely studied, demonstrating how a negative variant — threat-based awe, which refers to a mix of positive awe and fear (Gordon et al., 2017) — helps encourage donations in the context of natural disasters (Septianto et al., 2022). This emotion can be elicited in different ways, such as within an advertisement (e.g. using images of natural disasters) and through unrelated information (e.g. news about a natural disaster). Threat-based awe may encourage charitable behavior when processed at a high construal level (*i.e.*, an abstract and broad interpretation focusing on the why of an action). At the same time, it may discourage charitable behaviour when processed at a low constructive level (*i.e.*, a concrete and specific interpretation that focuses on the how of an action) (Septianto et al., 2022). The bivalent mixed-emotion nature of threat-based awe can explain

this effect. Moreover, like positive awe, threat-based awe can increase one's concern for others and decrease concerns regarding oneself (Piff et al., 2015), thereby augmenting donors' concern for the victims of natural disasters and motivating donations.

On the other hand, similar to fear, threat-based awe is linked to a sense of powerlessness (Gordon et al., 2017), which lowers the perceived efficacy of donations and inhibits them. Consumers evaluating a high construal-level message have a wide range of thinking (Bullard et al., 2019), making it easier to think about others (*i.e.*, beyond themselves). Here, threat-based awe is a positive stimulus in encouraging donations. In contrast, people evaluating a low construal level message are more focused on the negative component of threat-based awe, which augments their feelings of powerlessness and perceived donation efficacy and decreases their donation intention.

2.3.3.1.2 Comparing emotions

Studies comparing different emotional appeals reveal that the effectiveness of one emotion over another in stimulating prosocial behavior depends on its interaction with other factors, such as the donor's psychological characteristics, the organization's moral objectives, and specific features of the advertisement.

Elevation vs Outrage. Two moral emotions — elevation and outrage — affect prosocial behavior as a function of different action domains (Van de Vyver & Abrams, 2015). Building on the appraisal tendency framework (ATF) (Lerner & Keltner, 2000), which states that distinct emotions can lead to varying types of prosocial actions based on their unique appraisals, Van de Vyver and Abrams (2015) demonstrate that outrage mainly boosts justice-related activities, such as actions in response to injustice or unfairness (e.g. protests of petition signing), whereas elevation primarily improves benevolent acts.

Gratitude vs Compassion. The effectiveness of the emotions of compassion and gratitude depends on the moral goals of organizations (Goenka & Van Osselaer, 2019). In particular, stimulating the feeling of compassion and evoking the moral values of caring increases donations to charities that promote humanitarian and caring causes (e.g., the Red Cross). On the other hand, gratitude that evokes moral values of justice and fairness increases donations to charities that promote equality and social justice (e.g.

Human Rights Watch). This evidence highlights that selecting the "right" emotion must be strategically aligned with the campaign's moral goals and the desired donor response.

Guilt vs Nostalgia. Guilt and nostalgia evoke distinct emotional responses, but their effectiveness in driving donations varies significantly (Chen et al., 2016). In a quantitative study based on a content analysis of 200 crowdfunding campaigns on Kickstarter, Chen et al. (2016) examined the impact of various emotional appeals on donation levels through a multiple regression model. Among the appeal types analyzed, guilt emerged as the most effective, showing a significant and positive impact on the percentage of funding achieved. Guilt-based messages foster a sense of personal responsibility, making them particularly effective in encouraging prosocial behaviors. By contrast, nostalgia did not show any significant effect on donation levels, despite its emotional resonance. This finding stands in contrast to the results of Ford and Merchant (2010), who had previously identified nostalgia as a positive driver of charitable giving. The divergence suggests that while nostalgia may be effective in traditional charity advertising, it appears to be less persuasive in the context of crowdfunding campaigns, where urgency and a sense of personal obligation, characteristics typical of guilt appeals, play a more decisive role in mobilizing donor support. In any case, such conflicting results about the effect of nostalgia on charity donations, leave room for future investigations.

Hope vs Despair. When examining which appeals are more effective for attracting donors to a charity education program, it was found that positive appeals, eliciting a sense of hope, work best for attracting more donors and gathering a higher donation amount, rather than appeals evoking despair (Nisa, 2019). These findings suggest that hope increases the perceived efficacy of giving. Donors are likelier to give if they believe their support can lead to meaningful change. Conversely, appeals based on despair can inhibit prosocial behavior by increasing feelings of helplessness and emotional overwhelm, undermining motivation to act.

Hope vs Fear. Nonprofit organizations involved in environmental protection, such as WWF, can enhance the effectiveness of their charity advertising by strategically matching emotions like hope and fear with

specific numerical formats (Septianto et al., 2020). Specifically, hope appeals increase the effectiveness of numerical details in a point-value format. In contrast, fear appeals to increase the efficacy of numerical information in an interval format. Research revealed that consumers' self-reported emotions when thinking about an environmental issue (hope, fear, disgust, guilt, sadness, and anger) can influence the likelihood of following an ad with numerical information in a point-value or a range format. Moreover, non-governmental animal welfare organizations who want to advertise with positive emotions, especially hope, should use numerical information in a point-value format. Fear and hope are associated with evaluating uncertainty (Smith & Ellsworth, 1985; Winterich & Haws, 2011). Consequently, the consumers who experience these emotions perceive this ambiguity differently. Findings thus reveal a more nuanced understanding of how two emotions associated with the same evaluation may perceive that evaluation differently, leading to different effects on consumers' judgments and decisions (Septianto et al., 2020).

Positive vs Negative Emotions. The impact of emotional valence in appeals—negative versus positive—varies significantly based on the organization's objectives (Erlandsson et al., 2018). Negative appeals (evoking guilt and sadness) trigger more excellent actual donation behavior. Conversely, positive appeals (evoking happiness and hope) generate favorable attitudes toward the ad and the organization (measured as attitude toward the ad and the advertiser) but do not significantly increase actual donation behavior (Erlandsson et al., 2018). This indicates that negative appeals are more effective in translating emotions into concrete actions due to an uncomfortable emotional tension that individuals seek to resolve through immediate helping action, while positive appeals, decreasing the sense of urgency, enhance perceptions of the brand or initiative without necessarily stimulating behavioral responses.

Positive Emotions vs Shock. Showing the harsh conditions faced by those in need can often shock potential donors, raising the question: are shock appeals truly more effective than positive ones? Shock appeals evoke shock, fear, and disgust, but these emotions do not directly drive behaviors. Instead, the feelings activated by shock appeals that act as mediators are compassion, interest, and surprise, which

encourage behaviors such as donating and discussing the ad. Positive appeals evoke hope, happiness, and relief, but these emotions often do not serve as positive mediators; instead, they act as deterrents, reducing the urgency to contribute. However, compassion and interest are critical mediators in promoting concrete actions, even in positive appeals. In summary, shock appeals activate more effective mediators for stimulating immediate behaviors, while positive appeals enhance perceptions of the organization but have limited mediated effects on prosocial behaviors (Cockrill & Parsonage, 2016).

Pride vs Compassion. When investigating whether pride or compassion is more effective in motivating donations, their impact depends on how the organization's performance is framed. An organization's performance was found to moderate the effectiveness of emotions such as pride (positive) or compassion (negative) in increasing donations. Intuitively, if an organization's performance is better than its previous year's, it is ideal to evoke feelings of pride in potential donors about the achieved goals. Conversely, if the current performance is worse than the previous year, it is more effective to appeal to feelings of compassion and request support (Septianto & Tjiptono, 2019). Pride reinforces donors' self-identification with successful causes and increases their willingness to associate with and support organizations that positively reflect their values.

In contrast, compassion activates a moral obligation to help those in need, especially when confronted with evidence of organizational struggle.

Sadness vs Happiness. Several studies focused on measuring the effects of sadness vs happiness represented in charity advertising images through facial expressions or elicited by text messages. Using computational emotional content analysis, Kwon et al. (2022) examined how representing sadness or happiness in images and text influences social media engagement. Regarding images and text content, sadness was found to be more effective. However, representing sadness in images and texts decreased engagement more than showing it once in an image or a text. In contrast, when happiness was shown through images and texts, viewer engagement increased. Sad congruent matches, however, decreased viewer engagement compared to showing only sadness in either a face image or a text description.

Conversely, happy congruent matches were more effective than having only a happy emotion in a facial image or a text description (Kwon et al., 2022).

However, various factors can influence how sadness and happiness affect prosocial behaviour, such as the donors' regulatory focus, degree of psychological involvement with charities, the number of beneficiaries portrayed, and the presence or absence of eye contact.

Firstly, to understand the greater effectiveness of appeals evoking sadness or happiness, it is essential to consider the donor's regulatory focus (prevention vs promotion) (Choi & Park, 2021). Specifically, when donations are requested through sad appeals, a prevention focus reduces charity donations to children in poverty more than a promotion focus. Activating persuasive knowledge thus raises scepticism and decreases empathy, which mediates the effect of sad appeals on charity donations, thereby reducing philanthropic giving (Choi & Park, 2021).

Having examined the effectiveness of appeals that evoke sadness and happiness, the focus now shifts to how the facial expressions of the recipients - whether sad or happy - shape the emotional impact of these messages and influence prosocial behaviour.

It was found that the number of recipients and facial expressions influenced the participants' inclinations to donate to educational projects for children in poor mountainous areas (Li & Yin, 2022). Charity advertisements with sad recipients show only one increased donor's willingness to contribute more than multiple recipients. However, when the advertisements showed smiling recipients, having multiple receivers was more successful than having only one. Furthermore, the perceived effectiveness of a donation acted as a mediator between the interaction effect between facial emotions and the beneficiary number (Li & Yin, 2022).

Furthermore, the effectiveness of a happy or sad facial expression of children in need changes depending on the presence or absence of eye contact between the donor and recipient. Research revealed that when there is eye contact between the donor and recipient—*i.e.* when the recipient's eyes are visible in the photograph—consumers tend to have higher emotional intensity and a greater willingness to donate if

the recipient has a happy rather than a sad facial expression. In contrast, when eye contact is absent—*i.e.* when the gaze is obscured for privacy reasons—consumers show higher emotional intensity and donation intention towards charity ads when the recipient has a sad rather than a happy facial expression (Tong et al., 2021). Moreover, emotional intensity was found to mediate also the interaction effect of facial expression and eye contact on the donation amount—a happy facial expression led to more intense positive emotions than a sad facial expression when there was eye contact between the donor and the recipients, and this was associated with a higher donation amount. Indeed, the pictures of sad vs happy children triggered stronger donation intentions for the less involved participants. In contrast, the opposite was true for those who were highly involved: less involved people are then prompted by the unpleasant emotions they experience to take action (*i.e.*, donate) and alleviate these emotions (Cao & Jia, 2017). This aligns with Mood Management Theory and the Negative State Relief Model (Cialdini et al., 1973), which suggests that people act to reduce unpleasant emotions.

Shame vs Anger. The effectiveness of emotions evoked by advertising appeals varies depending on the context (poverty vs illness) and the type of emotion used (shame or anger) (Power et al., 2011). Appeals based on shame are more effective in the context of poverty, where they elicit pity in participants—a positive mediator that promotes the intention to donate. However, in the context of illness, the effects of shame-based appeals are less pronounced, though still cheerful. In contrast, anger-based appeals are generally less effective, particularly in poverty, where they provoke anger in participants—a negative mediator that decreases willingness to donate. In the context of illness, anger is perceived as more acceptable, with fewer adverse effects than poverty (Power et al., 2011). In this case, the effectiveness of the emotional appeal depends on the moral judgment made about the beneficiary and their condition. In the context of poverty, it is socially acceptable for individuals to feel shame about their situation but less acceptable to express anger, as poverty is often associated (even if mistakenly) with some degree of personal responsibility. By contrast, anger is socially acceptable in the case of illness because the cause is perceived as external and unpredictable and thus does not diminish prosocial behavior.

Shame vs Hope. Comparing shame and hope appeals reveals interesting mechanisms behind social media engagement (Yousef et al., 2022). The greater effectiveness of loss-framed shame appeals can be explained by their ability to trigger a sense of immediate personal responsibility in the donor. Unlike appeals centered on beneficiaries, shame in this context is directed toward donors, highlighting the negative consequences of careless behaviour (e.g., donating unusable items) and evoking discomfort associated with potential social judgment (Yousef et al., 2022). Shame appeals and loss-framed messages can increase the urgency to take corrective action, such as showing engagement and advocacy for the message.

Conversely, hope-based appeals stimulate optimistic projections about the future, generating a less immediate urgency to act (Yousef et al., 2022).

Hope promotes reflection and long-term motivation but does not create the same pressure to act rapidly. This pattern suggests that digital charity campaigns aiming to maximize engagement may benefit from framing negative emotions like shame within a context of loss to prompt faster and more impulsive actions from potential donors.

Sympathy vs Pride. Whether pride or sympathy is more effective in driving prosocial behaviour depends on an individual's gender, gender identity, and personality traits (Kemp et al., 2013). Sympathy promotes attention to the needs of others and caring, while pride involves evaluations related to success. Findings suggest that the effectiveness of these emotions on donation intention is mediated by an individual's gender, gender identity, and personality traits. Appeals that induce sympathy are more effective for women than men in encouraging prosocial behaviors (Kemp et al., 2013). Although no significant differences were found between men and women in appeals that promoted pride, men expressed more donation intention to the target organization when exposed to a pride appeal than a compassion appeal (Kemp et al., 2013).

2.3.3.1.3 Mixed emotions

Mixed emotional appeals represent an advanced stage of emotional persuasion, leveraging emotional complexity to enhance cognitive engagement and perceived personal impact. The co-presence of positive

and negative emotions fosters profound emotional elaboration, ultimately boosting donation intention and behavior more effectively than single-valence appeals.

Sadness and Dignity. The combination of sadness with a victim's dignity elicited a positive evaluation and, consequently, a greater willingness to donate than appeals that only had each condition (Rahim et al., 2023). Specifically, dignity can inspire people—people are often moved when they witness the dignity and moral excellence of others and feel inspired when they praise their qualities. Moreover, the combination of sadness and dignity in appeals was more effective than the sadness-dominating ones, persuading people to donate to needy old citizens. The combination of sadness and dignity will inspire donors to donate and ease viewers' discomfort (Rahim et al., 2023). This is due to the dual power of sadness and the moral elevation of dignity. While sadness creates a sense of urgency to act, portraying the beneficiary dignifiedly increases admiration for them and the perceived effectiveness of the donor's contribution.

Sadness and Happiness. Using mixed emotional appeals, specifically by combining a happy picture of a victim with a sad text message, the authors showed that it can effectively increase individuals' prosocial behavior by strengthening their donation intention (Septianto & Paramita, 2021). The emotional contrast between the picture and the text explains this evidence, making it easier for donors to understand how much their help can positively change the victims' lives (Septianto & Paramita, 2021). This evidence is not trivial, as it points to the donors' perceived "sense of impact" in driving donation behaviour, which has also been highlighted in other studies.

Sadness and Hope. Several reviewed studies focused on measuring the effects of different combinations of contrasting emotions (negative vs positive) triggered by advertising texts and images (Homer, 2021). Research revealed that constructing an appeal with both sadness and hope leads to more donations to the cause of helping children in need (e.g. UNICEF) compared to appeals dominated by one or the other. In addition, findings confirmed that appeals representing an evolution from negative to positive emotions (for example, from being sad to hopeful) generate more donations than appeals that represent the opposite

path, from positive to negative emotions (for example, from being optimistic to sad). Moving from negative to positive, it emphasizes the restorative power of giving, reinforcing the donor's belief that their contribution can make a real and meaningful difference.

2.3.3.2 The role of emotions as mediators and moderators

This section outlines the emotions mediating and moderating the relationship between advertising characteristics and prosocial behavior.

2.3.3.2.1 Mediators

Empathy is one of the primary emotions that reveal the effect of advertising characteristics on prosocial behavior. Xiao et al. (2022) examined the greater effectiveness of concrete appeals, characterized by numerous details about the donation's use, on participants' intention to donate to the charity "World Children Cancer" compared to abstract appeals. Four primary mediators explain this effect: message credibility, perceived transparency, cognitive processing, and empathy. In particular, the details embedded in the appeals increase the message's credibility, which generates an excellent perception of transparency. The more the perceived transparency of a message, the higher the likelihood of donations and the higher the donation amount. The results demonstrate that cognitive elaboration and empathy mediate the relationship between message concreteness and prosocial behaviors. This mechanism highlights how emotional involvement is not spontaneous but cognitively constructed through information processing. Consistent with previous literature, concrete messages were found to heighten the likelihood of people's elaboration (Kisielius & Sternthal, 1984), and elaborated thinking of a cause leads to a higher level of empathy, as empathy is a cognitive response to acknowledging another individual's situation (Eisenberg et al., 2014; Feshbach, 1978; Hoffman, 1982).

Furthermore, research has shown that reading a specific message about the results of a donation increases the likelihood of further engagement and empathy with the cause (Xiao et al., 2022). This effect occurs because appeals that leverage autonomy reinforce the perception that donations can make a difference, fueling hope for a better future for the beneficiary and stimulating prosocial behavior. The study

highlights how hope is a fundamental lever for the effectiveness of solidarity campaigns. This emotion strengthens donors' belief that their contribution can have a tangible impact on the lives of the victims. The role of hope has also been widely studied in the construction of advertising campaigns. In particular, Waites et al. (2023) outlined this bond, showing that autonomous aid appeals increase the impact perceptions, leading to higher donation levels through increased hope for the beneficiary's future.

Another fascinating result has been outlined by studying the process underlying the relationship between exposure to cold images and prosocial behavior in response to negative emotional charity appeals, examining loneliness, sympathy, and donation intention in a multiple mediation model (Choi et al., 2016). The results support the hypothesis that exposure to cold images before viewing a negative charity appeal reduces the effectiveness of the appeal in eliciting prosocial behavior towards children in need and that this effect does not extend to warm or neutral images. The attenuating effect of coldness arises because physical coldness is related to feelings of loneliness and thus dampens feelings of sympathy. This result suggests that the everyday images of cold objects adjacent to the visual field in which the charity appeal is presented evoke image-induced feelings of loneliness that attenuate an individual's ability to sympathize with the victims of a charity appeal, thus eliminating the appeal's effectiveness. This evidence shows how emotional responses are susceptible to incidental external cues. Even subtle stimuli, such as cold images, can diminish the emotional intensity that encourages prosocial behaviour. Thus, evoking sympathy is about managing the broader sensory and cognitive context in which the message is received and crafting compelling appeals.

Research has highlighted the role of guilt as a mediator of empathy and self-efficacy, shaping how empathy and self-efficacy can trigger guilt and generate intentions to donate (Basil et al., 2008). Empathy and self-efficacy increase anticipated guilt, leading to stronger intentions to donate to needy children. Guilt fully mediates empathy, suggesting guilt is integral to the relationship between empathy and donation intention. Empathy increases anticipated guilt, and people intend to donate to reduce this unpleasant feeling. Emotional activation alone is not enough for prosocial action; it must be accompanied

by emotional self-regulation, such as guilt. It is, therefore, necessary to shed light on the complexity of the emotional journey that leads to donation, which often involves multiple emotions and different cognitive mechanisms. In this case, the study shows that the motivation to act triggered by empathy does not arise solely from concern for others but also from the need to manage the emotional distress arising from empathy towards the cause.

In Bennett (2015), the mediating role of the level of mixed emotions experienced and the extent to which the feelings experienced are more positive or negative emerged. Stimuli from charities supporting children in need, animal welfare, and adults suffering from distressing medical conditions were used to explore how personal tendencies, such as empathy, affect intensity, duality acceptance, and sensitivity to stress affect attitude towards the appeals and intention to donate, through the mediating role of the level of mixed emotions experienced. Factors such as empathetic disposition, duality acceptance, and susceptibility to stress significantly influenced the degree of mixed emotions felt, leading to a higher level of mixed emotions and positively impacting attitude towards the advertisement and behavioral intention, especially when positive emotions predominated. This finding suggests that emotional ambivalence can increase the effectiveness of charitable appeals. Experiencing conflicting emotions—such as hope and sadness—may foster a more genuine emotional response, leading to deeper donor engagement and a greater willingness to give.

A valuable study illustrates the mediating effect of the salience of moral concerns evoked by the emotions that drive the positive impact of moral congruency between the feelings evoked and a charity's moral purpose. In particular, the research indicates that compassion increases preferences for welfare charities, as it increases the salience of care for moral concerns. However, gratitude increases preferences for equality/justice charities because it increases the salience of fairness and moral concerns. Gratitude and compassion thus make different moral concerns salient, which mediates the effect of feelings on prosocial preferences (Goenka & Van Osselaer, 2019). Finally, research highlights the mediating role of empathy and disgust elicited by severe imagery of sick individuals in prompting charitable donations (Sung et al.,

2023). The graphic depiction of illness can trigger contrasting emotional responses: empathy or disgust, depending on the perceived social closeness between donor and beneficiary. While empathy stimulates helping behaviors (Al-Shawaf et al., 2016), disgust, linked to fear of contagion (Rozin & Fallon, 1987), leads to avoidance and reduces prosocial actions. This study reveals a key insight into donor behaviour: Individuals are more likely to empathize with beneficiaries perceived as socially close. Therefore, it becomes crucial to consider the double-edged emotional impact that appeals may generate depending on the perceived social distance between donors and recipients.

2.3.3.2.2 Moderators

In examining the moderating relationships analyzed by the studies under review, it is essential to consider that the moderating variables may act at different stages of the model. These include the following: between the antecedent variable and the mediating variable and between the mediating variable and the outcome variable (see Figure 3). Concerning moderators, research showed that social closeness (high vs low) moderates the mediating effect of empathy and disgust (Sung et al., 2023). Social closeness moderates whether an approach tendency (triggered by empathy) or an avoidance response (triggered by disgust) is more likely to be evoked by an image of people with severe illness. Examining empathy, it is possible to discover no difference in the empathy felt for the person from a severe or non-severe image in a low social closeness condition (Sung et al., 2023).

Nevertheless, the study participants had more compassion towards the severe image in the high social closeness condition. Examining disgust, the authors discovered a lower donation allocation to the severe image in the low social closeness condition because it was perceived as more repulsive than the non-severe image. There were no variations in disgust perceptions in the high social closeness condition. Those in the high social closeness condition did not view the severe image as more repulsive, indicating that social closeness may act as a buffer against the disgust response that drives avoidance. According to the study, several pictures of people socially close to the viewer elicited empathy rather than disgust, which increased the level of donations. However, in the social distance condition, the severe images evoked disgust, resulting in lower donations and avoidance tendencies towards the appeal.

Notably, Kim and Childs (2021) extended the concept of personal and induced nostalgia by examining their moderating role on appeal typology (other-benefit vs self-benefit) and clothing donation intention. They demonstrated that nostalgia proneness and situationally induced nostalgia are essential to bolster donation intentions. A key insight from this research is that, compared with self-benefit appeals, other-benefit appeals are more effective when people feel nostalgic. The interplay between nostalgia and self-benefit appeals offers an in-depth investigation of the elements influencing people to donate clothing. The study grounded its approach in construal level theory (CTL) (Liberman & Trope, 2008; Trope & Liberman, 2010), proposing that genuine nostalgia acts as a personality trait that contextually induces a socially oriented emotional state. Specifically, the study posited that charity appeals towards socially distant beneficiaries (*i.e.* another benefit) are more effective in enhancing prosocial behavior when participants are nostalgic (temporally distant to the past). This study carved out a new trajectory in exploring CLT by demonstrating that the congruence between temporal and social distance significantly enhances helping behavior. In line with the Kim and Childs (2021) study results, individuals with higher tendencies towards nostalgia are more likely to be moved towards charitable behavior and donate, particularly when their donation is framed as impacting others rather than serving themselves. These findings may seem counterintuitive, given that nostalgia is typically associated with personal memories and an individualistic outlook. However, this study challenges this assumption. This can be explained by the fact that nostalgia increases emotional sensitivity and vulnerability, which promotes a greater appreciation of social ties and prosocial values. For this reason, individuals who experience nostalgia tend to value social connections and altruistic values more and respond better to appeals for other benefits.

By highlighting receiving gifts in exchange for donations, the salience of exchange norms has been manipulated when participants evaluated charities with different moral purposes (Goenka & Van Osselaer, 2019). It was thus possible to examine how the salience of exchange norms moderates the positive effect of emotional congruency between the emotion evoked and a charity's moral purpose on

prosocial preferences. The results revealed that the positive effect of moral congruence weakens when the exchange norms are salient. When the participants were cued to view their donation as an exchange relationship, the ethical values prompted by the study of two emotions (compassion and gratitude) no longer resulted in divergent prosocial preferences. Hence, these results suggest that charities seeking to utilize morally congruent emotions in their promotional campaigns may want to avoid highlighting a direct exchange. This can be explained by the fact that when it is made clear that something will be received in return for the donation, the use of moral emotions (compassion and gratitude) loses its differentiating power because the logic of exchange contaminates the altruistic motivation, shifting the donor's mindset from value-driven giving to transactional thinking. For this reason, moral congruency (*i.e.*, the alignment between the emotion evoked and the moral value promoted) no longer works if the appeal emphasizes that there will be a material return for the donor. Investigating the effectiveness of sadness and happiness appeals in consumer generosity, it has been possible to provide theoretical findings on the moderating role of self-construal (Mesler & Simpson, 2022).

Self-construal refers to how individuals perceive themselves in relation to others: those with an independent self-construal see themselves as autonomous and distinct from others, while those with an interdependent self-construal view themselves as connected and relationally bound to others.

For more independent self-construal, happiness increased empathy, leading to greater generosity. In contrast, sadness led to greater generosity for more interdependent self-construal. The interaction between sadness and interdependent self-construal causes a higher level of empathy, boosting generosity (Mesler & Simpson, 2022). Individuals with an interdependent self-construal define themselves through social relationships: they perceive themselves as part of a broader network of people and communities. Their sense of identity is deeply rooted in moral obligations toward others. When an advertisement conveys sadness (e.g., a child in distress), individuals with an interdependent self-concept feel a heightened connection and empathy toward the cause, driven by their strong relational orientation.

In contrast, individuals with an independent self-construal perceive themselves as autonomous, self-determined, and distinct from others. They place a high value on self-efficacy, personal achievement, and individual growth. When exposed to appeals that express happiness (e.g., children experiencing joy after receiving help), these individuals perceive helping as consistent with their positive self-image. They are motivated by the opportunity to contribute to a successful and uplifting outcome.

To conclude the overview of the central moderators underlying the effectiveness of emotional charity advertising, it is essential to mention that the helping mode (e.g. the modality through which individuals behave prosocially) moderates the influence of victim images on intentions to help (Li & Atkinson, 2020). In particular, results showed that the influence of positive victim images was more evident in donation-based fundraising for charities. On the contrary, the images of sad victims effectively promoted the helping mode of purchasing cause-related products (Li & Atkinson, 2020). More than donations, cause-related marketing allows customers to reduce the harmful emotional impact of seeing sad victims by using a product with a prosocial aim (Li & Atkinson, 2020).

2.3.3.3 Outcome variables

This section sheds light on the primary behavioral outcomes (e.g. dependent variables) considered in seminal studies. The dependent variables most often examined relate to various nuances of conative responses (Lavidge & Steiner, 1961) to emotional charity advertising, ranging from behavioral intentions (e.g., intention to donate, willingness to volunteer, likelihood to donate.) to behaviors (e.g., actual donations, social media metrics on user behavior: number of likes, comments, interactions, clicks, and shares.).

For this purpose, the outcome variables can be divided into two groups: on one hand, the behavioral intentions and on the other the behaviors.

Behavioral Intentions. This group of dependent variables focuses on constructs that capture attitudes and intentions that may not immediately translate into actions but predict future behavior.

Key measures include:

- Likelihood to Donate: Perceived likelihood of donating;
- Intention to Donate: Level of intention to contribute;
- Willingness to Volunteer: Stated willingness to donate time, an essential measure for assessing long-term involvement;

Across the reviewed studies, single positive emotions such as hope and nostalgia (Waites et al., 2023; Ford & Merchant, 2010) were found to frequently enhance donation intentions and favorable attitudes toward charitable causes, especially when appeals tapped into personal memories or optimism future expectations.

Similarly, single emotions like empathy, particularly when mediated by feelings of anticipated guilt (Basil et al., 2008), were shown to strengthen intentions to donate, activating a personal sense of obligation to help. Guilt, when framed around personal benefits (e.g., "giving makes you happier") and anger (Chang, 2014; Van Doorn et al., 2017), when conveyed through appeals emphasizing personal responsibility or injustice, showed stronger associations with actual donation intention.

The comparison between emotions provided more differentiated results depending on different conditions. For example, when different emotions, such as compassion and gratitude, were compared, donation intentions tended to be higher when the emotion was consistent with the charity's moral mission (Goenka & Van Osselaer, 2019). Similarly, comparing fear and hope, both emotions positively influenced the intention to donate when accompanied by numerical information in interval and point formats, respectively (Septianto et al., 2020). The effect of emotions on individuals' intention to donate has also been examined through a comparison of pride and compassion, where the influence depends on the organization's past performance (Septianto & Tjiptono, 2019). Furthermore, the intention to donate has been studied in connection with sadness and happiness. Specifically, the effectiveness of facial expressions from sad or happy beneficiaries on donation intentions depends on the number of beneficiaries represented (Li & Yin, 2022) and the psychological involvement to the cause (Cao & Jia, 2017).

Different studies shed light on mixed emotions, such as sadness and hope or sadness and dignity (Septianto & Paramita, 2021; Rahim et al., 2023), and their positive impact on donation intentions. Mixed-emotional experiences offer donors a richer narrative framework, balancing urgency and optimism and strengthening cognitive engagement with the cause.

Donation intentions, donation likelihood, and willingness to volunteer were measured using previously tested and ad-hoc developed scales.

Behaviors.

This group includes all dependent variables related to observable behaviours and tangible actions related to direct interactions with the stimuli or actual appeals of charity campaigns used in field studies.

Key measures include:

- Click on the Like Button: Number of likes reflecting immediate appreciation and visibility of the appeal in social media;
- Comments: Number of comments that may indicate audience engagement;
- Shares: Social media shares that expand the message's reach, increasing the campaign's potential impact;
- Calls for Donations: This measure of engagement and effectiveness of the campaign aired is based on actual calls received to donate or request information;
- Donation Level: Total donation raised, helpful in assessing the economic success of a crowdfunding campaign;
- Actual Donation Amount: The amount donated is indicative of donor generosity;
- Number of Donors: People who decided to contribute to the cause after the experiment;

As for single emotions, threat-based awe aroused in donors is a positive stimulus encouraging donations (Septianto et al., 2022). Observable behaviors, such as actual donations or engagement on social media,

have been studied more frequently in comparing emotions. This choice is probably motivated by comparing different emotions, allowing researchers to demonstrate the relative effectiveness of emotional appeals more clearly. By comparing two distinct emotions (e.g., guilt vs hope), it is possible to observe tangible and measurable differences in donor behavior. Moreover, measuring concrete behaviours rather than intentions provides stronger empirical evidence on how different emotions translate into different levels of prosocial engagement.

In comparative emotional settings, negative emotions such as guilt and shame tended to be particularly effective in driving observable behaviors, such as direct donations or social media engagement with fundraising messages (Chen et al., 2016; Yousef et al., 2022). These emotions create emotional urgency that translates more readily into tangible action. When comparing two moral emotions, elevation, and outrage, it has been shown that elevation increases donations amount. In contrast, outrage increases justice-related behaviors, such as supporting political action (Van de Vyver & Abrams, 2015). Similarly, the Know et al. 2022 study shows that social media content that stimulates happiness through text and facial expressions positively impacts engagement levels.

Moreover, appeals involving mixed emotions, such as sadness and hope (Homer, 2021), facilitated emotional elaboration and intention to donate. By providing donors with a simultaneous sense of concern and positive efficacy, these mixed emotional appeals increased the likelihood of feeling involved and acting on behalf of the cause.

Finally, most of the analyzed studies measured the effects of the stimuli (promotional appeals) on variables related to the total or single amount raised from donations (e.g. the level or amount donated). To measure the actual donation behavior, participants were asked to donate a portion of their bonus to participate in the experiment on charity.

2.4 Implications and future research

2.4.1 General discussion

Marketers have always leveraged emotions to pique consumers' interest and elicit behavioral changes. NPOs constantly require innovative and persuasive ways to reach donors, build emotional connections, and convey a brand's objective. Unfortunately, despite the growing importance of emotions in advertisement appeals, the literature provides NPO marketers with scant and fragmented guidelines. This review highlights how emotional charity advertising has become increasingly complex, with growing attention to single emotional triggers, comparisons between different emotional appeals, and more sophisticated and layered emotional configurations such as mixed emotions.

While early studies focused predominantly on easily recognizable emotions such as sadness and happiness, recent research has explored nuanced emotions like awe (Septianto et al., 2022), outrage and elevation (Van de Vyver & Abrams, 2015), and emotional blends such as sadness and hope (Homer, 2021; Septianto & Paramita, 2021; Rahim et al., 2023)

This tripartite distinction, between single, comparing, and mixed emotional appeals, has guided the interpretation of findings across the literature. Each category reveals distinct mechanisms and implications for donor behavior.

This work shed light on the growing recognition of the dynamic nature of emotional experiences. Studies increasingly show that mixed emotional appeals, representing an evolution from negative to positive emotional states, for instance, from sadness to hope (Homer, 2021), foster stronger behavioural responses than static or single-valence appeals. In addition, the review demonstrates that emotional appeals' impact will vary as a function of moderating variables, including donors' regulatory focus (Choi & Park, 2021), self-construal (Mesler & Simpson, 2022), or degree of psychological involvement (Cao & Jia, 2017). This evidence confirms that emotions must be examined regarding the audience's psychological, situational, and cultural context. Moreover, it is noteworthy that emotions activate prosocial behavior through self-regulation mechanisms. Emotional responses such as empathy and guilt create a state of emotional discomfort, either by evoking concern for others or generating a sense of personal moral

failure, that individuals are motivated to alleviate through helping behavior (Chang, 2014). From this view, donating is a way of restoring emotional balance, reducing discomfort, and restoring a positive self-image (Chang, 2014). This self-regulatory function is particularly prominent in single negative emotions, such as guilt or anger, which often lead to immediate action when the donor feels personally responsible or morally involved.

In contrast, comparing emotions reveals that the effectiveness of a particular emotion is contingent on how it performs relative to another, often influenced by contextual or psychological moderators. Mixed emotions, finally, offer a richer affective experience, where emotional tension and resolution drive both cognitive elaboration and action.

The analysis indicates that positive emotions such as hope influence prosocial behavior through another mechanism: increasing the perceived effectiveness of the donation. When individuals perceive the meaningfulness of their contribution, they experience a sense of efficacy and empowerment that fosters donation behaviour. Thus, while negative emotions stimulate prosocial actions through emotional discomfort, positive emotions promote action by increasing the donor's sense of efficacy and agency (Nisa, 2019; Waites et al., 2023).

It is worth pointing out that the effects of emotions on prosocial behavior are not universal but heavily moderated by social constructs (Lunardo & Bezençon, 2016; Sung et al., 2023). Social closeness to the beneficiary amplifies empathic responses and reduces avoidance tendencies linked to negative emotions such as disgust. Moreover, stigmatized conditions (e.g., homelessness, addiction) can attenuate the effectiveness of pity or empathy-based appeals because societal beliefs about personal responsibility influence moral judgments, reducing the emotional resonance of the message (Lunardo & Bezençon, 2016; Sung et al., 2023).

When individuals perceive that their contribution can make a meaningful difference in a beneficiary's life, they experience a sense of efficacy and agency that encourages giving. Thus, while negative emotions promote prosocial action through emotional discomfort, positive emotions promote action by

increasing the donor's sense of efficacy and agency. In general, when comparing different emotions, not the same consistently outperforms the others: their effectiveness depends on the presence of other factors such as the gender of the donor (Kemp et al., 2013), the goals of the organization (Goenka & Van Osselaer, 2019), and the specific context (Power et al., 2011).

Though marketers cannot control every aspect of an advertisement, knowing the mechanisms and situations in which certain emotions work better than others is essential to achieving NPOs' ultimate goal: to persuade people to donate money or their time to help those in need. Moreover, context is a crucial component of this study's conceptual framework. Researchers must be aware of how emotions can vary depending on cultural context. Future researchers must be extremely mindful of this issue to prevent incorrect generalizations.

2.4.2 Theoretical implications

The review of existing literature on emotional charity advertising has identified new avenues for further theoretical understanding of the mechanisms that explain the persuasive effectiveness of emotional appeals. In particular, drawing on neuroscientific theories that can explain the complexity of emotional phenomena could be helpful.

First, the results indicate the need to adopt a more dynamic perspective of emotional experiences in future research. Current models often treat emotions as static states. However, the evidence emerging from this review emphasizes that emotions are dynamic phenomena and that "emotional transitions" (e.g., from sadness to hope) critically shape behavioural outcomes.

Integrating the perspective proposed by Davidson (1998), which highlights the importance of affective chronometry (i.e., the timing of emotional onset, peak, and recovery), could provide a richer understanding of how emotional transitions (e.g., from sadness to hope) influence prosocial action in response to charity appeals.

Second, drawing on the functionalist view of emotions proposed by Lazarus (1991) emotions are dynamic, goal-directed, and context-sensitive processes. According to this perspective, emotions are not

isolated and purely intimate reactions but emerge from interactions with the environment, reflecting individual goals, social cues, and past experiences.

Thirdly, the review suggests that theories related to the perception of agency, such as the Theory of Planned Behavior (Ajzen, 1991), and the moral self-concept, such as the Self-Signaling Theory (Bodner & Prelec, 2003), could be integrated into future studies more systematically. Donors' perception that contributions can create a real, positive impact on beneficiaries' lives and, at the same time, reinforce a positive self-image emerges as a crucial driver of prosocial behaviour, yet remains an area that has not been fully explored.

In conclusion, new theoretical avenues can be explored to study emotional charity advertising as a dynamic, complex, and highly context-dependent phenomenon that requires integrative and interdisciplinary approaches.

2.4.3 Managerial implications

The findings of this study offer actionable insights for nonprofit organizations (NPOs) seeking to enhance the effectiveness of their advertising campaigns. Managers should tailor emotional appeals to align with their campaigns' specific objectives and target audiences' characteristics. For example, restorative emotions such as hope and pride are particularly effective when promoting outcomes that highlight progress or success. In contrast, guilt or compassion may be better suited to appeals emphasizing urgency and need (Goenka & Van Osselaer, 2019; Chang, 2014). For campaigns that invoke collective memories, such as those of museums or schools, nostalgia can be a powerful tool. However, it must be tailored to the cultural or individual propensity toward this emotion. For example, older targets or audiences with strong collective ties might respond better to such appeals.

Mixed emotional appeals can be compelling in fostering a sense of impact and encouraging donations by illustrating the transformative potential of donor contributions (Septianto & Paramita, 2021).

The visual presentation of beneficiaries is another critical consideration. For instance, happy facial expressions combined with eye contact can foster a stronger emotional connection, while sad expressions

may be more effective for portraying urgency, especially when the recipients are perceived as socially distant (Li & Yin, 2022; Tong et al., 2021). Moreover, nonprofit marketers should leverage personalization by using imagery and narratives that reduce the social distance between donors and beneficiaries, fostering empathy and emotional engagement (Sung et al., 2023). For example, including images representing beneficiaries perceived as socially close can improve the effectiveness of appeals by fostering a deeper emotional connection.

Digital platforms provide unique opportunities to amplify the reach of emotional appeals. Managers should explore the use of targeted emotional messages tailored to specific platforms, utilizing formats such as video storytelling or interactive content to boost engagement (Hou et al., 2023). Additionally, generative AI tools can help craft personalized, emotionally resonant campaigns at scale, but their impact on trust and authenticity should be carefully managed to avoid donor skepticism (Jang & Chu, 2022).

Lastly, nonprofit organizations should consider strategies to encourage long-term donor loyalty, not just one-time contributions. This can include crafting campaigns that evoke emotions like gratitude or pride to foster a sense of belonging and long-term commitment. By combining emotional appeals with clear, transparent messaging about how donations are used, organizations can build trust and strengthen relationships with their donor base over time.

2.4.4 Future research directions

This study reviewed the most recent and significant references on charity advertising, providing a foundation for outlining future research directions.

Firstly, the majority of existing studies have focused on stimuli targeting children in need, given their portrayal as among the most innocent and vulnerable beneficiaries (Batson et al., 2005). However, relatively few studies have extended their findings to organizations addressing other areas, such as environmental causes (Chung & Braun, 2022), homelessness (Bartsch & Kloss, 2019), or clothing donations (Kim & Childs, 2021). Future research could explore whether different emotional responses

arise when considering other domains of action, including war, health, environmental conservation, cultural initiatives, and education, as well as campaigns featuring subjects other than children.

Secondly, while most studies focus on traditional media, there is a growing need to explore the effectiveness of emotional appeals in digital ecosystems, such as social media platforms and crowdfunding websites, where interaction dynamics and audience behavior may differ significantly (Chung & Braun, 2022; Hou et al., 2023). Additionally, the cultural context of emotional resonance remains underexplored; future work should examine how cultural differences shape emotional responses to appeals, particularly for international campaigns (Bartsch & Kloss, 2019).

Thirdly, the potential of generative AI tools in crafting emotional narratives and their implications for trust and authenticity in nonprofit campaigns also warrants investigation (Jang & Chu, 2022).

Fourthly, all of the examined studies focus on encouraging immediate donations. Future research should move beyond immediate donation outcomes to consider the long-term impact of emotional appeals on donor loyalty and recurring contributions (Waites et al., 2023).

Fifthly, there is still much room for investigation into the effects of evoking mixed emotions in advertising appeals, that is, different and potentially conflicting emotions. It would also be interesting to understand the emotional transitions during the appeals. For example, passing from a negative emotion to a positive one in the same ad might impact donors' behavior differently compared to the opposite transition (positive to negative).

Finally, given the dominance of quantitative methodologies, employing qualitative approaches could provide richer insights into the complex interplay of emotions, donor motivations, and campaign effectiveness (Basil et al., 2008; Sung et al., 2023).

2.5 Conclusions and limitations

This study offers a broad overview of existing research on how emotions influence charitable giving. Specifically, it highlights how combining different emotions within a single advertising message can enhance a donor's willingness to contribute. The most impactful emotions are happiness, sadness, pride, hope, nostalgia, guilt, and empathy. However, no definitive evidence exists to determine whether positive or negative emotions are more effective in charity advertising. While the literature advocates for a "mixed emotions" strategy, it is evident that the impact of these emotions is shaped by the donor's context and the organization's mission. However, the study is not without limitations. First, although the review was conducted using a rigorous methodological approach, it is possible that some relevant studies were omitted due to the reliance on a particular combination of keywords in the search string. In future studies, researchers could use a different combination of keywords and databases to search for new contributions and findings. Second, the selection and interpretation of articles involve subjective judgment, which may introduce bias into the synthesis of results despite the structured approach. While human interpretation is an integral part of scientific research and essential for adding meaningful context to the results (Zhu et al., 2021), future reviews could integrate bibliometric analysis methods (e.g., citation analysis, main path analysis) with subjective analysis. This approach would help minimize the influence of human interpretation and offer a more precise depiction of the roles of emotions in driving donors' behaviors in the context of charity advertising.

Third, the review primarily relies on quantitative studies, leaving unexplored the nuanced insights that qualitative approaches might offer about donor motivations and emotional responses. Fourth, much of the existing research focuses on specific beneficiary groups, such as children, limiting generalizability to other contexts like environmental, cultural, or health-related causes. Finally, systematic literature reviews often focus on peer-reviewed academic publications and exclude grey literature (e.g., reports, theses, or working papers), potentially missing valuable insights or practical perspectives.

Addressing these gaps presents a promising avenue for future research, ensuring that nonprofit organisations can leverage emotional appeals to drive both immediate and sustained support.

3. Attention Battles: How Text and Faces Shape Engagement in Nonprofit Instagram Communication

3.1 Introduction

Throughout the past ten years, social media platforms became a crucial tool for nonprofit organisations (NPOs) to interact with their supporters, building awareness for their cause and acquiring funds in a saturated digital arena. The United Nations Development Program (UNDP) describes this setting as rapidly changing and fast-running where attention spans are short and require constant adaptation (UNDP, 2024). The 2025 M+R Benchmarks Study highlights how important these platforms are for fundraising and advocacy. It reports that 99% of NPOs have a presence on Facebook and 98% on Instagram, with the latter seeing a significant audience increase of 11% in 2024. In this setting, visual storytelling has a pivotal role for grabbing attention and fostering emotional involvement. An essential component of this phenomenon lies in the ability of visual representations to draw in the audience by weaving narratives that connect deeply on emotional and cognitive level. Research on charity advertising primarily highlights the importance of human faces, especially those of recognizable beneficiaries, in generating empathy, increasing engagement, and encouraging donations (Small & Loewenstein, 2003; Small & Verrochi, 2009; Nikulina et al., 2024). However, the effect of facial imagery in non-profit campaigns is not fixed, it depends on the context, influenced by a combination of visual and textual design choices. In this context, text overlays (TO) is emerging as an increasingly common visual element in social media communication. NPOs are increasingly adding short messages, calls-to-action, or slogans directly onto images, using TO to stand out in the fast-scrolling feeds (Farace et al., 2025; Wooley et al., 2022). Unlike captions that require extra thought from users, TO gives immediate semantic cues, improving the clarity of appeals (Farace et al., 2025). Placing crucial information into visually compelling textual elements, nonprofit organizations can engender a sense of immediacy, underscore campaign narratives, or amplify the emotive resonance of visual representations. In fact, competition for attention on social media has intensified significantly. The average organic engagement rate on Instagram fell by over 30% between 2022 and 2024 (RivalIQ, 2025), and nonprofit content faces growing challenges from

algorithms that favor entertainment and commercial ads. This scenario necessitates a thorough comprehension of the design elements that affect engagement, which is paramount for sustaining online prominence and fostering relationships between donors and NPOs. Additionally, little is known about the specific design traits that determine how effective TO are. The effectiveness of embedding text hinges on how the overlays are arranged, considering factors such as length (i.e. character count) spatial placement, emotional tone and contrast with the background. Previous research on charity advertising has mostly homed in on the emotional dimensions often neglecting the multimodal design components that fuse words and images and shape the way viewers allocate attention and become engaged. Indeed, there exists a deficiency in comprehension regarding the manner in which text operates in conjunction with various visual components, particularly facial representations, in influencing levels of engagement. This study addresses this missing aspect by examining how the textual and visual elements interact to influence attention in nonprofit social media posts. To explore these two areas, the current research combines a field analysis with a predictive modeling approach. Study 1 focuses on how TO and human faces interacts in influencing engagement. Using theories of visual prominence and recent findings on multimodal communication design, we explore whether TO enhances or reduces the persuasive power of faces on audience engagement. Building on these findings, Study 2 isolates posts with TO that do not have faces to identify which attributes of TO most strongly predict engagement. By harnessing machine-learning models this second approach enables us to step beyond hypothesis-driven testing yielding a perspective, on how attention is engineered in social-media advertising. By utilizing automated machine learning (AutoGluon) and explainable AI methods (SHAP), we can identify complex and interactive relationships among various design factors, providing a more detailed view of how different features work together to catch user attention. Together, the two studies add to the growing body of research on multimodal messages and attention competition in digital spaces by clarifying both the limits (Study 1) and the underlying design mechanisms (Study 2) that drive engagement in nonprofit communication. The analysis is based on 1,982 Instagram posts from three major international nonprofit

organizations (Doctors Without Borders, UNICEF, and Save the Children), which were analyzed using a prompt-engineered, AI-based multimodal content analysis pipeline developed with the ChatGPT 4.1 API. Working with this approach, researchers can systematically encode large amounts of textual and visual data ensuring strong replicability and solid interpretive reliability. Our findings expand the literature on charitable communication by presenting new insights on how visual and textual arrangements impact audience reactions, along with practical strategies for nonprofits to enhance their communication efforts in a competitive online environment. This research contributes in three main ways. First, it improves theoretical knowledge of multimodal attention by connecting textual and visual design features in nonprofit advertising. Second, it introduces an explainable machine learning framework for modeling engagement behavior. Third, it provides practical recommendations for nonprofit organizations, outlining which of visual and textual elements are most likely to attract attention and encourage interaction in the social media spaces. The paper includes two studies. Study 1 investigates how faces representation and TO interact shaping engagement of a comprehensive sample of actual nonprofit Instagram posts. Study 2 employs predictive modeling (AutoGluon, SHAP) to identify which specific design features of TO best predict engagement in posts without faces. Together, these studies offer valuable insights on the efficacy of design choices in affecting user responses in non-profit communication. Furthermore, this research introduce a methodological contribution proposing an AI-based, prompt-engineered, multimodal content analysis pipeline that improves the reliability, scope and interpretability of the annotation process.

3.2 Theoretical Background

3.2.1 Text overlays, attention, and the moderating role of faces

On fast-moving social media feeds, many images compete for users' attention, so visual strategies that can quickly convey the messages of non-profit organizations to an audience with an increasingly limited attention span become essential. The current social media arena is awash, with a torrent of content compelling managers to devise tactics that can elevate their posts above the relentless swell of information users constantly wade through (Wooley & Sharif 2022). Similarly to traditional advertising, social media ads are often characterized by a visual element and a textual one (Pieters & Wedel, 2004). The textual element includes all the textual information of the advertisement, excluding all occurrences of the brand name (Pieters & Wedel, 2004). The visual element includes all the non-textual information of the advertisement, excluding all occurrences of the brand name and logo. (Pieters & Wedel, 2004). Depending on the context and the visual composition, these two elements may either cooperate or compete with each other to capture the consumer's attention (Pieters & Wedel, 2004). Image perception is phylogenetically older than text perception and relies on automatic, parallel, fast, and low-effort processes (Loftus 1983; Öhman et al., 2001; Stolk et al.1993), which may grant it attentional priority. Moreover, images are often more distinctive than words (Childers & Houston 1984), thereby attracting attention more easily. This likely leads to an image superiority effect on baseline attention, regardless of image size (Pieters & Wedel, 2004). Text perception, by contrast, is evolutionarily more recent and is based on focused, voluntary, serial, and slower processes (Loftus, 1983; Rayner 1998; Reichle et al. 1998). Although the general meaning of a imagery scene can often be grasped in just a few glances (Henderson & Hollingworth, 1999), text requires more eye fixations to be understood. Because text typically occupies denser areas of the visual field, it demands more attention per unit of surface area; consequently, increasing the textual portion of an advertisement further raises its attentional demand, producing a text superiority effect on incremental attention. In the context of social media, platforms such as Instagram allocate only a small portion to text, through the caption. In this way, the salience of the text, which guides the interpretation of the image, risks going even more unnoticed. Furthermore,

reflecting the general decline in attention spans, consumers are increasingly likely to interact with social media content through automatic, visual practices (Chan et al., 2023), and are more reluctant to read captions in depth. These trends suggest the need to reconsider how textual information is included in social media posts without disrupting users' visual experience (Farace et al. , 2025). Integrating textual information into the visual space of an image ensures users see the textual message, even if they only glance at the post. TO, defined as "words or phrases (beyond a brand trademark or logo) that content providers insert deliberately within a delimited area of an image in a social media post" (Farace et al., 2025), have emerged as an increasingly adopted practice. By embedding concise textual cues inside the visual field, TO allow audiences to grasp the intended message even with a fleeting glance, in contrast to captions that require more deliberate reading (Wooley & Sharif, 2022). Theoretically, TO can increase engagement through several mechanisms. They decrease cognitive effort and enhance message clarity, through semantic anchoring (Farace et al., 2025), guiding the viewer's attention and interpretation of the image, thereby increasing message effectiveness (Kosslyn, 2006). They also create visual salience that helps posts stand out from competing stimuli (Arnheim, 1954; Pieters &Wedel, 2004), and they integrate verbal and visual cues into a unified composition. Moreover, Pieters and Wedel (2004) demonstrated that increasing the surface area of text in an advertisement enhances attention to the entire ad, as enlarging the textual area increases attention toward this element much more than it simultaneously reduces attention toward the image. According to the saliency model proposed by Rosenholtz and Jin (2005), the human visual system prioritizes "unusual" elements that stand out due to contrast, color, orientation, or motion (Wolfe, 1998). Consequently, TO, introducing an additional, visually distinctive element within the image, may act as a salient cue that captures attention and positively influences engagement.

We therefore propose the following hypothesis:

H1: *Social media posts containing TO are expected to generate higher engagement than posts without TO.*

A vast research stream in the field of neuroscience, pointed out that humans have a remarkable ability to identify and recognize faces in visual stimuli (Haxby et al., 2000). Faces act as dense, non-verbal signaling hubs (Bakhshi et al., 2014), and images showcasing faces dominate the stream of content flooding social media feeds (Bakhshi et al., 2014). Faces play a crucial role in social cognition, as they convey emotions and internal states (Darwin, 1998; Ekman et al., 1975), and their communicative power has been extensively exploited in marketing, where attractive faces have been shown to enhance consumers' responses to advertisements. This evidence was further explored by Bakhshi et al. (2014), who demonstrated that featuring human faces in digital images increase both likes (+38%) and comments (+32%). However, the number of faces does not affect this phenomenon: whether an image portrays an individual or a group, the presence of a face encourages greater interaction. In summary, faces capture and engage attention: they act as powerful catalysts of interaction even in digital environments, confirming what has long been observed in social psychology and consumer behavior research. Due to their sociobiological relevance, faces receive enhanced processing in the competition for attention (Dekowska et al., 2008; Hershler & Hochstein, 2005; Rakover & Cahlon, 2001), making them ideal candidates for automatic processing (Öhman, 2001). Psychological research suggests that faces catch observer's attention more readily than other visual stimuli, effectively conveying meaningful information (Palermo & Rhodes, 2007; VanRullen, 2006; Weaver & Lauwereyns, 2011). Faces also elicit stronger involuntary responses: in complex scenes containing a face among other objects, the first gaze shifts tend to be directed toward the face (Cerf et al., 2008; Honey et al., 2008) and, overall, individuals categorize faces much faster than other objects (Pegna et al., 2004). Moreover, faces are the most biologically and socially meaningful visual stimuli in the human environment: according to previous studies, this adaptive process creates an attentional bias towards facial stimuli (Frischen et al., 2008), resulting in faces having a particularly strong effect on attentional engagement. Faces rapidly and efficiently communicate information about others' intentions as well as their feelings (Small & Verrochi, 2009). In online advertising, banners containing faces capture greater attention (Sajjacholapunt & Ball, 2014), and

advertising content that includes faces is more easily remembered (Droulers & Adil, 2015). In addition, studies in the field of Human–Computer Interaction (HCI) have demonstrated that including faces or facial icons within an interface increases users' attention, engagement, and participation (Laurel, 1990; Takeuchi & Nagao, 1993; Takeuchi & Naito, 1995; Sproull et al., 1996). For instance, Walker et al. (1994) observed that a "talking" interface featuring a synthetic face led users to provide longer responses, include more comments, and make fewer errors compared to a text-based interface. Similarly, Takeuchi and Naito (1995) showed that an animated 3D-faced agent elicited a perception of greater involvement and pleasantness than neutral or symbolic graphical representations, suggesting that digital faces can trigger socially oriented forms of attention and participation. Although both advertising practice and psychological literature suggest that individuals tend to focus on faces at the expense of other visual stimuli, it remains unclear how the presence of a face might interact with the presence of text within an image on social media. Similarly to faces, TO are salient visual elements that attract attention and and influence the interpretation of messages (Farace et al., 2025). However, when both faces and TOs appear within the same frame, visual competition may occur and the resulting visual clutter can increase attention but simultaneously reduce perceptual fluency, making the image harder to read and interpret (Nelson, 1985). High feature complexity has been shown to reduce attention to the brand and decrease positive attitudes toward the advertisement, as visual overload distracts viewers and prevents them from focusing on key elements (Pieters et al., 2010). For these reasons, although TO can enhance comprehension of the message, its effectiveness may be contingent upon its interaction with other prominent visual elements within the image. Non-profit advertisement literature agrees that human faces, are among the most powerful visual cues in charitable communication because they are able to elicit empathy and identification (Henderson et al. 1999, Small & Verrochi, 2009; Nikulina et al., 2024). However, prior research also highlights important contextual factors: overly negative facial expressions can induce discomfort or skepticism (Kwon et al., 2021), and racial or gendered cues can activate stereotypes that reduce donations (Yazdani et al., 2025). Since both TO and faces are prominent elements

in the image, they can affect the overall harmony of the creative content: in fact, the presence of multiple attractive elements can lead to visual complexity and clutter that reduce the ability of faces to attract attention and foster empathy (Pieters et al., 2007). Farace et al. (2025) emphasize that the specific design of the text overlay, such as its size, position, and contrast, plays a decisive role: overly salient configurations can create visual imbalance and reduce engagement when combined with already prominent image elements. Building on visual salience and aesthetic processing theories (Locher et al. 1999; Affonso & Janiszewski, 2023), we argue that human faces and TO can compete with each other. When no face is present, TO can take center stage and guide viewers' understanding. However, when a face is present a TO may split attention, reduce perceptual fluency, and weaken the positive effect of facial cues on engagement. Accordingly, we posit the following hypothesis:

H2. *The effect of TO on engagement is moderated by the presence of human faces: when no face is present, TO increases engagement, whereas when a face is present, TO decreases engagement.*

3.2.2 Textual cues and emotional framing in nonprofit advertising

In the context of nonprofit social media advertising, textual cues embedded within visual content perform more than an informational function: they serve as emotional and cognitive anchors that guide message interpretation (Farace et al. 2025). A text can influence users' perceptions and reactions not only through its meaning but also through the tone and style and the feelings it conveys. Previous research indicates that emotionally charged language can lead to higher engagement by activating feelings and motivation (Cascio Rizzo et al., 2024). However, emotional appeals are not always effective: their impact relies on how well they fit the context and how authentic they seem (Kwon et al., 2021). When the valence of the message and the emotional tone of the accompanying image are incongruent, audiences may experience empathic distress or skepticism, leading to reduced engagement (Kwon et al., 2021). Compared with informational appeals, emotional appeals are more likely to be shared. Emotional news is more likely to make the most e-mailed list (Berger & Milkman 2012), and more emotional stories are more likely to be liked (Heath et al., 2001; Rimé, 2009). Emotional arousal increases social transmission (Berger, 2011),

and people may share surprising or interesting content because it makes them look good (Berger & Schwartz, 2011; De Angelis et al., 2012; Moldovan et al., 2011). Given the effectiveness of emotional appeals, the discussion on nonprofit communication has long focused on whether positive or negative emotional appeals are better at generating donations and engagement. According to empathy theory-based studies negative emotions such as sadness or guilt can inspire prosocial behavior through emotional contagion and empathic concern (Small & Verrochi, 2009; Chang & Lee, 2010). At the same time, positive emotions such as hope and pride improve attention and encourage a connection with the cause (Bagozzi & Moore, 1994). However, recent research in social media suggests that these effects depend heavily on the context. As Kwon et al. (2022) argue, while moderately negative appeals can still trigger empathy, overly sad or emotionally saturated content may lead to avoidance or compassion fatigue in digital contexts, where users scroll rapidly and seek uplifting content (Berger & Milkman, 2012). Hence, the sentiment expressed through textual overlays can likely shape engagement differently depending on its emotional valence and intensity, suggesting the following research question:

RQ1. To what extent does the emotional valence of text overlays (negative, positive, neutral, or mixed) predict audience engagement in nonprofit social media posts?

Beyond emotional framing, textual features also affect engagement through cognitive mechanisms. Brevity, clarity, and fluent language are key factors to increase persuasion by making it easier to understand and process information (Puntoni et al., 2010; Reber et al., 2004). Prior research in consumer psychology and information processing has shown that the presence of numerical information can meaningfully influence how individuals interpret, evaluate, and respond to messages (Kardes, Posavac, & Cronley, 2004; Nelson, 1970; Van Osselaer & Janiszewski, 2011). Numbers are pivotal element to show measurable details about performance, size, or impact, helping people make judgments when direct experience is lacking (Schley & Peters, 2014). Adding numerical data to a message conveys trustworthiness, expertise and transparency, as it is generally associated with accuracy and reliability (Monga & Bagchi, 2011). In persuasive and marketing communication, messages that include numbers

are generally processed as more informative and diagnostic, prompting greater cognitive engagement and sometimes stronger behavioral responses compared to messages expressed solely in qualitative or emotional terms. This effect has been studied in different research fields from advertising to financial decisions, where numbers boost trust and perceived reliability (Rothschild et al., 2011; Lembregts & Pandelaere, 2018). However, most of this research looks at consumer choices or product ads. There is a paucity of literature on whether analogous processes occur in the realm of nonprofit communication, wherein the objective is not selling products but rather the fostering of empathy, trust, and social involvement. In social media campaigns, organizations often combine emotionally powerful images with text that may or may not include statistics (e.g. '5,000 meals delivered', 'Help one child today'). Yet, it remains unclear whether the presence of numbers in such overlays primarily functions as a cue of impact and accountability, or whether it competes with the emotional appeal of the message.

Similarly, calls to action (CTAs) such as “Donate now” or “Join us” serve as behavioral prompts that convert emotional activation into concrete action (Dahl et al., 2005). CTAs connect awareness and engagement, especially in fast-scrolling social media where users need quick direction toward a response. Text elements in nonprofit advertising have been shown to influence individuals emotionally and cognitively by evoking feelings, improving understanding, and inspiring action. Consequently, we propose two additional research questions:

RQ2. *To what extent does the presence of numerical information within text overlays predict audience engagement in nonprofit social media posts?*

RQ3. *To what extent does the inclusion of explicit calls to action within text overlays predict audience engagement in nonprofit social media posts?*

3.2.3 Visual and structural integration of text overlays

While textual framing shapes what a message communicates, the visual and structural configuration of TO determines how that message is perceived, processed, and emotionally experienced. On social media, where images and words must coexist within a compressed visual field, the aesthetic and spatial

integration of TOs plays a crucial role in guiding user attention and shaping engagement outcomes. A key theoretical foundation for this phenomenon is visual salience theory, according to which elements that differ in contrast, color, size, or position play the role of effective attention cues (Arnheim, 1954; Pieters & Wedel, 2004, Pieters et al., 2007). In this view, every visual field has a hierarchy of focal points and the viewer's gaze tends to follow the most noticeable ones. In nonprofit social media advertising, TO introduce an additional focal element, often competing with emotionally evocative images of beneficiaries or humanitarian scenes. When multiple salient features coexist (text, logos, bright colors), visual clutter can emerge, leading to cognitive overload and reducing both perceptual fluency and aesthetic appreciation (Locher et al., 1999; Farace et al., 2025). Conversely, when visual elements are proportionally distributed and harmoniously aligned through balanced compositions, fluency and aesthetic pleasure can be improved, enhancing engagement and message comprehension. Farace et al. (2025) propose a comprehensive framework explaining how TO design parameters influence engagement. They show that position, size, and contrast of overlays interact with image dynamics to determine appeal. Specifically, large or centrally placed overlays in dynamic images tend to reduce engagement, as they disrupt perceptual equilibrium and overwhelm the viewer's attention. This underscores the importance of optimal salience distribution, a condition where text and imagery coexist without perceptual competition. Similarly, background contrast serves to improve legibility and maintain visual integration. From a multimodal aesthetic viewpoint combining verbal and visual elements can generate aesthetic pleasure if globally observed rather then examined separately (Hagtvedt & Patrick, 2011; Moffett et al., 2021). When textual and visual cues work in synergy, they produce perceptual harmony and enhance processing fluency, eliciting positive affective responses (Reber et al., 2004). Conversely, misaligned or competing elements, such as overly salient TO, generate dissonance and reduce engagement. This is particularly salient for nonprofit communication, where emotional resonance and informational clarity must coexist in a limited visual space. The visual storytelling framework further enriches this view. According Nikulina et al. (2024), composition, gaze direction, and spatial layout guide

viewers through a narrative flow. When TO align with the visual trajectory, they sustain immersion and enhance emotional transport; when misaligned, they interrupt narrative coherence and reduce empathic connection. Taken together, these frameworks suggest that engagement depends not merely on the presence of a TO but on its visual integration: how position, background, graphic elements, and compositional balance interact to shape aesthetic fluency and narrative coherence. Visually consistent overlays make it easy to understand and connect emotionally. On the other hand, competing designs can confuse the message and lower engagement. Accordingly, we propose the following research question:

RQ4. *How do visual and compositional attributes of text overlays—such as graphic elements, spatial composition, position, and background contrast, affect engagement in nonprofit social media posts?*

3.2.4 Machine learning and explainable AI in advertising research

Recent advances in computational advertising research have emphasized the need for scalable yet interpretable approaches to multimodal content analysis. As highlighted by Chang (2017), traditional content analysis is constrained by heavy manual effort, risk of human error, and the tendency to reduce multimedia complexity. Data science and machine learning now make it possible to examine large-scale multimodal datasets, encompassing text, images, audio, and video, without such simplifications (Huh & Malthouse, 2020; Berger et al., 2020). Recent applications demonstrate the potential to automatically detect objects, emotions, and themes, or to conduct topic modeling and clustering at scale, revealing patterns invisible to manual coding (Ordenes et al., 2019; Shi et al., 2023). Nevertheless, AI-driven CCA has limitations. Supervised approaches typically require large annotated datasets that are costly and time-consuming to create, and fully automated systems may uncover statistical regularities without providing theoretical clarity (Barari et al., 2024). Moreover, most applications still focus on unimodal content, especially text, while contemporary advertising increasingly relies on multimodal communication (Barari et al., 2024). Against this backdrop, our study introduces an innovative prompt-based multimodal procedure. Rather than combining separate models for facial recognition and optical character

recognition (OCR), we rely on a single large language model (ChatGPT 4.1) capable of simultaneously detecting human faces and text overlay.

The annotation process involved a prompt engineering phase, during which the prompt was iteratively refined and tested in the ChatGPT Playground. The Playground is an interactive web-based environment provided by OpenAI that allows users to design, test, and refine prompts in real time. This tool enabled us to optimize the wording and structure of the prompt, verifying the accuracy of model outputs before automating the procedure through Python. Once validated, the procedure was fully automated through a custom Python script. The script sequentially encoded images, submitted them to the API together with the annotation prompt, and stored the structured outputs in JSONL format. To ensure reliability, a validation check was performed: a random subsample of 50 images was manually coded by an independent human coder. The comparison showed full consistency between automated and manual annotations, providing strong evidence for the accuracy of the automated procedure.

3.3 Study 1

Study 1 investigates how *text overlays (TO)* interact with *human faces* in shaping user engagement on nonprofit organizations' social media posts.

3.3.1 Sample

To test our hypothesis, we collected 1982 Instagram posts between April 2023 and June 2025. Posts were scraped using the Apify platform from three top-performing international nonprofit organizations: UNICEF International, Save the Children US, and Doctors Without Borders. These accounts were selected based on three criteria: First, we focused on organizations that communicate primarily in English. This choice allowed us to rely on validated natural language processing (NLP) dictionaries and to perform multimodal annotation through GPT-based APIs, while also ensuring semantic consistency in the interpretation of both textual and visual content. Second, we selected accounts with a large followers base ($\geq$ 1 million). This threshold identified leading actors in the nonprofit sector, characterized by high visibility and substantial global influence. Finally, we selected organizations with high levels of

social media activity. In particular, we included accounts that had published more than 2,000 posts (images and videos) and had maintained a steady posting rhythm since January 1, 2023. This ensured access to a rich and up-to-date dataset, reflecting current practices rather than historical patterns of communication.

Overall, this sampling strategy ensured a balance between representativeness, cross-organizational comparability, and relevance for current nonprofit communication dynamics.

3.3.2 Measurement

Building on these annotated data, we defined the variables for the empirical analysis. The dependent variable is engagement, measured as the logarithm of the total number of interactions (likes and comments) on each post. The log transformation was applied to reduce skewness and approximate normality. The focal independent variable is text overlay (TO) presence**,** coded 0 when no text overlay is present and 1 when it is present. The moderator is face presence**,** coded 0 when no human face is visible and 1 when at least one face is shown. Three covariates were included to control for external factors that could influence engagement: (1) the logarithm of followers, as a proxy for audience size; (2) weekend posting (dummy-coded 1 = weekend, 0 = weekday); and (3) color concentration, operationalized as the overall chromatic density of the image. All visual and textual variables were derived from the AI-based multimodal annotation procedure described in paragraph 3.2.4, ensuring consistent and reliable coding across all posts.

3.3.3 Procedure

The moderation hypothesis was tested using Hayes' PROCESS macro for SPSS (Model 1; Hayes, 2022). In this specification, TO presence was entered as the independent variable (X), engagement as the dependent variable (Y), and face presence as the moderator (W). The model estimated the conditional effect of TO on engagement at different levels of the moderator (Face = 0 vs. Face = 1). Standard errors were computed using 5,000 bootstrap resamples with 95% bias-corrected confidence intervals. The

significance of the interaction term (TO × Face presence) was evaluated to determine whether the presence of faces moderates the effect of text overlay on engagement. All statistical analyses were performed using SPSS v.29.0 with the PROCESS macro (Model 1) and α = .05 as the significance threshold.

3.3.4 Results

To test the hypothesized moderation model, we used Hayes' PROCESS macro for SPSS (Model 1) with 5,000 bootstrapped samples (Hayes, 2018; Zhao et al., 2010). The dependent variable was engagement, measured as the log-transformed number of likes and comments. The overall model was significant (R = 0.47; R^2 = 0.23; $F(6,1975) = 95.65$, $p < 0.001$). Results show that TO presence positively affects engagement ($b = 0.24$, $p < 0.05$), supporting H1. Table 3 presents the complete PROCESS Model 1 results.

As predicted in H2, face presence significantly moderates the effect of TO on engagement ($b = –0.39$, $p = 0.002$*), indicating that the impact of TO depends on whether a human face appears in the post. The conditional effects are summarized in Table 4. Specifically, when no face was present, TO presence significantly increased engagement ($b = 0.24$, $p = 0.03$*). Conversely, when a face was present, TO presence significantly decreased engagement ($b = –0.15$, $p = 0.01$*). These findings confirm that text overlay boosts engagement only in posts without human faces and exerts a reverse (negative) effect when faces are included. Among the covariates, Logarithm of followers and color concentration displayed positive and significant relationships with engagement, whereas weekend posting did not reach significance.

Predictor	**B**	**SE**	**t**	***p***	**95% CI**
Constant	1.46	0.37	3.92	.000	[0.73, 2.19]
TO presence (x)	0.24	0.11	2.13	.033	[0.02, 0.46]
Face presence (w)	–0.16	0.10	–1.58	.113	[–0.37, 0.04]
TO × face presence	–0.39	0.12	–3.11	.002	[–0.63, –0.14]
Logarithm of followers	0.43	0.02	18.47	<.001	[0.38, 0.47]

Weekend posting	0.08	0.05	1.60	.110	[–0.02, 0.17]
Color concentration	0.007	0.001	6.50	<.001	[0.005, 0.009]

Table 3: Regression coefficients from PROCESS Model 1 - $R^2 = 0.23$; $F(6,1975) = 95.65$, $p < 0.001$.

Face presence	***Effect of TO on Engagement***	***SE***	***t***	***p***	***95% CI***
Absent	**0.24**	0.11	2.13	.033	[0.02, 0.46]
Present	**–0.15**	0.06	–2.44	.015	[–0.26, –0.03]

Table 4: Conditional effects of TO presence on engagement at different levels of face presence.

The results of Study 1 provide evidence that the persuasive role of text overlays in nonprofit communication depends on the visual context in which they appear. Specifically, text overlays enhance engagement when no human faces are present, but reduce it when faces are included in the image. This pattern suggests that, in the absence of strong emotional cues such as faces, text overlays act as cognitive anchors that facilitate message comprehension and capture attention. Conversely, when faces are visible, textual elements may compete for perceptual salience, creating cognitive overload and reducing users' affective focus on the emotional stimulus. These findings highlight the dual nature of textual design in visual storytelling and contribute to defining the boundary conditions under which text overlays are most effective. Building on these insights, Study 2 isolates posts containing text overlays without faces and applies explainable machine learning (AutoGluon and SHAP) to identify which specific visual and TO features best predict engagement in nonprofit social media advertising.

3.4 Study 2

Building on the results of Study 1, which demonstrated that the effectiveness of text overlays (TO) depends on the presence or absence of human faces, Study 2 aims to identify which specific textual and visual features of TO posts drive audience engagement. To this end, we isolate posts containing text overlays but no visible human faces, thus focusing on the subset of images where text acts as the main persuasive cue.

This study adopts a predictive, data-driven approach, using automated machine learning (AutoGluon) and explainable AI (SHAP) to capture nonlinear and interactive effects among multimodal design variables.

By doing so, it moves beyond traditional hypothesis testing to explore how combinations of semantic, compositional, and structural attributes contribute to engagement variability in nonprofit social media communication.

3.4.1 Sample

The analysis builds on the same dataset used in Study 1, consisting of 1,982 Instagram posts collected from *UNICEF International*, *Save the Children US*, and *Doctors Without Borders* between April 2023 and June 2025. From this initial dataset, we selected only posts featuring a text overlay and no visible human faces, as identified through the AI-based multimodal annotation procedure described in the in paragraph 3.2.4. This filtering process resulted in 603 posts**,** representing the subset of nonprofit visual communication where text is the dominant focal element. Each observation includes metadata on engagement (likes and comments), organizational followers, and variables describing textual and visual characteristics of the post. Descriptive statistics show that the average updated followers count was approximately 7.08 million (SD = 5.05M), with engagement values ranging widely across posts. The average TO length was 181.5 characters (SD = 143.75)**.**

3.4.2 Measurement

The dependent variable was engagement, operationalized as the natural logarithm of the total number of likes and comments to normalize the highly skewed distribution typical of social media data. This transformation reduces heteroscedasticity, limits the influence of extreme values, and allows for a proportional interpretation of changes in engagement. Such normalization is standard in communication and marketing analytics to ensure scale-free comparisons across accounts of heterogeneous size (Ordenes et al., 2019).

The independent variables included both numerical and categorical design features extracted through the multimodal annotation process.

Numerical predictors:

- **log(TO_length):** natural logarithm of the number of characters in the text overlay, used to capture message density.
- **log(Followers):** natural logarithm of the organization's follower count at the post's publication date, merged from historical data to account for temporal fluctuations in audience size.

Both **log(TO_length)** and **log(Followers)** exhibited strong right-skewed distributions, typical of social media datasets where audience size and content length vary exponentially across posts. Applying a log-transformation ensured more stable variance and interpretable elasticities.

Categorical features captured the main visual and textual characteristics of each post, as automatically derived through prompt-based multimodal annotation using the ChatGPT 4.1 API**.** The annotation prompt followed a fixed JSON schema designed to ensure consistent and replicable labeling across hundreds of nonprofit campaign images.

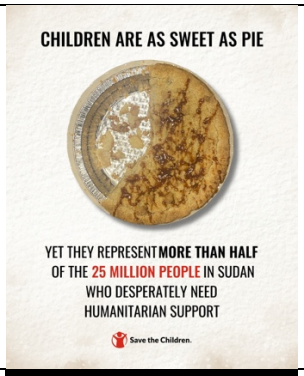
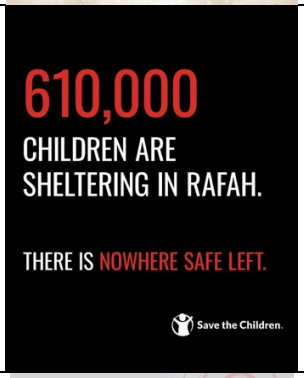
The key categorical variables included:

- **TO Sentiment:** emotional valence of the text overlay (positive, negative, neutral, multiple, or none);
- **Presence of numbers:** presence or absence of numerical information (e.g., "10,000 children helped");
- **TO background:** whether the text is placed on a plain or contrasting background that enhances readability (yes/no);
- **TO position:** spatial placement of the text overlay within the image (top, center, bottom, or multiple);

- **Visual composition:** overall composition type (TO-only vs TO-plus-visual)
- **Presence of call to action:** presence or absence of an explicit behavioral imperative (e.g., "Donate now", "Join our mission");
- **Presence of graphic elements:** presence or absence of digitally added non-photographic elements (icons, shapes, pictograms, or decorative designs).

Examples of each categorical variable and its coding scheme are summarized in Table 5, which visually illustrates how multimodal features were operationalized during annotation.

Variable	Category	Description (coding rule)	Visual Example
TO Sentiment	**Positive**	The text overlay explicitly evokes **hope**, gratitude, or **optimism**. It is designed to **motivate** or **inspire** the viewer. Examples: "Together, we can build a better future for everyone."	
	Negative	The text conveys sadness, guilt, despair, fear, or urgency. It highlights suffering or danger. Also used for emergency appeals. Example: "Every minute counts."	
	Neutral	The text is **factual** or **descriptive**, lacking **explicit emotional** tone. Used for informational or promotional statements. Examples: "We are active in 70 countries."	

	Multiple	The text combines **both negative and positive tones**, often shifting from hardship to hope. Example: "He was starving… now he can play again."	
Presence of Numbers	**Yes**	One or more numbers clearly visible as part of the communicative message (statistics, percentages, dates, or monetary amounts). Examples: "10,000 children helped", "Since 1987".	
	No	No numerical elements are visible in the image or message.	
TO Background	**Yes**	The text is placed on a plain or contrasting background (e.g., colored box, ribbon, shaded area, or intentional blur) to enhance readability.	
	No	Text placed directly on the image without distinct background separation; only color or font style distinguishes it.	

TO Position	**Top**	The main text overlay appears in the upper part of the image.	
	Center	The text overlay is positioned in the central area of the image, visually dominant.	
	Bottom	The text overlay is positioned in the lower third of the image, similar to a caption.	
	Multiple	The image contains two or more distinct text areas (e.g., one at the top and one at the bottom).	

Visual Composition	**Text-only**	The image contains only textual content and possibly simple graphic shapes (e.g., colored background with slogan or icon). No real photographed scene is present.	
	Text-plus-Visual	The image combines a text overlay with photographed content such as people, objects, or environments.	
Presence of Call to Action (CTA)	**Yes**	The text overlay includes an explicit directive urging the viewer to act (e.g., "Donate now", "Join our mission", "Sign the petition"). Must contain an imperative verb.	

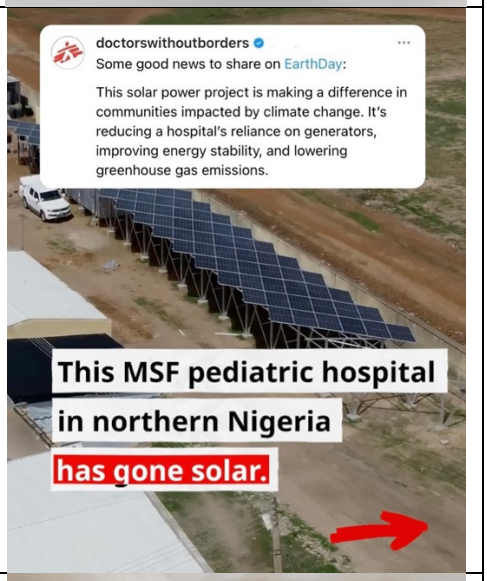
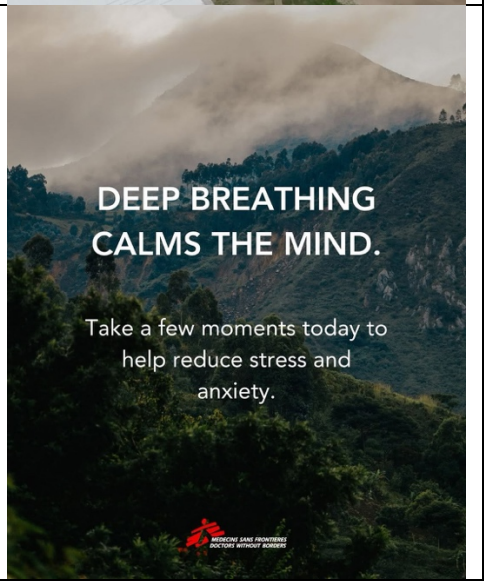
	No	The text is emotional or informative but not imperative;	
Presence of Graphic Elements	**Yes**	One or more non-photographic elements are digitally added (e.g., icons, arrows, pictograms, charts, decorative shapes). These are not part of the photographed scene.	
	No	The image contains only photographic content and textual overlay, with no added graphic elements.	

Table 5 Categorical Variable Coding Scheme and Examples

3.4.3 Procedure

We used a modeling approach that aligns with the recent shift toward data-driven predictive analytics in consumer and advertising research, which emphasizes nonlinear and interaction-based estimation over traditional regression frameworks (Perfetti et al., 2025; Ordenes et al., 2019). We employed AutoGluon-Tabular (Erickson et al., 2020), an automated machine-learning framework that performs multi-model training, ensembling, and hyperparameter optimization to identify the best predictive configuration. The dataset (N = 603) was split into 75% training and 25% test sets, with a 0.10 holdout fraction for validation and hyperparameter tuning (Goodfellow et al., 2016). The dataset was randomly partitioned while preserving proportional representation of categorical features. Multiple algorithms were trained, including Random Forest, Extra Trees, XGBoost, LightGBM, CatBoost, and Neural Networks. Model performance was evaluated using R^2 and Root Mean Squared Error (RMSE) metrics.

3.4.4 Results

3.4.4.1 Comparison of model performances

Table 6 presents the comparison of model performances. The best model predicting the logarithm of engagement achieved $R^2 = 0.395$ and RMSE = 1.087. Among the competing models, the RandomForestMSE algorithm performed best ($R^2 = 0.395$), followed by ExtraTreesMSE ($R^2 = 0.379$) and WeightedEnsemble_L2 ($R^2 = 0.367$).

Model	R^2	RMSE
RandomForestMSE	**0.395**	1.087
ExtraTreesMSE	0.379	1.102
WeightedEnsemble_L2	0.367	1.113
XGBoost	0.364	1.115
LightGBMXT	0.351	1.127
LightGBMLarge	0.321	1.153
LightGBM	0.293	1.176
CatBoost	0.255	1.207
NeuralNetFastAI	0.129	1.305
NeuralNetTorch	0.112	1.318

Table 6 Model comparison

To enhance interpretability, feature importance analysis was computed using permutation shuffling**,** a model-agnostic approach that quantifies the decrease in predictive performance when the values of a given feature are randomly permuted. This method evaluates the relative contribution of each input variable to the model's accuracy and is widely recognized for its robustness and transparency (Breiman, 2001).

3.4.4.2 Feature importance

Permutation-based feature importance (AutoGluon) indicated that *log(Followers)* and *TO Sentiment* were the strongest predictors of engagement, followed by *Presence of graphic elements*, *Visual composition*, and *log(TO_length)*. *TO position* and *Presence of TO background* also displayed minor but consistent contributions, while the *presence of numbers* and *calls to action* showed negligible predictive power (Table 7).

Feature	**Importance**	**p-value**
log(Followers)	**0.203**	< .001
TO Sentiment	**0.116**	< .001
Presence of graphic elements	0.049	.002
Visual composition	0.035	.007
log(TO_length)	0.031	.002
TO position	0.017	.016
Presence of TO background	0.011	.013
Presence of call to action	0.003	.209
Presence ofnumbers	0.001	.548

Table 7 Feature importance (Permutation-based)

3.4.4.3 SHAP analysis

To better capture how each feature contributes to the model's predictions, we computed SHAP (SHapley Additive exPlanations) values for the best-performing RandomForestMSE model both at the category level (for categorical features) and across quantile bins (for numerical features). SHAP values quantify how much each variable contributes to the model's output, both in general and for individual posts.

For categorical predictors, SHAP values are estimated as discrete differences between categories (e.g., positive vs. negative vs. neutral vs mixed sentiment), as these variables do not have an inherent numerical scale. In contrast, for continuous variables, SHAP values can vary smoothly across their range. Grouping continuous predictors into quantile bins allows identifying nonlinear relationships, such as threshold or U-shaped effects, that would not be visible from global feature importance alone. This distinction follows standard interpretability practices for tree-based ensemble models, where SHAP provides both discrete category-level comparisons and continuous, non-monotonic response patterns (Lundberg & Lee, 2017; Wang et al., 2020).

Figure 4 displays the global SHAP summary plot, ranking predictors by their average absolute SHAP value and visualizing their directional effects on *log(engagement)*. Each dot represents a single post, with the x-axis showing whether a feature increases (positive SHAP) or decreases (negative SHAP) the predicted engagement. The color gradient represents the underlying feature value, from low (blue) to high (red), for numerical predictors, while for categorical variables it distinguishes between encoded categories rather than ordered intensities. Thus, the plot integrates both numerical and categorical design features, providing a comprehensive overview of their relative impact.

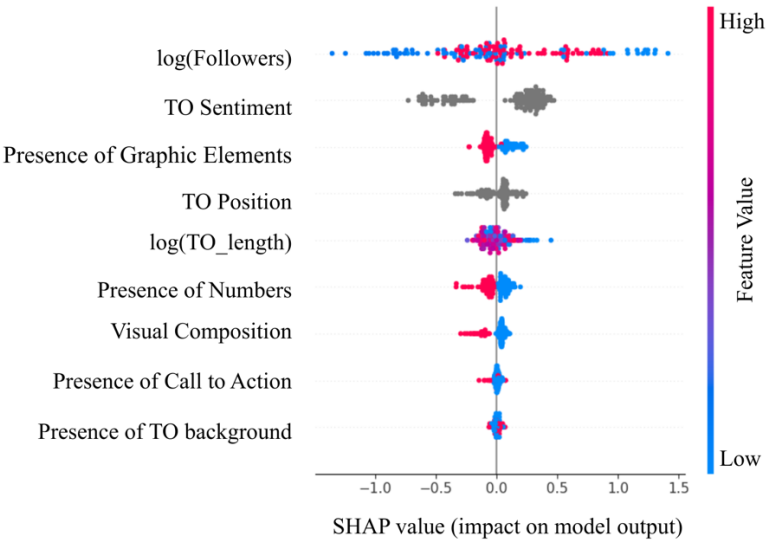


Figure 4 Global SHAP summary plot for the RandomForestMSE model.

Results from the permutation-based feature importance (Table 7) and the SHAP summary plot (Figure 4) converged in identifying audience size and TO sentiment as the strongest predictors of engagement. Minor variations in ranking (e.g., for *Visual Composition*, TO *position*, or *log_TO_length*) are consistent with the methodological distinction between the two interpretability approaches. Permutation-based importance quantifies the model's reliance on each feature for predictive accuracy, whereas SHAP values reveal the magnitude and direction of each feature's contribution to individual predictions, accounting for nonlinearities and inter-feature dependencies. Taken together, these analyses confirm that both the audience factor and message valence are the main drivers of social media engagement, while visual and textual design attributes exert subtler but systematic effects. To further explore the nature of these relationships, Table 8 report the mean SHAP contribution for each category within the categorical predictors These visualizations clarify not only the relative strength of effects but also the directionality of engagement outcomes associated with distinct design choices—showing, for instance, that *negative or mixed sentiments* tend to enhance engagement, while *neutral or positive tones* are associated with lower predicted interaction levels. Visual clarity also emerges as beneficial: images without graphic elements and those adopting text-only compositions yield higher predicted engagement levels. Conversely, positive or neutral tones, top-aligned text, and the presence of additional graphics reduce predicted engagement, confirming that both emotional tone and visual simplicity play a crucial role in user response.

Feature	**Category**	**Mean SHAP value**
TO sentiment	Negative	0.288
	Mixed	0.259
	Neutral	−0.412
	Positive	−0.450
Presence of graphic elements	False	0.124
	True	−0.076
Visual composition	TO only	0.045
	TO+Visual	−0.140
TO position	Center	0.084
	Bottom	0.049
	Multiple	−0.089
	Top	−0.174

Presence of numbers	No	0.069
	Yes	−0.084
Presence of call to action	No	0.007
	Yes	−0.025
Presence of TO background	No	0.008
	Yes	−0.005

Table 8 Mean SHAP values for categorical predictors

To capture effects for continuous predictors, we computed mean SHAP contributions across quantile bins (Figures 5a–5b).For Log(TO length) (Figure 5a), shorter overlays (≤ 41 characters, ≤ p10) show the highest positive contribution to log(engagement), while medium-length texts (70–272 characters, p25–p75) reduce it. The effect slightly rebounds for very long overlays (> 369 characters, > p90), revealing a U-shaped pattern in which concise or intentionally extended messages perform better than moderately long ones.

Quantile bin	Mean SHAP value
≤p10	0.123
p10–p25	0.019
p25–p50	−0.047
p50–p75	−0.033
p75–p90	−0.007
>p90	0.014

Table 9 Quantile thresholds and real-value mapping for TO_length

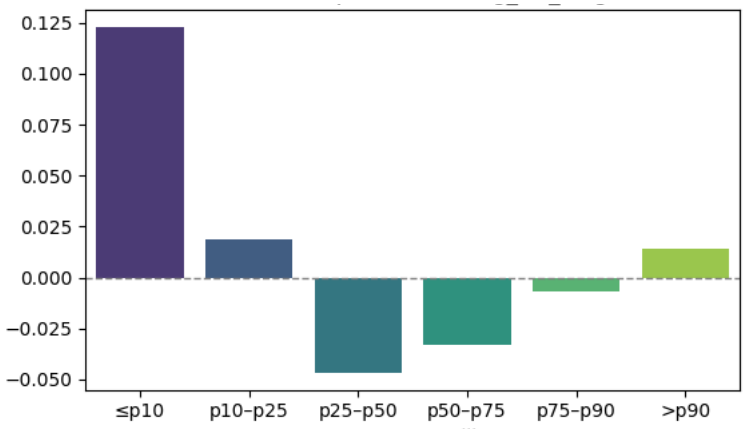


Figure 5a Mean SHAP contribution per quantile of log(TO_length).

Note. Quantile bins correspond to the following character ranges: ≤p10 = ≤41 characters; p10–p25 = 42–70; p25–p50 = 71–139; p50–p75 = 140–272; p75–p90 = 273–369; >p90 = >369.

For what concerns the audience size, log(Followers), the SHAP pattern displays a U-shaped relationship between audience size and engagement contribution (Figure 5b). Accounts in the lowest quantile (≤ 1.2M followers) and those in the top quantile (> 11.6M followers) show the strongest positive impact on predicted engagement, while intermediate quantiles (p25–p75) contribute negatively. This suggests that smaller accounts benefit from stronger community ties, while very large accounts gain engagement through massive reach; mid-sized audiences show weaker relative performance. This pattern suggests a dual dynamic: organizations with smaller audience base may benefit from loyal, highly responsive audiences, while major non-profits capitalize on visibility and brand familiarity.

Quantile bin	Mean SHAP value
≤p10	0.928
p10–p25	−0.031
p25–p50	−0.504
p50–p75	−0.102
p75–p90	0.291
>p90	0.614

Table 10 Quantile thresholds and real-value mapping for Followers_Count.

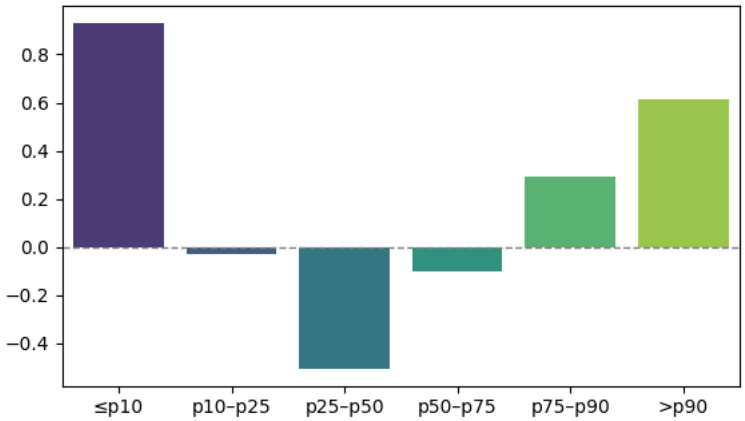


Figure 5b. Mean SHAP contribution per quantile of log(Followers_Count

Note. Quantile bins correspond to the following follower ranges (absolute values): ≤p10 = ≤1,195,302; p10–p25 = 1,195,303–1,441,956; p25–p50 = 1,441,957–11,411,165; p50–p75 = 11,411,166–11,506,718; p75–p90 = 11,506,719–11,581,082; >p90 = >11,581,082.

In sum, SHAP analysis reveals that engagement is maximized when:

1. The message is short, emotionally negative, and visually simple.
2. The layout favors centered or bottom text placement and avoids clutter (e.g., multiple text areas or added icons).
3. The organization operates at either end of the audience-size spectrum, consistent with the visibility–community duality observed in nonprofit digital ecosystems.

These findings quantitatively validate and extend prior conceptual models of emotional valence, visual attention, and message fluency in nonprofit advertising. They highlight how linguistic, structural, and contextual cues jointly shape attention and interaction, clarifying the design conditions under which text-centered visual communication is most effective.

3.5 General Discussion

Across two complementary studies, this research provides an integrated understanding of how textual and visual cues jointly shape engagement in nonprofit social media advertising. By combining experimental and machine learning evidence, we show that TO can enhance engagement when appropriately designed and integrated. but that their effectiveness depends critically on emotional tone, visual composition, and contextual factors such as audience size. From a theoretical standpoint, this work advances the literature on multimodal communication, aesthetic fluency, and attention in digital advertising by clarifying *when* and *how* textual information embedded within images influences engagement. Drawing on theories of visual salience (Pieters & Wedel, 2004), aesthetic processing (Reber et al., 2004), and emotional framing (Small & Verrochi, 2009), our findings demonstrate that TOs act simultaneously as *semantic anchors*, guiding message interpretation, and as *attentional attractors* that compete with other salient visual features. When no human faces are present, TO take on a central communicative role, enhancing comprehension and engagement. However, when faces are included, they may split attention and reduce perceptual fluency, highlighting a key trade-off between visual salience

and compositional harmony. This finding provides empirical evidence for the interplay between message clarity and aesthetic balance, an idea often discussed but rarely quantified in advertising research. The second study refines this understanding by identifying which textual and compositional characteristics most effectively predict engagement. Engagement peaked when messages were *short, emotionally negative or mixed in tone, and visually simple*, while longer texts, decorative graphics, or positive/neutral tones reduced it. These findings extend prior conceptual models by revealing that message effectiveness depends not only on *what* is communicated (emotional or factual content) but also on *how* it is visually integrated. This supports a multimodal fluency framework in which emotional, cognitive, and aesthetic processes jointly drive user interaction.

From a methodological standpoint, this research contributes to the growing integration of explainable artificial intelligence (XAI) in communication and advertising studies. The combination of automated multimodal annotation and SHAP-based interpretability offers a transparent and scalable approach to analyzing complex visual content. Unlike manual content analysis, which is time-consuming and prone to subjectivity, our approach ensures consistency across large datasets while preserving theoretical relevance. By merging human conceptual reasoning with AI-assisted pattern discovery, this study exemplifies a *human–AI collaborative paradigm* for content analysis that enhances both rigor and interpretability. In doing so, it bridges the gap between traditional communication theory and computational advertising analytics, demonstrating how interpretable machine learning can deepen theoretical understanding.

3.6 Managerial Implications

From a practical perspective, these findings offer actionable insights for nonprofit organizations seeking to improve message effectiveness in highly saturated digital environments. Practitioners should adopt *less-is-more* visual strategies—emphasizing textual brevity, emotional resonance, and compositional simplicity. TOs should be concise, easily legible, and harmoniously integrated within the image. Central

or bottom placement performs best, while top-aligned or multi-area overlays tend to reduce engagement. Emotional tone also plays a key role: messages framed with *negative or mixed emotional valence* elicit stronger audience reactions by evoking empathy and urgency, whereas overly positive or neutral tones reduce perceptual distinctiveness. Moreover, decorative graphics or additional visual elements should be minimized, as they introduce clutter that lowers fluency and distracts from the core message. Taken together, these insights suggest that the most effective nonprofit communications are those that *balance emotion with simplicity* and integrate textual cues seamlessly into the visual narrative, ensuring that users grasp the message instantly, even within the fast-scrolling dynamics of social media.

3.7 Limitations and Future Research

While this research combines methodological innovation with theoretical depth, several limitations open avenues for further inquiry. First, although the dataset spans multiple nonprofit organizations and campaign types, future work could explore whether these findings generalize to other communication contexts (e.g., corporate or political advertising). Second, while SHAP analysis captures nonlinear and threshold effects, it does not fully model high-order feature interactions; follow-up studies could integrate partial dependence or interaction heatmaps to map such relationships more explicitly. Third, experimental validation through psychophysiological or eye-tracking measures could provide direct evidence of how visual salience and compositional fluency mediate engagement outcomes. In conclusion, this research underscores that the effectiveness of nonprofit advertising on social media does not stem from the abundance of visual elements, but from their *harmonious integration*. By aligning emotional, textual, and visual cues within a coherent multimodal design, organizations can enhance both message clarity and audience engagement, offering a blueprint for more effective, evidence-based digital storytelling in the nonprofit sector.

4. Channeling Generosity: A Machine-Learning Media-Mix Model for Charity Advertising

4.1 Introduction

Nonprofit organizations (NPOs) play a crucial role in addressing social, health, and humanitarian challenges that governments and markets alone cannot fully solve. However, their survival and capacity to fulfill their missions largely depend on their ability to attract and retain donors (Bennett & Barkensjo, 2005; Sargeant & Woodliffe, 2007). Fundraising, therefore, represents not only an operational necessity but also a strategic lever to ensure long-term sustainability (Bekkers & Wiepking, 2011). Over the past decade, the communication landscape of NPOs has profoundly changed. While traditional offline channels such as television and direct mail remain relevant, digital media, particularly social media advertising, have become essential tools to reach and engage supporters (Waters & Jamal, 2011; Lovejoy & Saxton, 2012; Saxton & Wang, 2014, Guo & Saxton, 2020). Nonetheless, for nonprofit managers, understanding how to allocate limited resources across offline and online media remains a major challenge. Even more than for-profit companies, NPOs operate under strict budget constraints, meaning that every euro invested in marketing must generate tangible social returns and cannot be wasted. Recent industry reports confirm the complexity of this issue. The 2025 M+R Benchmarks Study shows that while nonprofits increased their digital ad spending by 14% in 2024, the overall return on ad spend (ROAS) dropped by nearly 10% compared to the previous year. Moreover, the Blackbaud Institute's Charitable Giving Report highlights that although online giving continues to grow, many organizations still lack integrated models to evaluate cross-channel effectiveness (Blackbaud, 2024). From a theoretical perspective, the difficulty of measuring campaign performance stems from the multidimensional nature of donation behavior (Merchant et al., 2010, Bendapudi et al., 1996). Donors are influenced by emotional, cognitive, and contextual factors that make the effect of advertising investments non-linear and time-dependent (Chapman et al., 2022). Therefore, developing predictive models capable of capturing how different investments interact over time represents a crucial step toward evidence-based fundraising management. This study aims to address this gap by developing an AI-based forecasting model to

estimate donation trends based on media investments across multiple channels (television, social media, and online ads). Leveraging the Prophet time-series model (Taylor & Letham, 2018) to analyze historical investment and donation flows from a prominent Italian non-profit organization, this study aims to determine the optimal marketing budget allocation that maximizes fundraising revenue while ensuring resource efficiency. Specifically, the study quantifies the temporal relationship between media expenditure and donation inflows, testing the robustness of the Prophet model in a complex marketing mix context. In doing so, it provides actionable guidelines for optimizing communication strategies within budget constraints. From a theoretical standpoint, this work contributes to the emerging literature on data-driven decision-making in nonprofit marketing. By applying advanced forecasting models to predict donations in relation to advertising investments within the nonprofit sector, this study advances both methodological innovation and managerial practice.

4.2 Theoretical Background

Nonprofit organizations (NPOs) face pronounced resource scarcity and accountability pressures: every euro assigned to communication must demonstrably translate public attention into charitable giving. A data-driven marketing-mix perspective is, therefore, not merely a technical option but a strategic imperative for NPOs. This approach rigorously models how offline and online investments synergistically drive donations, while accounting for complex factors such as seasonality and cross-media interactions. Classic advertising-response models posit that communication effects are fundamentally dynamic and nonlinear. Seminal works by Vidale and Wolfe (1957) formalized the saturating response, integrating the mechanisms of wear-in (the initial latency period before effectiveness is achieved) and decay (the gradual decline of results after a campaign ends). Subsequent theoretical developments by Nerlove and Arrow (1962) introduced the framework for optimal resource allocation under carry-over effects, which established the *Ad-stock* concept: a latent, cumulative stock of memory derived from all past media exposure that is the primary variable explaining the delayed advertising impact. Literature in advertising research also documents persistence and diminishing marginal returns across markets and

time (Hanssens, 1980; Dekimpe & Hanssens, 1995). In fundraising, where donations typically follow awareness, concern, and intention, carry-over is theoretically salient: mass-media exposure builds cause salience that later turns into giving through lower-funnel touchpoints like search, donation pages, and social retargeting. Within this dynamic view, the role of television (TV) remains central. Contrary to the "declining TV" narrative, a large meta-analysis finds no systematic erosion of TV effectiveness and highlights its outperformance for awareness relative to print and online (Rubinson, 2009). The theory of Integrated Marketing Communications (IMC) further holds that when different advertising channels (such as TV, print, and web) are used in a coordinated manner, the overall result is not a simple sum, but a genuine synergy, meaning their joint effect is greater than the sum of their individual effects (Belch & Belch, 2016). Scholars Naik and Raman (2003) formalized the concept of synergy, demonstrating that interactions between the various channels influence both public response and the ideal budget allocation. From a practical perspective, cognitive theories explain this phenomenon by proposing that different media engage distinct mental processes: TV typically activates affective processing (a fast, immediate, and emotional response) which serves to increase awareness and expand the pool of potential donors. In contrast, print and digital media act upon deliberation and education (a slow, rational process), thereby facilitating the final action and conversion (the actual donation) (Vakratsas & Ambler, 1999; Sadoski & Paivio, 2013). Empirical evidences align with this pathway: in a digital-native context, TV most effectively drives registrations (upper funnel), while search converts to paid outcomes (lower funnel), an analogue of donation harvesting in NPOs (Pfeiffer & Zinnbauer, 2010); conversely, turning TV off depresses digital intent: suspending TV for one week reduced brand-related keyword search by 5–15% with effects persisting up to two weeks, consistent with ad-stock decay (Liu et al., 2025). Real-world execution, however, often undercuts these theoretical gains: weak integration between offline and online assets and inconsistent creative weaken the synergic effect, highlighting the need for coordinated messaging and timing in fundraising campaigns. (Kanso & Nelson, 2004).

Within this theoretical framework, advanced modeling techniques offer the opportunity to optimize investment allocation across various channels, fully embracing the logic of Integrated Marketing Communication (IMC). From this perspective, adopting a "predict-then-optimize" approach proves pivotal: it entails constructing the best possible forecasting model as a decision-making foundation for strategic budget allocation.

This method is supported by machine learning algorithms and optimization techniques that refine decisions regarding timing and expenditure levels, incorporating critical variables such as carry-over and saturation (Niu et al., 2013). These models enable the identification of allocative inefficiencies and the estimation of potential benefits derived from budget rebalancing that is a vital capability for NPOs operating under stringent resource constraints (Färe et al., 2004). Furthermore, empirical evidence suggests that synergistic management of TV and online channels can expand effective reach, favoring media complementarity rather than mere substitution (Goerg et al., 2017).

Building on these premises, the present study aims to develop and validate a predictive model trained on real-world data, capable of estimating donation volumes as a function of investments in each channel. The objective is twofold: to assess the model's predictive accuracy and, concurrently, to quantify the efficiency and specific impact of each medium on donation inflows.

Specifically, the research pursues the objective of implementing an AI-based decision support system, utilizing the Prophet algorithm for time series modeling. The choice of this specific model is driven by the need to manage the intrinsic complexity of donation data, which is characterized by strong seasonal components, non-linear trends, and outliers. By integrating external regressors, representative of investment levels across different channels (TV and Digital), the study aims to transform the predictive model into a diagnostic tool. Consequently, the analysis will not be limited to merely minimizing forecast error (evaluated via metrics such as MAE and RMSE), but will extend to Feature Importance and Scenario Analysis. This step will allow for disaggregating the marginal contribution of each advertising

channel, isolating the net effectiveness of each medium independent of seasonal and inertial dynamics, thereby providing the insights required to transition from intuition-based allocation to evidence-based decision making.

4.3 Methodology

4.3.1 Dataset and Variables.

The empirical analysis relies on a proprietary dataset developed in collaboration with a prominent Italian nonprofit organization specializing in disability and rehabilitation. The organization maintains a continuous fundraising presence through a hybrid mix of offline (television) and online (social media and web advertising) channels. The dataset spans a period of 23 months (January 2023 – November 2024) and consists of weekly aggregated observations (N=98). The target variable, *Total Donations*, represents the weekly count of regular donation transactions (i.e., the absolute number of individual gifts, distinct from the monetary revenue). Focusing on the count of regular giving is strategically significant: unlike spontaneous one-off gifts, recurring contributions serve as a robust proxy for donor loyalty and ensure the predictable income flows necessary for long-term programmatic stability. Data were extracted from the organization's internal Customer Relationship Management (CRM) system, which integrates transactions from multiple payment gateways. To ensure temporal consistency, transactions were aligned to their effective payment date, strictly excluding extraordinary one-time gifts, corporate partnerships, and testamentary bequests. The time series exhibits distinct seasonal patterns, with peaks in January, March, July, August, and December, corresponding to national awareness campaigns, fiscal deduction periods, and year-end appeals.

The explanatory variables (regressors) consist of weekly advertising investments obtained from the organization's media planning and accounting systems. Expenditures are categorized into three primary channels:

- *Television advertising* (SPEND_TV): total expenditures on TV campaigns, including broadcasting costs across national stations.
- *Social media advertising* (SPEND_META): aggregated expenditure on Facebook and Instagram campaigns.
- *Google & Web Advertising* (SPEND_ADS): comprehensive expenditure on the Google Ads ecosystem, explicitly encompassing Search campaigns (keywords), Display network (banners), and YouTube (video advertising).

All expenditure values were recorded weekly and expressed in euros (€). These three regressors capture the organization's broad visibility across the offline and online spectrum, enabling an integrated analysis of how multi-channel pressure influences donor behavior over time.

4.3.2 Data Preprocessing

Donation and investment datasets were systematically aligned based on the weekly temporal index. Prior to model training, a rigorous preprocessing pipeline was applied to ensure data quality and model stability. In particular, the preprocessing phase adopted the following pipeline:

- *Standardization*. All continuous regressors were transformed using z-score standardization (zero mean and unit variance). This step ensures numerical stability during the optimization process and allows for the direct comparison of coefficients across channels with different investment magnitudes.
- *Feature Engineering*. To operationalize the theoretical concept of carry-over, first-, and second-order lagged variables (t-1, t-2,) were generated for each investment channel. These features capture the delayed response of advertising exposure, acknowledging that media pressure exerts an influence extending beyond the initial broadcast week.
- *Anomaly Detection and Correction*. Anomalous spikes unrelated to campaign activity (e.g., exceptional exogenous fundraising events) were identified using z-score thresholds. These

outliers were treated through statistical smoothing to preserve the integrity of underlying temporal patterns without introducing bias from non-replicable events.

4.3.3 Forecasting model selection

Based on a review of state-of-the-art forecasting methodologies, the Prophet model (Taylor & Letham, 2018) was selected as the predictive framework for this study. Developed by Facebook Research, Prophet is an open-source decomposable time series model designed for scalable and interpretable forecasting. Its selection is justified by its proven structural advantages: specifically, its robustness to missing data, tolerance to frequent trend shifts, and ability to handle outliers —conditions frequently encountered in real-world nonprofit donation data (Galdelli et al., 2023).

Mathematically, Prophet formulates the forecasting problem as a generalized additive model (GAM), representing the time series as the sum of three core components plus an error term:

$$y(t) = g(t) + s(t) + h(t) + \beta X(t) + \varepsilon_t$$

where:

- $y(t)$is the observed target value (the weekly count of regular donations);
- $g(t)$models the trend function, capturing non-periodic changes and long-term growth or decline;
- $s(t)$ represents periodic seasonality, modeled via Fourier series to capture periodic effects;
- $h(t)$ captures the effects of holidays and recurrent distinct events;
- $\beta X(t)$ represents the additional regressors term. Crucially for this research, this component incorporates the vector of external marketing variables (i.e. Television advertising, Meta social media advertising, Google & Web Advertising*)*, allowing the model to estimate the specific impact of advertising investments on the target variable;

- ε_t is the random error term, assumed to be normally distributed, represents changes in the time series that are not captured by the model.

4.3.4 Model configuration

To adapt the Prophet framework to the specific dynamics of nonprofit fundraising, the model was configured with a piecewise linear trend (the default specification) to capture structural shifts in donation levels. Seasonality was modeled using Fourier series to explicitly reflect the organization's recurring donation cycles, specifically encoding the observed peaks in January, March, July, August, November, and December. Regarding external predictors, the modeling framework initially considered the complete vector of weekly advertising investments (SPEND_TV, SPEND_META, SPEND_ADS). Consistent with marketing-mix literature (Naik & Raman, 2003), lagged transformations of these variables were generated to capture potential carry-over effects. However, given the relatively limited sample size (N=98), the final inclusion of these regressors was guided by the principle of parsimony to avoid overfitting and preserve degrees of freedom. Therefore, the variable set was determined through a specific selection process designed to evolve the model from a theoretical baseline to a data-driven configuration. To identify the optimal regressor set for the refined model (M3), a quantitative selection strategy was implemented based on signal strength: potential predictors were screened based on their linear association, retaining only those exhibiting a Pearson correlation coefficient $r > 0.30$ with the target variable. Moreover, Granger Causality tests were employed to validate the predictive power of the selected features. This step served as the critical discriminator to identify the most predictive lagged version for each predictor, specifically verifying whether the advertising impact manifests immediately within the same week (contemporaneous effect) or requires a latency period to influence donor behavior (delayed effect).

4.3.5 Model training and optimization

The modeling process adhered to a strict chronological split to respect the temporal order of observations. The model was trained on 74 weekly observations (January 2023 – June 2024) and evaluated on a hold-out test set of 24 weeks (June – November 2024). To ensure numerical stability and prevent data leakage, z-score standardization was applied, with parameters (mean and variance) fitted exclusively on the training set and subsequently applied to transform the test set. Model hyperparameters, including *changepoint_prior_scale*, *seasonality_prior_scale*, *changepoint_range*, and *seasonality_mode*, were optimized using the Optuna framework (Akiba et al., 2019). The optimization process employed Bayesian sampling to minimize the Root Mean Squared Error (RMSE) computed through Prophet's internal rolling-origin cross-validation. This technique simulates a real-world forecasting scenario by iteratively testing the model on past data while strictly respecting chronological order, thereby ensuring that no future information is accessed during the optimization process (avoiding look-ahead bias).

4.3.6 Experimental Design and Model Comparison

To rigorously quantify the value added by the optimization procedures and variable selection, the study adopted an incremental validation strategy. Three distinct model configurations were trained and compared against the hold-out test set:

1. Baseline Model (M1): this model utilizes Prophet's default hyperparameters and the full set of regressors (SPEND_TV, SPEND_META, SPEND_ADS) , including the theoretically assumed 2-week lag of *Television advertising (*SPEND_TV_LAG_2). This serves as the benchmark for standard performance.
2. Optimized Model (M2): this model retains the full set of regressors but applies the Optuna-tuned hyperparameters. This isolates the performance gain attributable solely to parameter tuning, independent of feature selection.

3. Refined Model (M3): this final configuration combines the Optuna-tuned hyperparameters with the statistically selected regressors identified via Pearson correlation and Granger Causality tests. Representing a fully data-driven approach, this final configuration introduced three critical structural updates: replacing the 2-week lag TV investments with the empirically stronger 1-week lag (SPEND_TV_LAG_1); substituting the contemporaneous Meta investment with its 1-week lagged component (SPEND_META_LAG_1) to capture delayed activation; and excluding SPEND_ADS due to its lack of significant predictive power.

4.3.7 Model evaluation and validation

Model performance was evaluated using a multi-metric approach to assess both predictive accuracy and goodness of fit:

- Absolute Accuracy: Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE) were used to quantify the magnitude of prediction errors. RMSE was particularly relevant to penalize large deviations during critical seasonal peaks.
- Relative Fit: Mean Absolute Percentage Error (MAPE) provided an interpretable measure of error relative to the volume of donations, while the Pearson correlation coefficient (r) assessed the model's ability to capture temporal dynamics and trend reversals.

Beyond standard accuracy metrics, the model's interpretability was addressed through a Permutation Feature Importance analysis. This technique quantified the marginal contribution of each regressor (TV, Meta, Web Ads) to the model's predictive power. The predictors identified as most influential were subsequently used to design counterfactual scenario simulations, testing alternative budget allocation strategies to estimate their potential uplift on total donations.

4.4 Results

4.4.1 Descriptive Analysis and Temporal Dynamics

The analyzed dataset includes weekly data from January 2023 to November 2024, covering a total of 98 observations. Each observation corresponds to a seven-day period and tracks the number of regular donations received alongside advertising investments across three communication channels: television (TV), Meta platforms (Facebook and Instagram), and Google/Web Ads. To provide a clear overview of the underlying patterns, data were aggregated at the monthly level. It is important to note that while the subsequent predictive modeling was performed on the original weekly resolution to capture rapid response dynamics, this section analyzes monthly totals to visualize macro-seasonal trends. Across the observed period, the organization received a monthly average of 760 regular donations. Regarding media investments, the average monthly total expenditure amounted to approximately €87,398 on TV, €43,141 on Meta, and €22,701 on Google/Web Ads. These figures identify TV as the dominant investment channel, while online platforms (Meta and Ads combined) represent a substantial and growing portion of the communication mix. Figure 6 illustrates the temporal evolution of donations and expenditures using monthly totals. The time series reveal strong temporal variability driven by seasonality, with recurring peaks aligned with major fundraising windows (January, July, August, November, and December). The TV channel exhibits the highest fluctuations, with sharp spikes corresponding to flighted campaigns in late autumn (coherently with the Christmas period) and mid-summer. By contrast, Meta spending presents a more regular pattern, sustaining engagement during high-activity months (July–August) and ramping up before end-of-year appeals. The Google/Web Ads channel displays lower but more consistent investment levels throughout the period, confirming its strategic role as an "always-on" awareness tool rather than a pulse-based driver. Crucially, the donation trend closely mirrors the investment TV cycles. While the monthly aggregation highlights the macro-alignment between spending and giving. Preliminary evidence suggests a strong temporal interdependence between advertising effort

and donation response, justifying the use of a causal forecasting approach to disentangle the specific contribution of each channel.

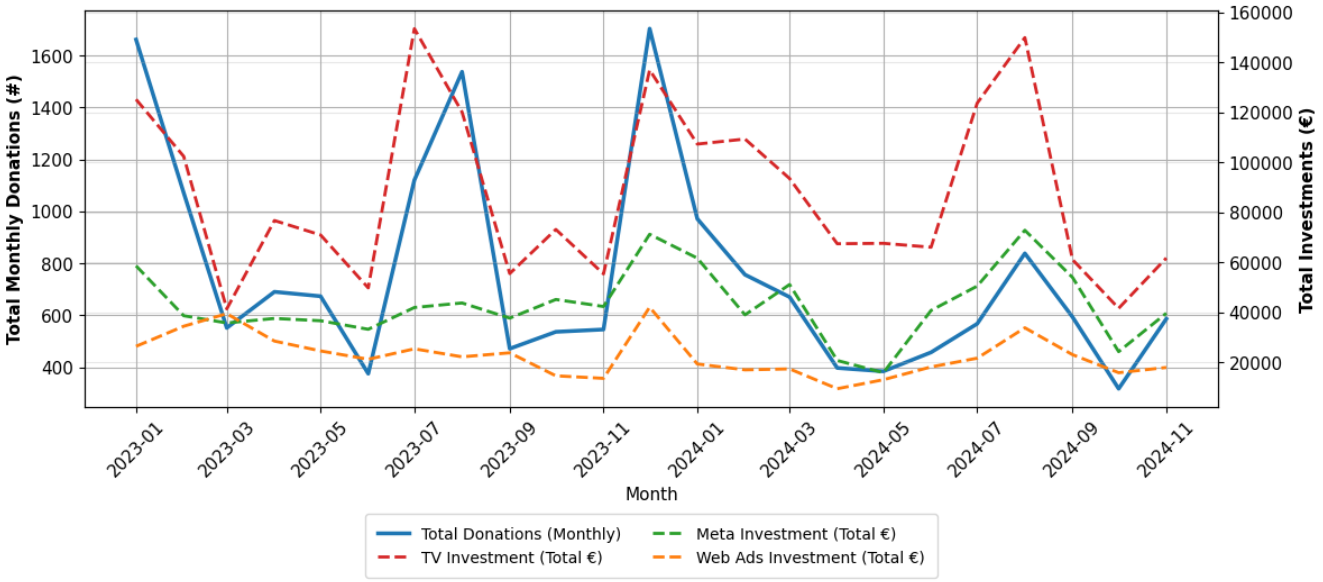


Figure 6 monthly Trend of donations and advertising expenditures

4.4.2 Baseline Prophet model

The initial forecasting attempt (Baseline Model M1) was established using Prophet's default additive seasonality and a heuristic regressor set comprising SPEND_TV, SPEND_META, and SPEND_ADS. Crucially, this configuration incorporated a theoretically assumed second-order lag for television investment (SPEND_TV_LAG_2), reflecting the standard managerial hypothesis that TV requires an extended latency period (approx. 14 days) to influence donor behavior (Leone, 1995). The model was trained on the first 74 weeks and validated on the subsequent 24 weeks hold-out test set (June–November 2024). Performance metrics indicated significant limitations:

- MAE: 98.95
- RMSE: 114.62
- MAPE: 73.83%

- Pearson r: 0.809

While the model captured the general seasonal trend (r>0.8), the high absolute error rates and a MAPE exceeding 73% suggested that standard assumptions regarding additive seasonality and theoretical media latency were insufficient to accurately predict donation volumes during peak volatility.

4.4.3 Algorithmic Optimization Results

To isolate the impact of hyperparameter tuning from feature selection, a second configuration was developed. This model retained the exact regressor structure of the baseline (including the 2-week TV investment lag) but applied the optimal parameters identified via Bayesian optimization (Optuna).The optimization process converged on a multiplicative seasonality mode, indicating that donation peaks scale proportionally with the underlying trend rather than as fixed additive values. This optimization step resulted in a significant improvement in model accuracy:

- MAE: 79.18 (-19.9% vs Baseline)
- RMSE: 98.89 (-13.7% vs Baseline)
- MAPE: 56.41
- Pearson r: 0.868

These results demonstrate that a substantial portion of the initial error was driven by suboptimal parameterization. However, the persistence of residual errors suggested that the input variables themselves required refinement based on empirical evidence.

4.4.4 Enhancing Predictive Accuracy: Causal Refinement and Final Selection

To define the inputs for the final model, a rigorous diagnostic process was conducted using Cross-Correlation Analysis (figure 7) and Granger Causality tests. The analysis revealed significant discrepancies between the theoretical assumptions used in M1 and M2 and the empirical reality. In particular, television advertising investment was confirmed as a primary driver (r=0.59, p=0.0129). Regarding the carry-over effect, the 2-week lag of television advertising investment used in the baseline model (M1) failed the Granger significance test (p=0.1468). Conversely, the 1-week lag of television advertising investment SPEND_TV_LAG_1 showed a comparable p-value (p=0.1762) but a significantly stronger linear correlation (r=0.49). Consequently, SPEND_TV_LAG_1 was selected to capture the short-term carryover, prioritizing signal strength.

For what concern Meta Averting Investment the contemporaneous variable SPEND_META failed the Granger test with a high p-value (p=0.5071), suggesting it contained non-predictive noise. However, the 1-week lag of the same variable demonstrated a radically improved predictive signal (p=0.0885, significant at the 10% level). To capture this delayed activation, the contemporaneous variable was replaced by SPEND_META_LAG_1.

Finally, regarding Google & Web Ads Investment (SPEND_ADS) despite it has a 0.38 correlation with the total donation, it failed to demonstrate Granger causality at any lag structure.

Consistent with the principle of parsimony given the sample size (N=98), To prevent redundancy and overfitting, only these three regressors, SPEND_TV, SPEND_TV_LAG_1, and SPEND_META_LAG_1, were retained in the refined Prophet specification.

Figure 7 Lagged correlations between donations and investments

Incorporating these statistically selected inputs, the Refined Model (M3) was evaluated against the previous configurations. Table 11 summarizes the incremental improvements across the experimental stages on the hold-out test set (June–November 2024).

Table 11 Model Performance Comparison

Model	MAE	RMSE	r	MAPE (%)
Default	98.95	114.62	0.809	73.83
Optuna-tuned	79.18	98.89	**0.868**	**56.41**
Lag-selected	**78.08**	**97.13**	0.835	59.23

The comparison highlights distinct contributions from the two optimization stages. Algorithmic tuning (M2) provided the main improvement in trend following (highest r), likely due to the shift to multiplicative seasonality. However, the correct identification of causal lags (M3) further refined the

model's precision, correcting the temporal misalignment introduced by the theoretical 2-week assumption.

Although M2 exhibited a marginally higher correlation, M3 was selected as the final model for two critical reasons:

1. Accuracy: It minimizes the magnitude of prediction errors (lowest RMSE and MAE), which is the primary objective for budget allocation to avoid resource waste.
2. Robustness: It relies on causally validated variables (Granger-verified), reducing the risk of spurious correlations.

The transition from the baseline (M1) to the fully data-driven approach (M3) resulted in a total 21.1% reduction in Mean Absolute Error, confirming the superiority of the proposed framework.

4.4.5 Model interpretation and regressor relevance

Permutation importance, performed on the hold-out test set, confirmed the structural reliance of the model on offline media: this technique, which measures the loss in predictive accuracy when a feature's temporal sequence is randomized, confirmed current television investment (SPEND_TV) as the primary structural driver. Permuting its sequence resulted in the highest degradation in performance, increasing MAE by +2.75 and MAPE by +9.83. This demonstrates that the model cannot predict accurately without the temporal information supplied by the current TV spend. Conversely, the lagged components SPEND_TV_LAG_1 and SPEND_META_LAG_1) for both television and social media investments exerted a smaller, yet stable, complementary influence. The magnitude of each regressor's long-term influence was further quantified through Component Contribution Decomposition (Figure 8). This analysis indicated that current TV investment (SPEND_TV) accounts for the vast majority of media contribution (70.5%), followed by its short-term lagged effect (SPEND_TV_LAG_1, 23.3%) and the

delayed social media investment (SPEND_META_LAG_1) contributes a modest 6.2%, unequivocally corroborating the dominance of the offline investment in driving overall donation volume.

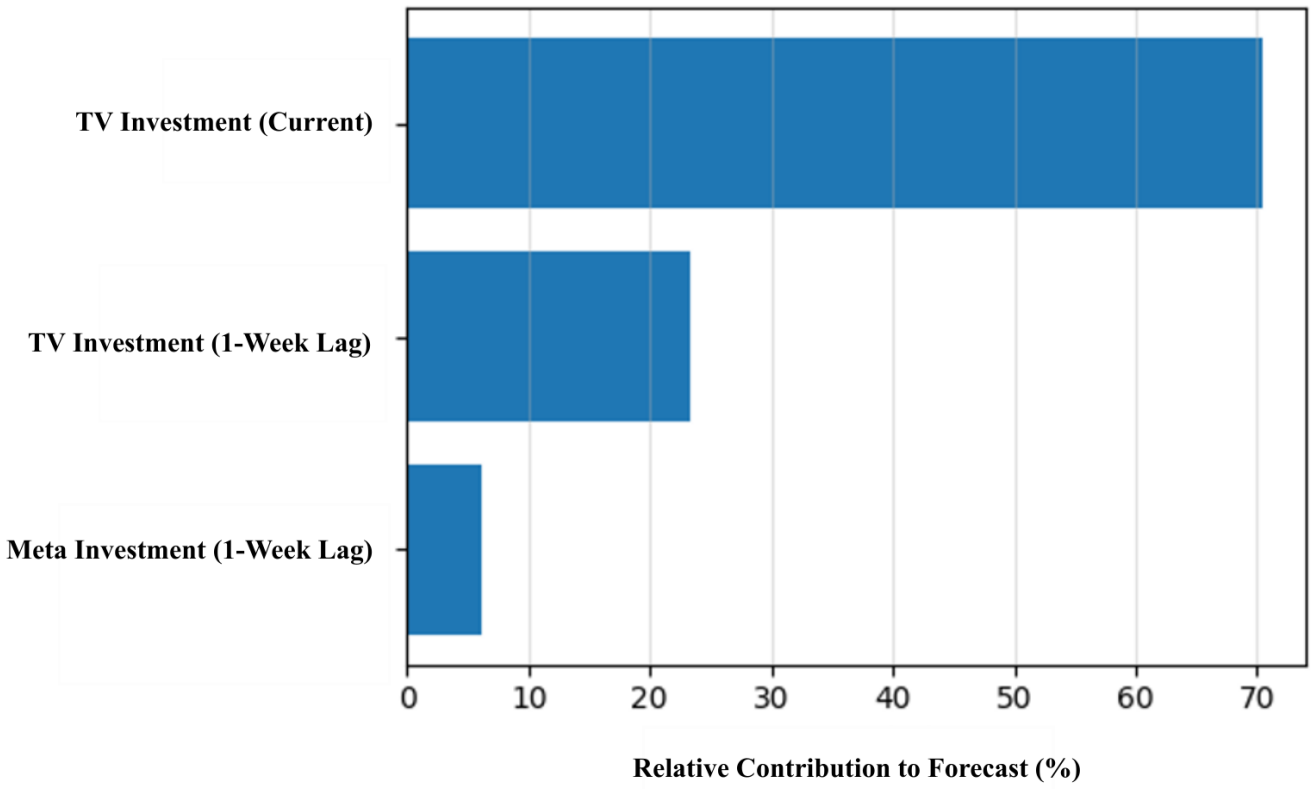


Figure 8 Relative importance of regressor

Complementing this analysis, marginal sensitivity analysis (Figure 9) revealed a monotonic, positive relationship between current and delayed TV spending and donations. However, the analysis also demonstrated that delayed social media investment (SPEND_META_LAG_1) exhibits slightly negative marginal returns beyond the average spending level. This finding suggests a low saturation ceiling for the social channel and points to potential inefficiencies or cannibalization effects when digital pressure is increased while holding TV constant.

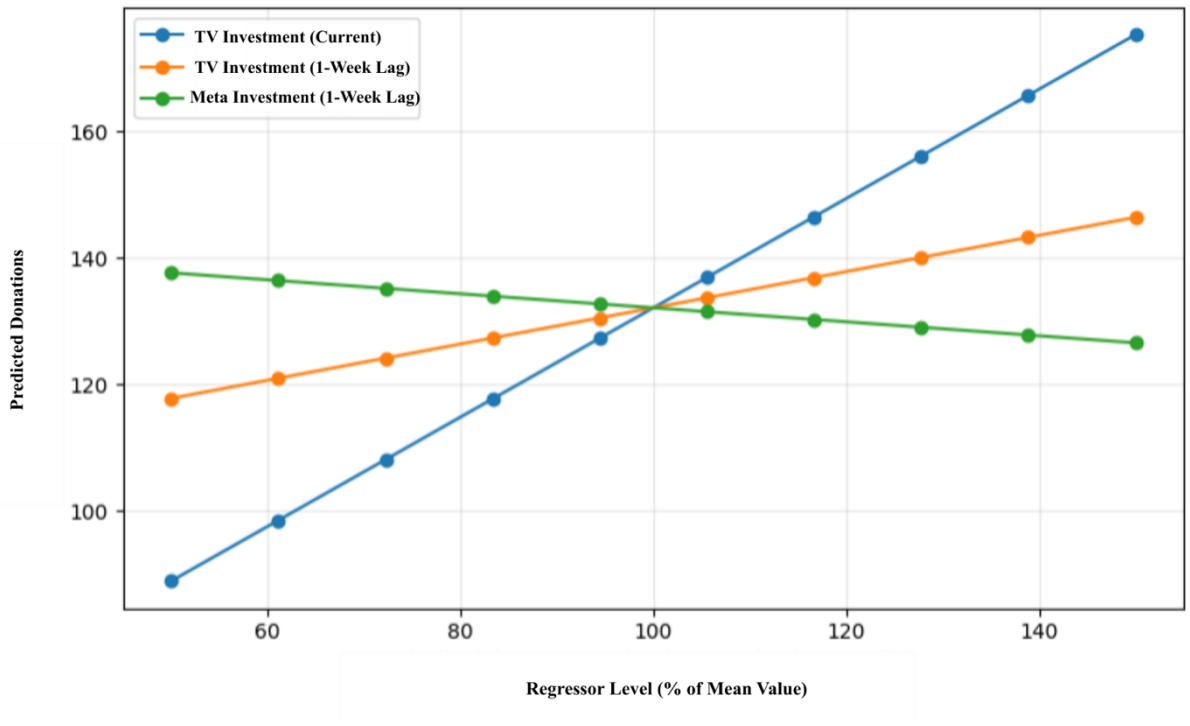


Figure 9 Predicted Response to Budget Variations. The X-axis represents the investment level relative to the mean (100%): values below 100 indicate spending cuts, while values above indicate increases. The Y-axis shows the resulting impact on the number of weekly donations.

4.4.6 Scenario simulation

To explore the practical implications of the refined model (M3), six investment scenarios were simulated on the test window (June–November 2024). As shown in Table 12, increasing TV investment yields the strongest and most stable uplift (a +20% TV increase yields an average uplift of +20.1%). Conversely, Meta-only increases slightly reduce predicted donations (down to -2.4% for +20% Meta). The final model demonstrates that combined increases (TV + Meta) experience an additive cancellation effect, where the negative elasticity of Meta offsets the positive gain from TV. The overall most effective configuration remains the +20% TV alone, maximizing return while avoiding inefficient online expenditure.

Scenario	Avg. uplift (%)	Cumulative uplift (donation units)
+20% TV	**+20.1**	**+507**
+20% TV & Meta	+17.7	+458
+10% TV	+10.0	+253
+10% TV & Meta	+8.9	+229
+10% Meta	−1.2	−24
+20% Meta	−2.4	−49

Table 12 Scenario Simulation

4.5 Discussion

Our empirical findings align closely with classic advertising-response theory and contemporary Integrated Marketing Communications (IMC) perspectives.

First, the dominant role of television confirms the high elasticity of response to the TV medium in the non-profit sector: consistent with Direct Response literature, TV investment demonstrates a unique capacity to generate significant and scalable volume growth, without showing the signs of early diminishing returns typical of digital channels. However, the temporal analysis reveals a crucial specificity: the carry-over effect dissipates almost entirely within a single week (Lag 1), a period significantly shorter than the 2–5 weeks typical of consumer goods (Leone, 1995). This one-week carry-over we observed is consistent with field evidence suggesting that TV shocks propagate into digital intent with short-lived persistence (Liu et al., 2025).

This “fast decay” is explained by the convergence between media strategy and the nature of the non-profit advertising message.

In terms of media planning, the analyzed campaigns typically follow a burst (or massed) strategy, characterized by high broadcast frequency concentrated in narrow time windows, consistent with our results. As demonstrated by Zielske (1959) in his advertising learning theory, such intensive pressure maximizes immediate recall but induces a much steeper forgetting curve compared to distributed schedules, explaining why the effect on donations vanishes as soon as advertising pressure ceases.

In terms of creative content, this fast decay is consistent with the mechanics of Direct Response Television (DRTV), which characterizes the campaigns under study. Unlike branding advertising, which

aims to build lasting mental associations, fundraising appeals are designed to stimulate an immediate behavioral reaction (Call to Action). According to Tellis (2004), this type of message generates instant response peaks based on emotional impulse, which naturally tend to dissipate quickly if the donation action is not taken at the moment of exposure.

Secondly, the negative marginal elasticity highlighted for the social channel (Meta) when pushed beyond average investment levels offers crucial empirical confirmation of the digital channel saturation theory. This phenomenon is theoretically plausible if interpreted through funnel logic: while TV acts as the primary generator of new demand (demand generation), social media operate primarily as capture and reinforcement channels (demand harvesting) (Pfeiffer & Zinnbauer, 2010). Our results suggest that, in the absence of adequate television pressure fueling the top of the funnel, isolated increases in Meta spending rapidly encounter an efficiency ceiling. This likely occurs because the advertising algorithm, targeting a restricted user pool without the audience refresh provided by TV reach, generates frequency overload or ends up cannibalizing conversions that would have occurred organically.

However, the dynamic changes in joint scenarios: the positive (albeit moderate) uplift observed when Meta accompanies TV peaks indicates asymmetric complementarity. Digital effectiveness is not intrinsic, but conditional on the salience generated by offline media, perfectly validating the cross-media synergy principle formalized by Naik and Raman (2003), whereby the return of the support channel is a direct function of the primary channel's intensity.

The hierarchy of effectiveness emerging from the data finds a clear correspondence in dual-process cognitive theories (Sadoski & Paivio, 2013), contrasting the affective immediacy of the television medium with the more deliberative nature of digital channels. This result empirically corroborates the sequential model "TV builds, digital harvests": the fact that Meta's incremental value reduces drastically in the presence of strong TV pressure suggests that the bottleneck for growth is not message reinforcement, but the generation of new salience. This distinction represents a critical nuance for budget

design at realistic spending levels, where excessive investment in frequency (reinforcement) risks saturating efficiency without expanding the donor base.

Methodologically, the application of the Prophet framework, enhanced by hyperparameter optimization and rigorous regressor selection, demonstrated remarkable robustness in handling the strong seasonality and variability (level shifts) characterizing fundraising cycles. The additive and decomposable nature of the model goes beyond ensuring precision and it enables a crucial strategic function: the isolated quantification of channel contributions and the execution of transparent counterfactual analyses. This approach operationalizes the "predict-then-optimize" paradigm, which is normatively ideal for non-profit organizations operating under strict resource constraints. Although black-box Machine Learning algorithms might theoretically offer superior accuracy margins, Prophet's structural interpretability and its aptitude for scenario simulation offer significantly higher decision-making value in contexts where stakeholder accountability is a priority (Färe et al., 2004; Niu et al., 2013).

4.6 Managerial Implications

From an operational standpoint, the results of this study offer a concrete decision-making framework to optimize resource allocation in budget-constrained non-profit contexts. Moving beyond the theoretical offline-online dichotomy, the analysis suggests three strategic guidelines to maximize Return on Investment (ROI).

Contrary to the prevailing "digital-first" trend, managers should view television not as a legacy cost, but as the main lever capable of genuine scalability. The linear elasticity revealed by the model, where an increase in TV budget translates into a proportional rise in donations, indicates that this channel is far from saturation.

For campaigns aimed at new donor acquisition or rapid volume growth, the budget should not be overly fragmented. The recommendation is to concentrate spending on the television medium to break through

background noise, as data show that donor fatigue on this channel is significantly lower compared to digital media.

The most critical insight for cost management concerns the Social channel (Meta). Evidence of negative marginal returns beyond average spending levels suggests that many organizations may be in a phase of digital over-spending, where the cost per contact increases without generating incremental conversions (cannibalization).

Managers must abandon the concept of digital as a stand-alone volume driver. The social budget should be managed with an “efficiency ceiling” approach: invest only up to the point where the channel supports TV, and drastically cut spending during periods of television silence. This "smart saving" frees up resources that can be reallocated to extend television presence.

Findings highlight the fact that the window of opportunity to convert the impulse generated by TV is brief and transient. Retargeting activities, Direct Email Marketing (DEM), and home page optimizations must be synchronized with surgical precision, activating with a 1-week delay (Lag 1) relative to TV pressure peaks. Anticipating or delaying these digital actions results in budget dispersion on a activated audience or one that has already forgotten the initial stimulus.

Finally, adopting an interpretable model like Prophet transforms the organization’s managerial culture. Shifting from allocations based on historical data (inertial budgeting) to counterfactual simulations (“what-if”) allows investment choices to be justified to the board with evidentiary data. It is recommended to institutionalize the use of these models not as a one-off exercise, but as a tool for preventive auditing. Being able to quantitatively demonstrate that “cutting the TV budget by 10% would cost X lost donations” offers marketing managers evidence-based negotiation power, protecting strategic investments from linear cuts and ensuring responsible stewardship of donor funds.

In summary, the winning strategy emerging from this study is not merely channel integration, but their functional hierarchization: use TV to generate demand, use digital to harvest it (with extreme cost discipline), and use data to defend these choices.

4.7 Limitations and Future Research

Despite the highlighted methodological and managerial contributions, this study presents some inherent limitations that temper its generalizability and suggest directions for future research.

First, the weekly resolution of the dataset limits the sample size to 98 total observations. While this aggregation is effective in filtering short-term noise and highlighting macroscopic seasonal trends, it inevitably compresses intra-campaign variance. Consequently, error metrics (MAE, RMSE, MAPE) are inherently higher compared to those obtainable with high-frequency daily time series. More granular data would allow for capturing immediate fluctuations in donor response to specific advertising bursts with greater precision, improving the model's sensitivity to short-term shocks. Furthermore, the focus on a single organization within a 23-month window, while ensuring control over internal variables, limits the external validity of the estimated elasticities. Future studies should extend the analysis to multi-organizational panels to isolate the effect of contextual factors such as organization size, donor base maturity, and the type of social cause addressed.

Second, although Prophet offers an excellent balance between flexibility and interpretability, its additive structure approximates complex advertising dynamics rather than modeling them structurally. The use of time lags allowed us to capture the memory effect, but this represents a linear approximation that does not perfectly replicate how advertising recall progressively fades over time (the so-called "decay"). Moreover, the model treats channels as separate components: synergies between TV and online are not calculated directly by the mathematical formula but inferred ex-post through simulations. This choice prioritizes the managerial interpretability of the results, while sacrificing the extreme precision of more complex econometric models that mathematically measure every interaction between channels.

Finally, the analysis relies exclusively on investment volumes, treating media exposure as homogeneous. The model does not incorporate qualitative variables such as creative message strength, emotional tone, or attention quality (Hallward, 2008), factors that literature identifies as critical determinants for the resonance of charitable campaigns. The omission of these qualitative drivers, together with the absence of macroeconomic or competitive exogenous covariates, contributes to unexplained residual variance and may obscure differences in effectiveness between campaigns with equal spending.

To overcome these limitations, future research should focus on integrating high-frequency (daily) data with granular behavioral metrics (clicks, dwell time, shares) and creative quality indicators. On a methodological level, adopting hybrid formulations incorporating nonlinear transfer functions (Adstock and Saturation) within the Prophet framework, or employing Machine Learning ensembles (e.g., XGBoost, AutoGluon) within a predict-then-optimize pipeline, could offer even more precise elasticity estimates. Finally, extending the scope of analysis to map the entire donor journey, from initial exposure (awareness) to final conversion, would allow for definitively validating the sequential role of channels, strengthening the strategic value of these models for fundraising governance.

4.8 Conclusions

This study demonstrates how the integration of established theoretical principles, such as ad-stock memory and cross-media synergy, with interpretable predictive modeling can effectively guide media-mix optimization in the third sector. Through the application of Prophet with exogenous regressors, the analysis successfully isolated and quantified the marginal contribution of offline and online channels, offering an empirical solution to the complexity of donation dynamics.

The results establish the primacy of television as the structural short-term driver, characterized by a rapid carry-over effect (1 week) that necessitates precise tactical synchronization. Conversely, the study redefines the role of social media (Meta) from autonomous performance generators to synergistic reinforcement mechanisms: their effectiveness is shown to be not intrinsic, but conditional on the salience

generated by television, confirming the hierarchical and interdependent nature of integrated communication.

Beyond its empirical findings, this research offers a distinct innovative contribution to the non-profit sector by introducing and validating a sophisticated predict-then-optimize framework. While the sector has traditionally relied on retrospective analysis or static heuristics, this study demonstrates the feasibility and added value of applying advanced machine-learning techniques to fundraising data. By adapting the Prophet algorithm, originally designed for high-frequency tech applications, to the specific features of charitable giving (e.g., strong seasonality, irregular campaign shocks), the research bridges the gap between modern data science and social impact management.

Ultimately, the work validates a decision-making approach that balances accuracy with transparency. Unlike black-box algorithms, the decomposable structure of the proposed model addresses the imperative of accountability typical of non-profit organizations, making forecasts auditable and justifiable to stakeholders. The capability to execute counterfactual simulations ("what-if" scenarios) transforms the model from a mere forecasting tool into a strategic lever, enabling a more conscious, efficient, and impact-oriented stewardship of donor resources.

5. Conclusion

This thesis, addressed the central challenge for non-profit organizations (NPOs) in the current media landscape: navigating a saturated environment where digital ubiquity often fails to translate into tangible financial support. Through a multidisciplinary approach integrating behavioral sciences with advanced artificial intelligence methodologies, this research provided an evidence-based framework for converting audience attention into sustained support. The analysis was articulated across three interconnected levels: message psychology (the power of emotions), creative optimization (design for attention on social media), and strategic planning (media mix effectiveness).Through a systematic literature review this work dismantled the notion of universal emotional effectiveness, highlighting instead a strong dependence on context, desired objective and donor's psychological mindset. In the spectrum of positive emotions**,** appeals based on hope or happiness are effective for improving attitudes toward the organization and building brand affinity, but perform less effectively in generating immediate helping behaviors due to a lower perceived urgency (Burt & Strongman, 2005; Septianto et al., 2018). Conversely, for what concerns negative emotions, appeals based on guilt or sadness create a psychological tension that the individual seeks to resolve through the direct action of donating (Chang, 2014; Choi, 2021). Even more effective are "mixed" emotions or transformative narratives (e.g., sadness evolving into hope), which facilitate emotional processing and allow the donor to visualize the impact of their contribution (Homer, 2021; Bennett 2015). In summary, emotional strategy must not be static but adaptive: NPOs should utilize negative levers for short-term activation and positive ones for long-term relationship building.

The prompt-based content analysis conducted on nearly 2,000 Instagram posts revealed how, in fast-scrolling environments, visual elements can compete for attention rather than cooperate. The most significant finding concerns the trade-off between human faces and text overlays presence. Findings support the evidence that the presence of a human face is a prioritized biological stimulus that immediately captures attention (Bakhshi et al. 2014). Adding a text overlays to an image featuring a face

creates cognitive overload and visual clutter, splitting attention and significantly reducing engagement (Nelson, 1985; Pieters et al., 2010). Conversely, in the absence of faces, text acts as a cognitive anchor (Farace et al. 2025) that enhances interaction, especially if the message is concise, visually clean, and characterized by negative or mixed sentiment. This suggests a fundamental design rule for NPOs on social media communication: visual simplicity wins. Creative content must choose whether to leverage the emotional connection of the face or the informative clarity of the text, avoiding their superposition. Finally, though the application of predictive models to real-world fundraising data this thesis offers a new perspective compared to the dominant digital-first narrative. The results delineate a clear functional hierarchy among channels: TV is confirmed as the dominant driver, responsible for 70.5% of the total contribution to donations. The relationship between TV spend and donations is nearly linear, indicating high scalability and a low risk of saturation. Conversely, Social media does not function as a primary demand generator, but as a tool for harvesting the awareness generated by TV. From these finding important managerial implication emerges: increasing social spend in isolation leads rapidly to diminishing or negative returns as a sort of saturation trap. However, digital effectiveness is amplified when synchronized with TV campaign peaks, confirming strong inter-channel synergy. The integration of these findings leads to the definition of a new operating model for fundraising. Non-profit organizations must abandon the idea of treating digital channels as autonomous growth drivers and instead adopt a hierarchical and synchronized strategy. Success lies in temporal synchronization. The impact of TV decays rapidly, exhausting itself almost completely within one week. Consequently, NPOs must use TV to generate mass-scale attention and activate digital channels with surgical precision within this narrow time window to convert the impulse into action. However, timing is a necessary but insufficient condition. In activating these highly crowded digital channels, characterized by chronic information overload, it is critical to master the specific mechanisms that capture user attention, foster engagement, and ultimately drive conversion.

This thesis proposes a unified strategic framework designed to bridge the gap between media planning and creative execution. At a macro-strategic level ("The When"), organizations should leverage the hierarchical channel perspective to align budget allocation with the donor's decision journey, concentrating digital spend in the high-propensity windows generated by offline media. Once the audience is reached, micro-tactical execution ("The How") becomes paramount: to maximize conversion probability in an environment of scarce attention, visual simplicity is essential, specifically avoiding the cognitive clutter of overlaying text on faces. Finally, at the content core ("The What"), the message must be infused with the appropriate emotional valence coherently whit the campaign and organization objective, to trigger the immediate behavioral tension required for donation.

In conclusion, the optimization of social advertising is not solely a creative issue nor solely an investment allocation issue, but a synergy between human signals and machine logic. To maximize donations, NPOs must balance emotional resonance and visual cleanliness following a media plan that respects the principle: "*TV builds, digital harvests*".

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