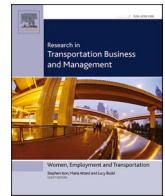




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## Navigating autonomous vehicle crashes: The role of corporate communication in shaping public opinion

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### ABSTRACT

Effective crisis communication is crucial for shaping public perceptions and restoring trust in autonomous vehicles (AVs) after safety incidents. While previous research has drawn on social media to explore public acceptance and user intentions related to AVs, few studies have examined how corporate communication strategies can influence public opinion and mitigate reputational risks. The present study addresses this gap by adopting the dual perspective of organizations and consumers. First, it analyzes the corporate communication strategies adopted by Cruise LLC, a leading AV company, following a recent high-impact accident on X. Second, the study analyzes public comments on the company's communications using sentiment analysis and emotion detection with KNIME and R software and a content analysis performed on NVivo 14 to identify the main issues raised in the public debate. The results show that corporate communication strategies aligned with the evolving attribution of responsibility and crisis phase coincide with positive public sentiments and favorable emotions, such as trust and expectation. The online debate highlighted public concerns about innovation, trust, accountability, transparency, and security. Monitoring online discussions reveals relevant insights for mitigating the negative effects of a crisis by communicating transparently and empathetically with stakeholders to foster technological development. Therefore, this study offers useful recommendations for industry managers to implement effective crisis communication strategies and outlines policy directions to foster collaboration and coordination to handle this new technology.

### 1. Introduction

Autonomous vehicles (AVs) can detect their surroundings and operate in various traffic conditions with little or no human input (Skeete, 2018). These advanced driver assistance systems operate at different levels of autonomy, as defined by the National Highway Traffic Safety Administration (NHTSA), starting from no automation (level 0) to full automation (level 5) (Thomas et al., 2020). Self-driving vehicles belong to autonomy levels 3-4, while AVs belong to level 5 (Penmetsa et al., 2021).

Among the most advanced nations in the development of AVs' hardware and software is the United States (National Highway Traffic Safety Administration, 2020), and among the various players are companies such as Tesla, Google, General Motors, and Uber that are fueling technological progress, investing in automation technologies and testing

these vehicles in different cities around the world (Crayton & Meier, 2017). Thus, recent technological advances related to automated vehicles have the potential to revolutionize the transport sector (Penmetsa et al., 2023; Yoganathan & Osburg, 2024), as clearly emerged especially after the COVID-19 pandemic (Abdel-Basset et al., 2021). This is particularly true in the context of Mobility as a Service (MaaS), described as a single trip management platform that digitally unifies the creation, purchase, planning, and delivery of trips at different levels of integration with a range of available transportation modes (Butler et al., 2021). These services are generally provided by innovative mobility service providers, which use a digital interface to match passengers to available vehicles (Burlando et al., 2019; Jittrapirom et al., 2017; Kamargianni et al., 2016). MaaS represents a promising mobility solution and is expected to contribute significantly to future urban mobility reform (Kamargianni et al., 2016).

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Thus, autonomous vehicles can change previous mobility-related logic by bringing various economic, social, and environmental benefits (Akimoto et al., 2022; Arpacı et al., 2024), such as improving fuel efficiency, reducing traffic congestion, shortening travel times, increasing comfort levels, enhancing productivity during travel, and increasing mobility opportunities for people with physical restrictions (Ahmad et al., 2021; Bansal et al., 2016; Chen et al., 2017; Chen et al., 2024; Crayton & Meier, 2017; Fagnant & Kockelman, 2015; Kassens-Noor et al., 2021).

However, in addition to these advantages, driverless transport opens the way to some new challenges related to privacy and regulation, for example, as autonomous vehicles pose a potential risk as they involve recording people's movements (Arpacı et al., 2024; Cao et al., 2024; Hudson et al., 2019; Zibarzani et al., 2024). In addition to these aspects, a crucial challenge to be addressed revolves around the AVs' security.

Safety is a crucial aspect of technology development. On one side, AVs can significantly improve road safety by eliminating human error, which accounts for a large percentage of car accidents (Wang et al., 2020). However, on the other side, AVs introduce new critical issues, such as handling unpredictable scenarios that human drivers might manage instinctively (Penmetsa et al., 2019). As a result, AV safety remains an evolving and complex process (Othman, 2021), requiring advancements in machine learning, sensor technology, and regulatory collaboration to ensure reliability and trust in their deployment (Koopman & Wagner, 2017). Consequently, while AVs hold promise for enhancing road safety, there is still no undisputed evidence that they are significantly safer than non-autonomous cars or that road accidents have been substantially reduced with their use (Hudson et al., 2019). Furthermore, accidents caused by AVs have attracted considerable media attention worldwide. Since events can change public perceptions of autonomous vehicles, companies must learn to recognize and handle these situations appropriately (Othman, 2021) to foster trust, encourage adoption, and support policies that facilitate the long-term integration of AVs into society (Di Vaio et al., 2020; Kenesei et al., 2022; Loureiro et al., 2021; Wu & Yuen, 2023).

The interest and relevance of AVs' impact on people's daily lives also stem from Elon Musk's recent launch in October 2024 of the "Cybercab" robotaxi, a service optimized for driverless transport, which is expected to go into production in the future (BBC, 2024; Zhou & Yi, 2025). For AVs to become widely adopted, they must overcome a significant barrier beyond technological advancements: public acceptance (Bakalos et al., 2020). While current research has already explored the public acceptance of AVs (Bansal & Kockelman, 2017; Chen et al., 2024; De Paepe & Witlox, 2024; Hohenberger et al., 2016; Kacperski et al., 2025; Koh & Yuen, 2023; Liu et al., 2019; Penmetsa et al., 2019; Xu et al., 2018; Yu et al., 2023) and user intention to adopt this technology (Cao et al., 2024; Xiao & Goulias, 2022; Zmud & Sener, 2017), few studies have explored the crisis communication perspective by assessing how corporate communication strategy may impact on users' perceptions of this technology (Mirbabaie & Zapatka, 2017; Stieglitz et al., 2015). Specifically, while previous studies have analyzed public perceptions of AVs (Hulse et al., 2018) and sentiment shifts following AV-related incidents (Jefferson & McDonald, 2019), there remains a gap in understanding how companies can strategically communicate to restore public trust following crises. Given the still low adoption rates of self-driving cars and their expected growth, there is a pressing need to understand how firms can manage negative public perceptions, particularly in response to safety incidents, to foster swift recovery and mitigate reputational risks. From these considerations, the following research questions emerge:

RQ1: How do companies manage and communicate with the public following accidents involving AV vehicles to contain the negative effects on public perception?

RQ2: How does the public react to the crisis communication strategies adopted, and what are the main issues and challenges that feed into the public debate following an accident involving AV vehicles?

To answer these research questions, the study considers a dual perspective, i.e., the organizational and the consumer one. Firstly, the study detects changes in the volume and type of corporate communication strategies adopted by the Cruise LLC company on social media X following a recent incident that attracted significant media attention. Secondly, the study examines the audience perspective, conducting a sentiment analysis, emotion detection, and content analysis on the comments made by the audience to understand the public perceptions, the prevailing emotions aroused, and the main challenges still open in the debate.

This study's theoretical contribution consists of analyzing the role of social media in shaping public perception during a crisis, specifically an accident involving a self-driving car. Combining public perception analysis with corporate communication strategies, this research examines how strategic communication influences crisis response effectiveness. In doing so, the study provides insights into the impact of different communication approaches on public trust, corporate reputation, and the broader acceptance of autonomous vehicles. Furthermore, the study aims to broaden the application of Situational Crisis Communication Theory (SCCT) by demonstrating that in crises characterized by high uncertainty and risk, such as those involving autonomous vehicles (AVs), the attribution of responsibility is a dynamic process influenced by media framing, the public's emotional interpretation, and regulatory action, rather than by a choice based solely on the corporate communication strategy adopted. These aspects, typical of crises centered on emerging technologies, require a dynamic rethinking of SCCT to better capture the emotions aroused in the public by crises characterized by high uncertainty.

The study offers valuable recommendations to managers on effective crisis communication strategies to contain the negative effects of a crisis and manage public perception to increase corporate resilience. It highlights the main concerns expressed by the public about AVs to work toward overcoming them.

The rest of the article is organized as follows: Section 2 reviews the crisis management and crisis communication framework. Section 3 outlines the research methodology, while Section 4 presents the main findings. The study continues in Section 5 with a discussion of the findings, outlining theoretical and managerial implications, limitations, and areas for future research.

## 2. Theoretical background

### 2.1. Social media crisis management and crisis communication

Crisis management can be defined as "a systematic attempt by members of the organization and external stakeholders to avoid crises or to effectively manage those that do occur" (Pearson & Clair, 1998, p. 61). Crisis management involves three basic phases: pre-crisis, crisis response, and post-crisis (Coombs, 2007a). In all these phases, providing correct, truthful, and timely information to the public is essential to limit any damage as much as possible (Jin et al., 2014). Crisis management becomes even more crucial in the social media landscape, where an event can develop and propagate much faster among the public than in traditional media, generating potential negative effects on the organizations involved (Shahbazi & Bunker, 2024). At the same time, social media can be valuable tools for organizations to manage potential crises (Mirbabaie et al., 2022), e.g., by helping safeguard corporate reputation or restoring stakeholders' trust (Kleer & Kunz, 2023).

Crisis communication and public relations play a crucial role in effective crisis management (Bundy et al., 2016). Elements conditioned by the development of social media enable the timely obtaining of information about a crisis (Roshan et al., 2016; Singh et al., 2017). In crises, the public needs more information and support, and social media fulfills this function by reducing crisis uncertainty and waiting time (Han et al., 2021; Stieglitz et al., 2019; Stieglitz, Mirbabaie, & Milde, 2018). Social media platforms have, thus, changed the way audiences

and organizations communicate, generating both new opportunities and challenges and more dialogic communication (Du Plessis, 2018).

Since the crisis arises, the need to make sense of the situation experienced (Stieglitz, Bunker, et al., 2018), the Situational Crisis Communication Theory (SCCT), which involves an attribution of responsibility by the public to the organization, has been widely developed in the literature. This theory divides crises into three clusters, i.e., the victim cluster, the accidental crisis cluster, and the intentional crisis cluster, and it also identifies more appropriate crisis communication strategies that can contain the effects of a crisis and reputational threat (Coombs & Holladay, 2002). The strategies that organizations implement can be categorized into primary (such as denial, reduction, and reconstruction) or secondary (such as reinforcement) (Coombs, 2006; Coombs, 2007a). Denial strategies indicate that the organization is not responsible for the occurrence of the crisis and include (a) attacking the accuser, when crisis managers directly attack those who claim that the organization has problems; (b) denial, when the crisis manager claims that there is no crisis; (c) scapegoating, when other people or organizations are responsible and insist that there is no crisis.

Reduction strategies seek to reduce the attribution of control over the crisis or the negative impact of the crisis and involve two main options, namely (d) excuse, i.e., making the public believe that there is no intention to harm, and (e) justification, i.e., providing rational explanations for the occurrence of the crisis and reducing the perceived degree of crisis.

Reconstruction strategies seek to enhance the organization's reputation through compensation and apology and include (f) compensation, i.e., compensating the victim in the form of material or money and (g) apology, i.e., admitting responsibility and making a sincere apology to gain the understanding of the victim or the public.

While reinforcement strategies seek to establish a favorable link between the organization and its stakeholders (Roshan et al., 2016), by disseminating positive images e.g. through (h) reminder, i.e., recalling the public of positive experiences lived in the past; (i) ingratiation, i.e., pleasing the stakeholders for the patience and understanding; (j) victimage, i.e., conveying the message that they too are victims.

Hence, crisis communication strategies must be suitable to manage a crisis effectively while minimizing the negative impact on different stakeholders (Coombs, 2007b). Companies must learn to assess the risk of an incident and manage it appropriately by disseminating appropriate information on social media. Depending on the responsibility attributed to the organization, the communication strategy to be adopted changes. In the case the public attributes high responsibility to the organization, accommodative strategies will be more effective than defensive ones (Coombs, 1998; Coombs & Holladay, 2002; Jin, 2010; Jin et al., 2014). In the case of a crisis where attribution of responsibility is moderate, reconstructive and supportive strategies are the most effective (Coombs & Holladay, 2008).

While SCCT focuses on how organizations respond to crises once they occur, scholars have also identified broader strategic approaches that help organizations prevent, manage, and mitigate crisis effects. For example, Wenzel et al. (2020) proposed four strategies to cope with recent crises, i.e., retrenchment, perseverance, innovation, and exit. Retrenchment strategies refer to the "reduction of a company's costs, assets, product lines, and overheads" in response to a crisis (Pearce & Robbins, 1994, p. 614). Companies use retrenchment strategies primarily to reduce costs through layoffs, product recalls, and asset reductions (Ndofofor et al., 2013). This strategic response allows companies to focus on existing functions by reducing complexity and increasing behavioral transparency. Perseverance strategies refer to maintaining current activities in response to a crisis (Seetharaman, 2020). Innovative strategies refer to the "implementation of strategic renewal in response to the crisis" (Wenzel et al., 2020, p. 11). Such responses suggest that companies can exploit the crisis to seize new opportunities. Exit strategies refer to business interruption, such as temporary closure in times of crisis (Wenzel et al., 2020).

## 2.2. Public perceptions and online debate

To help organizations in crisis management, it is fundamental to understand public perceptions concerning the technology and the public expectations and emotions (Fernandez & Matt, 2019). The degree of acceptance of technology allows for better prediction and explanation of positive or negative attitudes toward technology in different environments, even depending on perceived usefulness (Brown et al., 2012; De Paepe & Witlox, 2024; Valor et al., 2022; Zhou & Yi, 2025). Emotions have been seen in the literature as antecedents of the public adoption of innovations (Marikyan et al., 2019).

Regarding AVs, some people have a positive or negative perception, while still others remain neutral (Haboucha et al., 2017). Understanding audience perceptions becomes particularly important in the aftermath of critical events, such as incidents, to manage audience fears and concerns (Bakalos et al., 2020), to enable a quick resolution of the crisis, and to adopt a corporate communication strategy that meets the needs of the public and are empathetic towards the stakeholders involved. Therefore, corporate communication should not only enhance transparency with stakeholders but also foster an emotional connection, such as by demonstrating compassion for those affected (Schoofs et al., 2022). However, the public sentiments and emotions are not influenced only by corporate communications but also depend on the perception conveyed by media, the level of uncertainty, and perceived technological risk (Van Dijk & Poell, 2013; Zhu et al., 2024).

In crises, different emotions may emerge in the public, such as anger, sadness, and fear, depending on the degree of control and responsibility attributed to the organization (Jin et al., 2012; Kim & Cameron, 2011). Although the literature on emotional responses to the crisis has focused on these three emotions (Liu et al., 2011), other emotions may emerge in crisis contexts, such as anticipation, an emotion that prompts the public to engage in preparatory behaviors that help consumers cope with future crises and emphasizes the public's desire for recovery (Coombs, 2007c; Sellnow & Seeger, 2021). In situations of deep uncertainty, one of the dominant emotions is fear (Griffin et al., 2008; Liu et al., 2016). An emotion that can be a potential barrier to the widespread adoption of AV systems. In these situations of uncertainty and vulnerability, trust is a key element in the relationships between individuals and organizations and those between individuals and automation. The role of trust in human-automation relationships is crucial as negative perceptions often stem precisely from a lack of trust in autonomous vehicles, which, in turn, generates feelings of fear and worry. For this reason, several studies highlight the role of trust as a positive antecedent to the acceptance of autonomous vehicles (Choi & Ji, 2015; Hoff & Bashir, 2015).

The stronger the negative emotions encountered, the more the public will engage in behaviors that are averse to the organization, causing reputational damage, spreading negative word-of-mouth, or adopting unfavorable behaviors, such as boycotting (Chávez et al., 2024; Choi & Lin, 2009; Lu & Huang, 2018; Zhu et al., 2024). Thus, negative sentiment can make crisis management and business recovery much more complex and slower. The adoption of strategies consistent with the situation experienced fosters positive feelings and favorable emotions, which increase the likelihood of recovery and organizational resilience (Utz et al., 2013), at the same time, perceptions built through media use can strongly influence trust and future adoption intentions (Zhu et al., 2020).

Moreover, with the advent of social media, rhetorical arenas have emerged where different stakeholders discuss issues and negotiate concerns (Frandsen & Johansen, 2016). This has facilitated the increasing complexity of crisis communication and its management (Falkheimer & Heide, 2015). The multiple online voices animating the debate can increase pressure and generate potential controversy. Organizations can learn from online debate what is critical to the public and, at the same time, must know how to manage conflict appropriately (Hughes & Palen, 2012; Mellon & Prosser, 2017; Reddick et al., 2017).

Social media can amplify group polarization, driving certain positions to extremes in online debates. In response to specific concerns, these dynamics can intensify public anxieties, leading to heightened exaggeration and further escalation (Iandoli et al., 2021).

### 3. Methodology

#### 3.1. Case study

The study aims to analyze the crisis communication strategies implemented by Cruise LLC, a leading American self-driving car company based in San Francisco that tests and develops AVs in California. Founded in 2013 and acquired by General Motors, Cruise LLC was the first company to complete a fully autonomous ride in a major city in the United States (Cruise, 2024).

Initially, the company focused on developing direct-to-consumer kits for retrofitting vehicles with limited autonomous driving capabilities, such as its first product, RP-1, for cars like the Audi A4 and S4, which included cameras, sensors, and onboard computers. In 2015, Cruise radically changed its strategy from kits to creating platforms for fully autonomous vehicles (Griffith, 2016). Since joining General Motors in 2016, Cruise has worked on developing software and hardware to create fully autonomous vehicles using the Chevrolet Bolt (Motors, 2016). Thus, Cruise LLC combines a culture of innovative technology and safety with an automotive manufacturing history of excellence. Cruise LLC has also received funding from other leading companies and investors, including Honda, Microsoft, and Walmart. In 2021, it received permits from the California Department of Motor Vehicles to provide driverless taxi rides in the state (Hawkins, 2021). In 2022, it gained its first permit to deploy the service (Kolodny, 2022), becoming the first company to offer driverless rides in a major city for a fee. With these developments, Cruise has become an innovative mobility service provider responding to the transformation of MaaS. However, following a series of safety problems and accidents, the authorities suspended the permits for Cruise's self-driving car, resulting in an economically difficult situation, i.e., an operating loss of USD 3.48 billion in 2023. The loss led to the discontinuation of the nationwide driverless test program after the accident on 2 October 2023 (Thadani, 2024). Therefore, the article focused on this case as a paradigmatic example of a company pioneering autonomous mobility that faced a major reputational crisis. Cruise LLC is not only one of the first companies to develop large-scale autonomous vehicles but also one of the few companies that have transformed this

technology into a MaaS in complex urban settings (San Francisco).

The study intends to focus on the incident that took place on 2 October 2023, which received widespread media attention and sparked significant public debate. The incident generated immediate and severe regulatory consequences for AVs in California, the leading state in driverless car regulation and testing. This event led to the suspension of operations following investigations by the relevant authorities and culminated in the resignation of CEO Kyle Vogt in November 2023, representing a blow to industry trust (Bérubé et al., 2024). Since the end of October 2023, the company has suffered a significant disruption in corporate communication for about five months. Corporate communication on social media X did not resume until March 2024. The gradual resumption of business activities took place in April-May 2024 (Thadani & Duncan, 2024). Fig. 1 shows the temporal evolution of the main events following the accident on 2 October 2023 (Cruise, 2024a; Cruise, 2024b; Vignarolo, 2023).

#### 3.2. Data collection

To analyze the crisis communication strategy implemented by the Cruise LLC company, corporate posts published on social media X were analyzed. In particular, the posts disseminated by Cruise LLC on social media X from the date of the accident, i.e., 2 October 2023, to the time of the investigation, i.e., June 2024, were collected to explore the evolution of corporate communication following this event. In addition to the corporate posts, comments made by the public underneath the corporate communications were also collected to explore public perception and sentiment.

Social media are one of the main and most popular sources of information on current topics and, thus, play a crucial role in shaping public perceptions (Kepplinger, 2008). Compared to other social platforms, such as Facebook and LinkedIn, X encourages debate and animates user conversations (Li et al., 2023), ensuring the dynamism and immediacy of the dialogue concerning the breaking news (Molyneux & McGregor, 2022). Indeed, X is the social media with the highest number of public conversations and debates, where organizations actively respond and communicate, so it is a proper social media platform for understanding communications sent by companies and direct interactions with the public. Organizations convey official statements, launch press releases, and respond to emergencies in real time through X, allowing the public direct access to information (Alper, 2024). Several studies have already used this platform to understand trends in

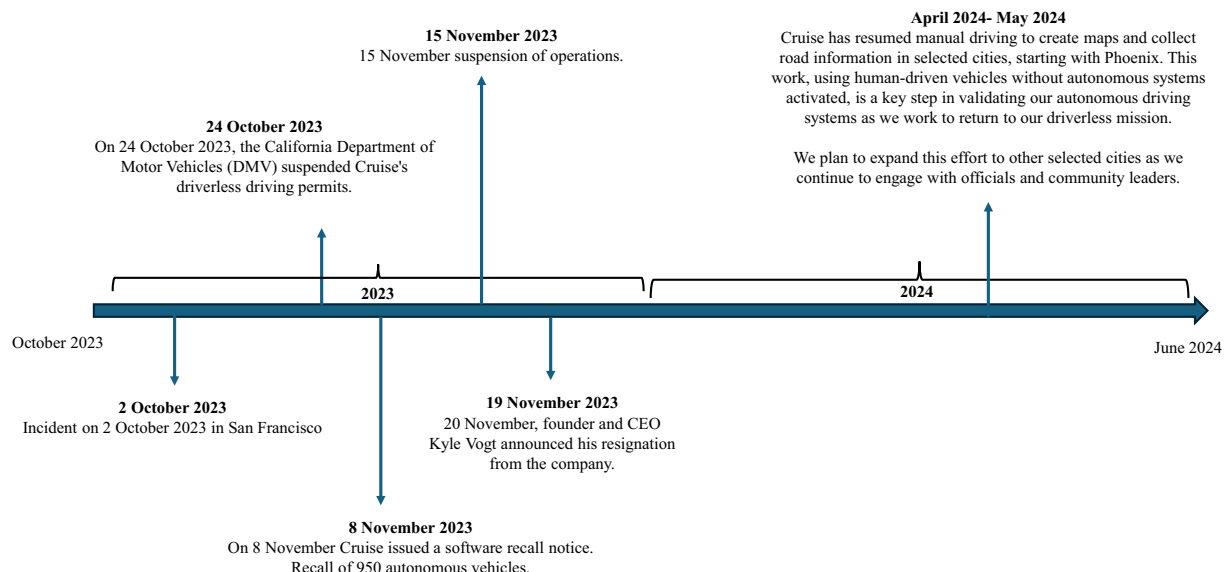


Fig. 1. Timeline of key events.

the online debate concerning political tensions, disasters, and emergencies (Hughes & Palen, 2012; Mellon & Prosser, 2017; Reddick et al., 2017). Therefore, this study aims to investigate the widespread dialogue on X to understand public perceptions following incidents involving AVs, even considering that crashes can attract wide media attention, thus animating a strong online debate (Jefferson & McDonald, 2019).

### 3.3. Data analysis

For analyzing the corporate perspective, the response strategies provided by Cruise LLC from October 2023 to June, 2024 were coded according to the strategies proposed by the SCCT theory (Coombs, 2007a), the strategies proposed by Wenzel et al. (2020), and under the label "Others strategies", messages that could not fit into the previous categories were included. The coding system followed a deductive, theory-driven approach, with categories defined a priori based on established theoretical frameworks widely discussed in the literature. Although formal intercoder reliability statistics (e.g., Cohen's  $\kappa$ ) were not calculated due to the interpretive nature of the coding process, disagreements were resolved through consensus, consistent with prior research in this domain (Zhou et al., 2021; Zhou et al., 2025) and with established practices in qualitative content analysis (Krippendorff, 2018). Since coding differences mainly concerned nuanced interpretations among conceptually related categories rather than clear-cut coding disagreements, and given the relatively small sample size ( $n = 29$ ), statistical reliability coefficients could have been unstable and less informative. Accordingly, the study adopts a qualitative content analysis perspective that prioritizes interpretive validity and shared meaning construction over statistical measures of coder agreement. The coding process was conducted independently by two researchers, who discussed and resolved cases of partial disagreement. Iterative discussion among researchers allowed us to systematically review and resolve partial disagreements through multiple rounds of comparison and reach consensus on such discrepancies. This approach ensured consistency and an acceptable level of coding reliability, in line with qualitative research standards.

To answer the second research question, which is aimed at exploring the public perspective, sentiment analysis and emotion detection have been applied. These are suitable methodologies to meet this study's objectives and understand audience perceptions concerning broadcast corporate communications. Sentiment analysis allows us to detect, extract, and classify opinions and emotional reactions by examining textual input (Ravi & Ravi, 2015). With the increasing use of social media and the multiplication of available data, sentiment analysis has become an increasingly relevant, effective, and efficient tool for examining social media discussion (Nagamanjula & Pethalakshmi, 2020). Sentiment analysis detects text polarity by dividing textual data into positive, negative, or neutral opinions (Alaei et al., 2019). Useful methodology for evaluating the effectiveness of crisis communication strategies. Therefore, it represents a powerful tool for companies and governments to extract and understand the public's opinions on certain topics and to enable better decision-making (Birjali et al., 2021). In particular, the study adopts a sentiment analysis based on the lexical approach. Sentiment analysis based on the lexical approach calculates the sentiment value and uses it as a basis for discovering trends in the text. In this case, lexicon-based sentiment analysis was chosen as it works best when analyzing short texts, like X posts (Saif et al., 2016). In contrast, longer texts require machine learning-related methodology for more effective analyses. For this reason, the present study employs lexicon-based sentiment analysis, specifically adopting the NRC dictionary proposed by Mohammad and Turney (2011), using KNIME software. The NRC Word-Emotion Association lexicon was used to analyze both sentiment and emotions. Specifically, it explores 8 emotions, divided into anger, fear, expectation, trust, surprise, sadness, joy, and disgust (Mohammad & Turney, 2011). For the detection of emotions, the analysis was conducted by employing the software R.

Subsequently, given that sentiment and emotion detection alone do not provide a complete understanding of public discourse but primarily quantify reactions, the comments were also analyzed by carrying out a content analysis through the NVivo 14 software. This approach allowed us to identify and investigate the main themes of online debate and discussion. Business communication scholars have widely applied this method as it represents a systematic and reproducible methodology for analyzing textual data (Krippendorff, 2018). Table 1 shows the NVivo coding, split into the macro themes, sub-codes, and examples of each voice. In analyzing public discourse, contrary to what was done previously, the coding process followed an inductive and data-driven approach based on open coding. No predefined categories were used, allowing themes and patterns to emerge directly from the public discourse and providing a comprehensive understanding of audience concerns.

## 4. Results

### 4.1. Corporate communication

From 2 October 2023 to June 2024, 29 corporate communications on X were released to the public. Fig. 2 and Table 2 show the percentage of company communications, out of a total of 29 posts, for the various crucial moments in the time frame. The percentages shown in Fig. 2 and Table 2 are based on the total sample consisting of the 29 posts published by the company during the period under review. These corporate communications have been grouped into three main periods, based on milestones of the crisis and corresponding shifts in the company's communication strategy in terms of frequency of messages sent by Cruise LLC (Fig. 2). Table 2 shows the breakdown of corporate communications not only by period but also by strategy employed.

The first period occurred in early October 2023, when the company remained silent on the day of the incident (2 October 2023) and issued its first response the following day (3 October 2023) through 3 posts aimed at shifting blame to third parties.

The second period took place in late October 2023, with a peak in communication on 24 October 2023, the day the company was ordered to suspend operations for investigations by the competent authorities. This day represented the peak of corporate communication, equal to 20.7%. At the end of October 2023, corporate communication went completely silent for 5 full months, from November to March.

The last period analyzed, from March 2024 to June 2024, relates to the resumption of corporate communication on X, which officially took place on 19 March 2024 and continued steadily at a rate of 3.4% up to the time of the survey, only with a slight increase around 3 June 2024 where corporate communication reached 6.9% of the total.

During the first period (beginning October 2023), around the date of the accident, the company mainly used 'scapegoating' strategies, i.e., a denial strategy aimed at shifting responsibility for the accident onto third parties. At this early stage, the company did not provide much information to the public and did not actively cooperate with the parties involved and the relevant authorities.

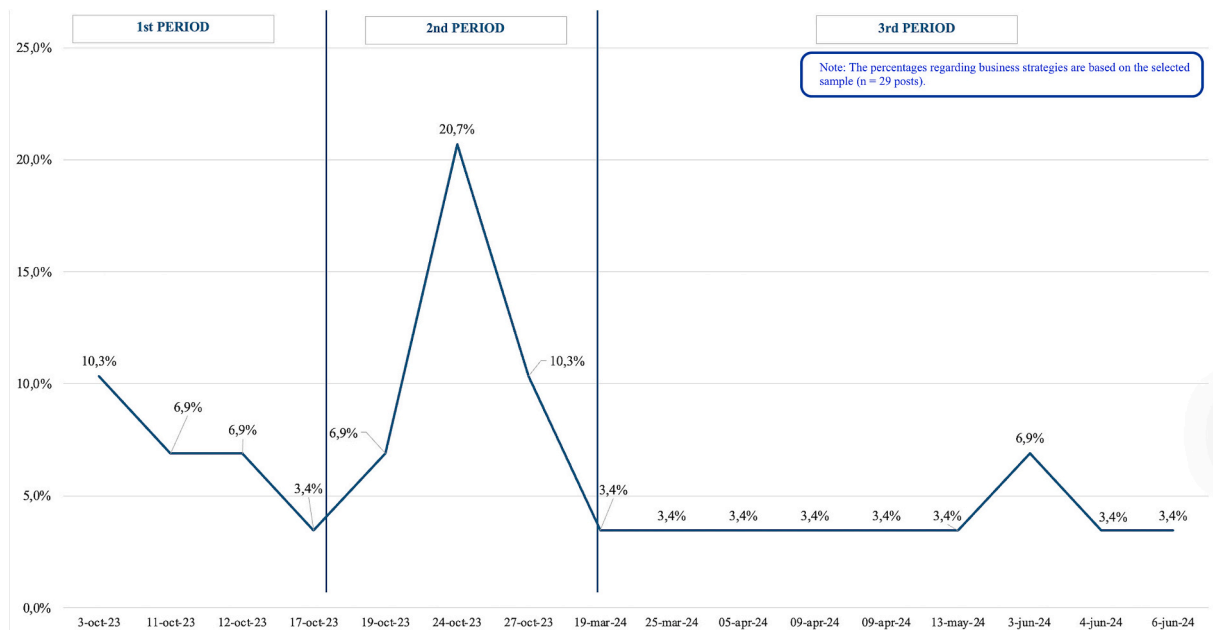
It was only in the following period (end of October 2023), around the date of 24 October 2023, when the suspension of operations requested by the competent authorities took place, that the company started to share more information about the accident, e.g., by making the full video of the accident available. In this second period, in addition to 'scapegoating' strategies, strategies of 'justification', i.e., minimization, were also used, e.g., by mentioning the AVs' commitment to contain the negative effects.

After the suspension of communication activities and the resumption in March 2024, i.e., about the third period (March 2024-June 2024), the company used strategies aimed at rebuilding trust by collaborating more with stakeholders and conveying more empathetic communications, using 'innovation' and 'corrective action' strategies, communicating the company's future directions aimed at continuous improvement and

**Table 1**  
Themes and sub-codes of public comments on NVivo 14

Themes	Sub-codes	Examples
1. Innovation	News and new models	News and new model developments
	Technological improvement	Improved technology through learning from accidents; Availability of data that improves algorithms' understanding of increasingly complex situations; Need not to stop activities to understand where mistakes occur; Innovation, e.g., through the introduction of new sensors; Improvements in technology; Need for increasingly intelligent vehicles to prevent accidents
	Expansion	People who are thoughtful about development; Incentives for continuous experimentation and research until the final goal is reached; Incentives for continuous experimentation; People who show desire in the resumption of experimentation; People who are happy about the interruption of activities; Hope in the resumption of activities; Expansion conditional on a change of company leadership
2. Opportunities	Reduction of human-generated danger	AV cars are more reliable than humans by reducing human errors, therefore, considered by some to be safer than human driving
	Transportation for people with disability and mobility limitations	AVs also allow greater accessibility for people with disabilities and mobility limitations
3. Responsibility	Blame AVs	People accuse the vehicle of either failing to forward the 911 call or of crushing the pedestrian
	Human's fault	For some, human driving is much more dangerous than AVs, e.g. through technology; Accidents caused by excessive speed could be avoided. Thus, many consider humans to be much more dangerous than AVs
	Stakeholders vulnerabilities	Vulnerability of pedestrians and cyclists on the roads and the injured and injured person
4. Safety	Edge case	Difficult to understand responsibilities especially in extreme situations that cost lives but are difficult to predict, e.g. due to the difficulty of predicting certain situations as traffic increases
	Regulation	Need for more regulation both to understand responsibility for events but also to stimulate collaboration within the industry. With regulation, greater safety on the roads could be achieved
	Safety problems on roads	Criticism of technology safety and the need to develop a common safety culture among people
	Request for more safety	Demand for more safety; Some argue that these technologies will make the roads much safer by continuing to innovate and experiment
5. Transparency	Dubst and questions	Questions from the public about production, accidents, whether notice is given when a dangerous situation arises to avoid certain areas
	Request more information by company	Public demand for more information from the public about the incident e.g. criticism of details omitted by the organization; Cutting of the full video; Lack of information; Demand for honesty and transparency
6. Trust and reputation	Protect company	Willingness to rebuild public trust even though many people claim the public has never trusted the brand
	Chose other company	Appreciation for competing companies e.g. Waymo software, Technology and licenses from Tesla
	People skepticism	Demand that the testing take place in other cities; Some consider these means not yet ready to navigate in cities; Some consider the product to be dangerous; Skepticism of people also in the use of maps

Source: Authors' elaboration



**Fig. 2.** Breakdown of corporate communications across the three main time periods examined.

providing the public with more trust.

**4.2. Public perspective**

Overall, the sentiment expressed in public comments was 58.89% positive, 21.25% negative, and 19.86% neutral. Positive comments highlight the public's confidence in the technology and enthusiasm for

resuming activities and resuming testing. On the other hand, particularly negative public comments focus on the effects of the accident on the affected person, i.e., the cost of lives affected in road accidents caused by AVs, but also on the unpreparedness to use such technologies on the roads, which are particularly harmful to vulnerable people such as pedestrians and cyclists. Particularly negative comments also include hashtags such as #KillerCruise that may incentivize the public to

**Table 2**  
Corporate communication.  
fx

		1st Period Beginning October 2023	2nd Period End October 2023	3rd Period March 2024 -June 2024
SCCT Strategies	Ingratiation	0%	0%	0%
	Reminder	0%	0%	0%
	Victimage	0%	0%	0%
	Attack the accuser	0%	0%	0%
	Denial	0%	0%	0%
	Scapegoat	42.78%	5.92%	0%
	Excuse	0%	0%	0%
	Justification	5%	5.01%	0%
	Apology	0%	0%	0%
Wenzel Strategies	Compensation	0%	0%	0%
	Exit	0%	0%	0%
	Innovation	30.56%	13.44%	61.58%
	Perseverance	0%	0%	0%
Other Strategies	Retrenchment	0%	9.11%	0%
	AV Opportunities	21.67%	25.06%	4.99%
	Corrective Action	0%	0%	29.62%
	Show Empathy	0%	3.87%	1.47%
	Full Disclosure	0%	22.78%	0%
	Rebuild Trust	0%	14.81%	2.35%

Note: The percentages regarding business strategies are based on the selected sample (n = 29 posts). Source: Authors' elaboration

boycott the brand

Fig. 3 shows the evolution of public sentiment over time, considering the shift between positive, neutral, and negative sentiment. The positive public sentiment found in the first period of the crisis, October 2023, resulted from the adoption of defensive communication strategies in the early phase. For example, messages such as “(2/3) The AV then braked aggressively to minimize the impact. The driver of the other vehicle fled the scene, and at the request of the police the AV was kept in place” (Scapegoat) or “Ultimately, we develop and deploy autonomous vehicles in an effort to save lives. In the incident being reviewed by the DMV, a human hit and run driver tragically struck and propelled the pedestrian into the path of the AV” (Scapegoat) or “The AV braked aggressively before impact and because it detected a collision, it attempted to pull over to avoid further safety issues. When the AV tried to pull over, it continued before coming to a final stop, pulling the pedestrian forward” (Justification).

Negative public sentiment came into play in the following months, April 2024, when corporate communication resumed, suggesting that the prolonged interruption of communication was not well accepted and that the message conveyed at the resumption may have raised further

concerns, aversions and outrage in the public. However, only when corporate communication emphasized different themes such as innovation, research and rebuilding trust, then positive sentiment gain ground again from mid-May onwards, overcoming negative perceptions by June 2024, for example with a message like “Over the past few months, we’ve been busy building a better Cruise. We’re committed to continuous improvement and keeping you up to date on the changes we’re making. Learn about our most recent updates and stay tuned to hear more from our new leaders” (Innovation).

The two emotions most frequently encountered by the public are trust, for 19.75%, and anticipation, for 18.80%, which highlights how in these situations the public's trust in the organization is particularly essential, but also the public's strong desire to resume using this technology soon. Among the most present negative emotions, fear prevails with 13.59%. Other minor and equally distributed emotions are, for example, sadness, anger and disgust (negative side), but also joy and surprise (positive side).

Fig. 4 shows the number of comments reported by the public, a total of 433 comments that peaked on 24 October 2023, with 34.41% of the

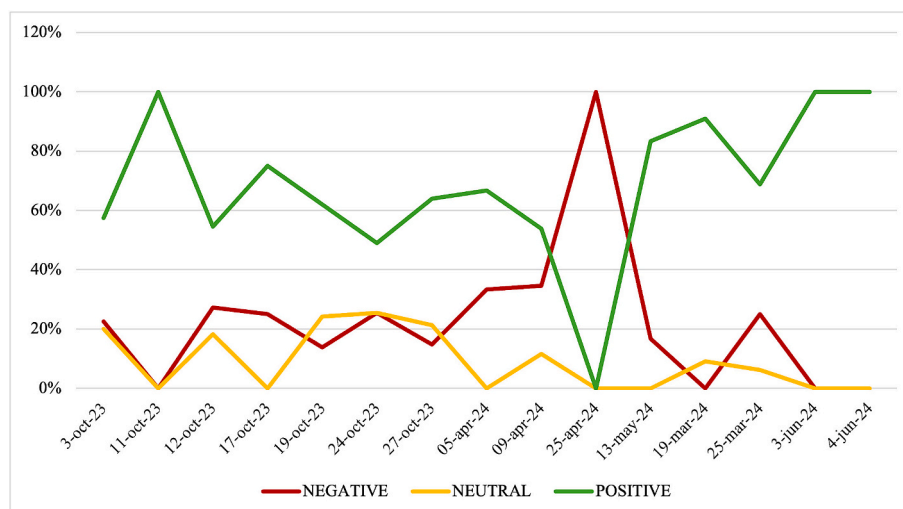


Fig. 3. Evolution of public sentiment over time.

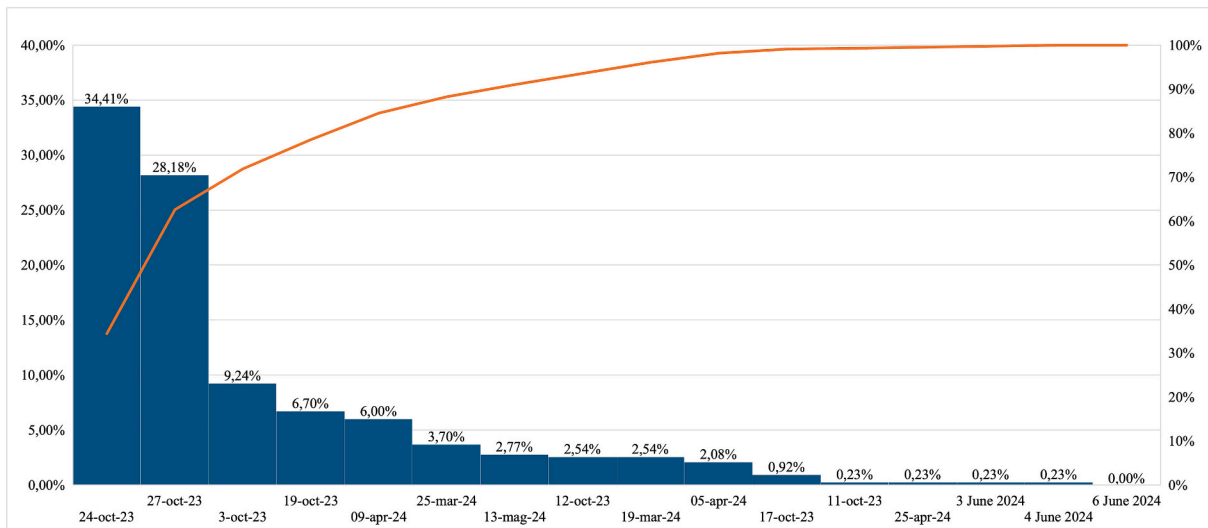


Fig. 4. Time distribution of public comments.

total, and on 27 October 2023, with 28.18%, and then declined significantly. The chart shows that the date when the DMV department suspended the company's permits to operate (24 October 2023) sparked the most public debate, as did the days shortly thereafter (27 October 2023) when the company slowed down its communication with the outside world.

Fig. 5 depicts the hierarchical graph obtained on NVivo 14 according to the number of references coded regarding public comments. The figure highlights how the online debate mainly focused on the topic of “Innovation”, with a particularly large group of comments debating on “Expansion” and the need for continuous research and experimentation to improve and advance this technology. A second crucial aspect of the online debate is that of “Responsibility”, and in this category, the most frequent public comments clashed between blaming humans or AVs. While on the issue of “Trust and Reputation”, the biggest problem in the public is still based on “People skepticism” toward the technology, but

also the competition of other organizations. On the topic of “Transparency”, the public demands more information to better understand the phenomenon, and on the topic of “Safety” and “Opportunities”, the public seeks more security to be able to benefit from the opportunities provided by this technology.

Concerning the themes that emerged from the coding carried out on NVivo 14, Table 3 shows their temporal evolution in particular by grouping them according to the first and second phases of analysis, i.e., beginning and end of October, in which many of the public comments revolved around the responsibility of the AVs or humans as well as requests for more information and transparency from the company to gather more data for assessing the situation. In the third period, the debate focused much more on the need for an expansion of technology. As well as comments emphasizing the opportunities provided by autonomous driving, such as greater accessibility for people with disabilities.

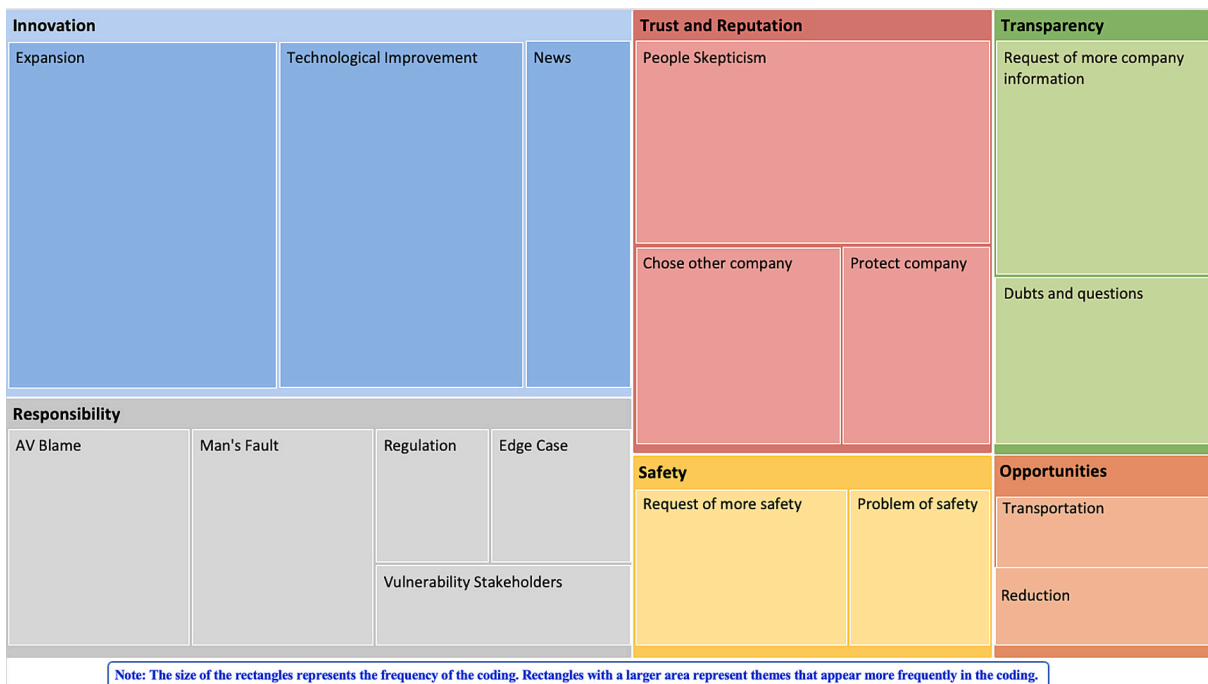


Fig. 5. Figure 5: Hierarchical diagram created using NVivo 14

**Table 3**  
Evolution of the public debate over time.  
fx

		1st Period Beginning October 2023	2nd Period End October 2023	3rd Period March 2024 - June 2024
Innovation	News and New Models	3.03%	2.4%	0%
	Technological Improvement	0%	10.45%	45.44%
	Expansion	4.24%	7.87%	35.29%
Opportunities	Reduction of human-generated danger	2.42%	1.11%	0%
	Transportation for people with disability	0%	0.2%	0.74%
Responsibility	Blame AVs	27.27%	12.82%	0%
	Man's Fault	19.88%	10.03%	0%
	Stakeholders Vulnerability	4%	0.97%	0%
	Extreme Cases	11.03%	1.46%	0%
	Regulation	0%	6.24%	0%
Safety	Safety Problems on road	1.82%	1.51%	0%
	Request of more safety	0.48%	5.05%	3.97%
Transparency	Dubts and questions	2.55%	3.89%	1.03%
	Request of more company information	18.42%	10.77%	0.74%
Trust and Reputation	Protect company	3.88%	2.48%	0%
	Chose other company	0.97%	7.28%	6.62%
	People Skepticism	0%	15.47%	6.18%

Source: Authors' elaboration

Fig. 6 shows the generation of 4 clusters among the different public comments. The first cluster (green) highlights how the public's questions and doubts regarding the responsibility attributed to AVs can limit experimentation and development. A second cluster (purple) focuses on extreme cases, i.e. cases where liability is difficult to attribute and which highlight major safety issues, fueling public skepticism. A third cluster (gold) focuses on the need for appropriate regulations to protect the reputation of collaborative organizations that demonstrate transparency to the public by conveying all available information and data. Finally, a final cluster (blue) focuses on the need for technological improvement to reduce the vulnerability of road stakeholders and foster greater accessibility for people with physical disabilities.

Fig. 7 summarizes the key events in terms of corporate communication strategies and changes in public opinion in chronological order, providing a more in-depth understanding of the dynamics of the crisis.

### 5. Discussion

In this section, the main findings are discussed and summarized into useful propositions for future research. The crisis triggered by the accident involving a self-driving car can be categorized as an accidental crisis over which the organization's control was moderate. In light of the exploratory nature of this research and the complexity of the crisis context, the relationships between communication strategies and public sentiment should be conceived as associative rather than causal. While

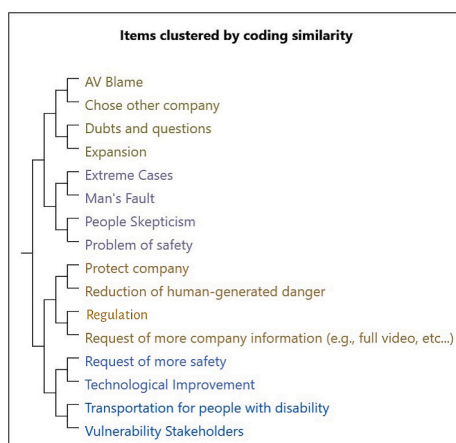


Fig. 6. Figure 6: Cluster analysis created using NVivo 14

accommodative strategies are generally considered more effective when responsibility attribution is high (Coombs, 1998; Coombs & Holladay, 2002; Jin, 2010; Jin et al., 2014), the present case involved several actors and an initially ambiguous responsibility attribution. In this context, responsibility attribution emerged progressively in the complex context of AV systems. Stakeholders showed mixed perceptions of organizational responsibility during the early stages of the crisis. Under these conditions, defensive and reductive strategies appear to have been relatively effective in the initial phase of crisis, as they aligned with the still-uncertain attribution of blame. This finding partially diverges from Coombs and Holladay (2002), who suggest that accommodative responses are more effective under conditions of high reputational threat. We propose that technological novelty and ambiguous responsibility may alter this relationship. These findings suggest that the relationship between responsibility attribution and communication strategy effectiveness may be less predictable in technology-driven crises compared to more traditional organizational contexts.

P1. In accidental crises involving emerging technologies, where responsibility attribution is initially ambiguous and distributed across multiple actors, defensive and reductive crisis communication strategies can help shape positive public perception towards technology and stimulate an online debate in favor of technology adoption and use.

Consistency with SCCT, in the case of crises belonging to the accidental crisis cluster, the most appropriate strategies should be those of excuse and justification. The organization primarily adopted the justification strategies, but also shows that the scapegoat strategy, i.e., a denial strategy, was adopted at an early stage of the crisis. This combination of denial and diminishment strategy was associated with relatively moderate levels of negative emotions: sadness and anger accounted for 10.43% and 9.79%, lower than levels of joy, trust, and expectation, demonstrating a certain degree of appreciation and success of the corporate strategies conveyed. These patterns suggest that defensive strategies did not appear to provoke strong negative emotional reactions in the short term.

As the crisis evolved, the gradual strategic change from denial to decrease to corrective action and future-oriented communication highlights the theoretical model from an evolutionary viewpoint in which response strategies are adjusted over time in line with changing public perceptions. In light of this temporal evolution, crisis communication could be interpreted as an adaptive process. For example, moving from messages such as "Shortly after the incident, our team proactively shared information with the CA DMV, CPUC, and NHTSA, including the full video. We've stayed in close contact with regulators to answer questions and assisted the police with identifying the vehicle of the hit and run driver" (Corrective

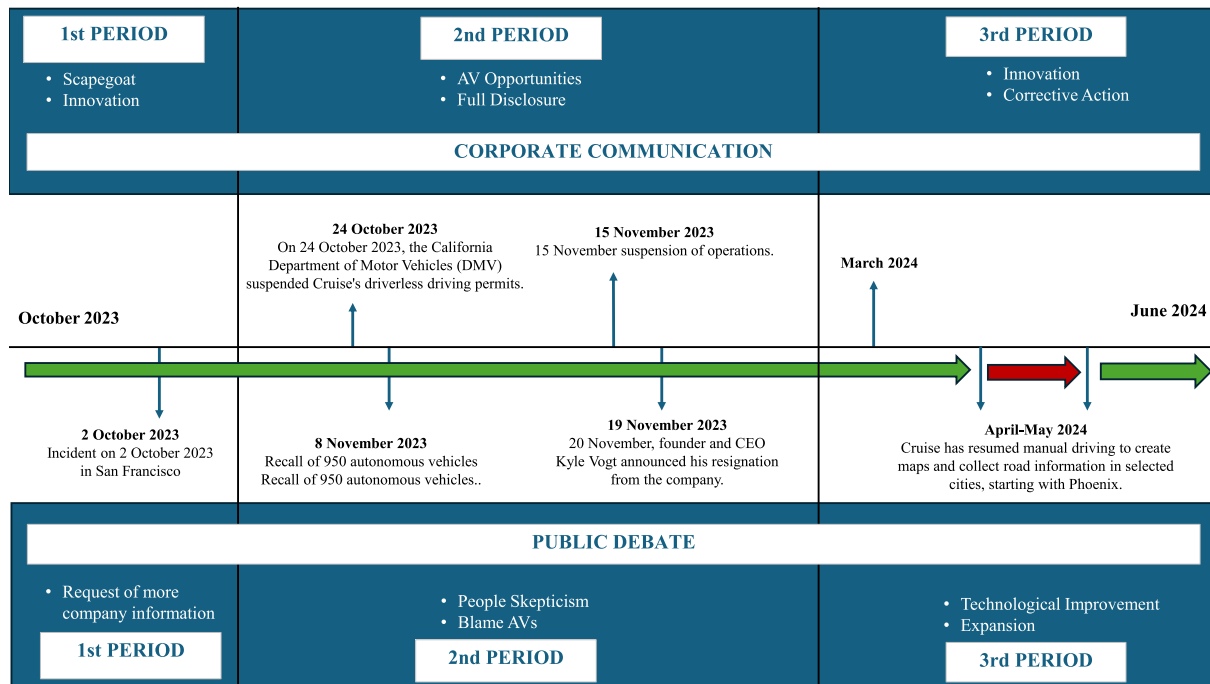


Fig. 7. Figure 7: Overview of the evolution of corporate communication and public discourse

Action) or “*In that spirit, we have decided to proactively pause driverless operations across all of our fleets while we take time to examine our processes, systems, and tools and reflect on how we can better operate in a way that will earn public trust*” (Corrective Action) to “*This week, we’re excited to begin supervised autonomous driving in Phoenix. During this phase, our cars drive autonomously, with a safety driver behind the wheel to monitor and take over if needed. Safety continues to be the defining principle for everything we do, and supervised driving helps us further improve and validate vehicle performance*” (Innovation). The combination of corrective actions and innovative-oriented messaging appears to have fostered renewed public confidence in the resumption of activities. These finding nuances theories of trust in emerging technologies by suggesting that trust is progressively constructed through iterative communication and future-oriented narratives, rather than solely rebuilt through accommodative responses. This expands on the discussion of renewal proposed by Ulmer et al. (2022), demonstrating that communicating innovation is not only effective for an organization’s reputation but is also necessary for rebuilding trust in the technology itself.

Thus, sentiment analysis is particularly relevant in understanding the effectiveness of the corporate communication strategies adopted and the public’s perception of technology that will determine whether consumers will support or hinder future technological developments (Bansal & Kockelman, 2017; Hohenberger et al., 2017; Penmetza et al., 2019). These findings highlight that, to improve the effectiveness of communication strategies, it is crucial to align communication strategies with emotional and cognitive public responses throughout the different phases of a crisis.

Effective crisis communication strategies offer relevant advantages that enable the organization to face new challenges in the future (Mishra & Sharma, 2018; Seltzer & Mitrook, 2007; Ulmer et al., 2022). These aspects are essential to contain the crisis effects and foster long-term trust-based relationships with stakeholders. By reporting and monitoring the online debate, organizations can also understand the public’s concerns and try to curb them quickly (Fang & Ben-Miled, 2017). Emphasizing values such as transparency, experimentation, responsibility, trust, and innovation can further enhance crisis management and resilience in the sector. These findings are consistent with the central role of trust as a precursor to the acceptance of autonomous

vehicles, as documented by Choi and Ji (2015), while also noting that trust is dynamically rebuilt through corporate crisis communication strategies and continuous organizational learning processes.

P2. Appropriate crisis communication strategies can foster business resilience by enabling organizational learning and outlining best practices to address future potential crises.

Finally, organizations should promote experimentation and continuous technological improvement to limit accident frequency, alleviate public fear, and strengthen consumer trust in AVs. This is consistent with the findings of Zhou and Yi (2025) and Penmetza et al. (2019), who identify the management of public concerns as a key factor in the adoption and success of autonomous vehicles. A commitment in this direction would accompany a successful mobility transition, improving society’s well-being economically and environmentally but also socially, thus generating various positive externalities and making mobility better (Kassens-Noor et al., 2021). Therefore, organizations that can manage and overcome public concerns and crises will support the achievement of the economic, social, and environmental goals associated with autonomous vehicles in the long run (Battilana et al., 2015; den Hond & Moser, 2023; Kaplan & Haenlein, 2020; Markman et al., 2016).

P3. Technological advancement in autonomous mobility can be fostered by coordination and collaboration among organizations and regulatory authorities, enabling experimentation and regulatory innovation to support economic, social, and environmental goals.

## 6. Conclusion, theoretical and managerial implications

In conclusion, driverless cars are an innovative technology that is developing rapidly and is expected to have significant effects on future society (Arpaci et al., 2024; Mesch & Dodel, 2022). The capability to handle possible accidents is challenging to acquire as it implies assimilating an appropriate culture of risk prevention and crisis management (Fountain et al., 2019). Organizations need to learn how to manage critical incidents and contain public concerns as much as possible because only by overcoming such resistance will the public facilitate the adoption of technology and the transition to mobility that will bring long-term economic, social, and environmental benefits. Therefore,

organizations will need to continue testing, innovating, and experimenting with the use of AVs, especially considering the complexity that these systems entail.

This article contributes to crisis communication theories, widely discussed in the literature (Coombs, 2007a), and emerging technology, such as AVs, about which the public still holds reticence. While SCCT has been widely applied in traditional organizational crises characterized by relatively clear responsibility attributions, AV-related crises present distinctive challenges due to technological opacity, distributed responsibility, and public uncertainty toward risk automation. The study expands the SCCT in three ways. First, the study suggests that the attribution of responsibility in crises is not a static given, but rather an ever-evolving outcome, shaped over time by corporate communications, media framing, and regulatory action. The study highlights that emotional reactions dominate the public’s interpretation process before cognitive attribution solidifies, suggesting that crisis communication must prioritize addressing the emotional dimension of the uncertainty and fear generated among the public. Third, the observed strategic shift, from defensive and corrective responses toward innovation-oriented messages, is essential for rebuilding trust in technology within emerging contexts considered high-risk, such as that of AVs. Taken together, these results suggest that the SCCT should be redefined as a dynamic model sensitive to public emotions when applied to crises characterized by high uncertainty and risk, rather than as a static rule linking the level of corporate responsibility to the type of corporate communication strategy (Table 4).

The study combines the organizational and public perspectives, allowing a comprehensive view of the phenomenon, highlighting effective crisis communication strategies in accidental crises where responsibility is not easily attributed a priori. The longitudinal analysis of corporate communication across the three periods suggests the evolution and the dynamic attribution of corporate responsibility for the incident over time. The denial and defensive strategies used at first, i.e., the scapegoating and justification strategy, appear to have contributed to containing the negative sentiment and adverse emotions of the public promptly, and are consistent with the validity of the SCCT theory. This suggests that, under conditions of extreme uncertainty and technological opacity, public anxiety and perceived risk may temporarily dominate blame attribution processes, reducing the immediate reputational costs of defensive responses. The findings support the core assumptions of SCCT based on the alignment between low initial responsibility attribution and the use of defensive response strategies. However, as the crisis and public understanding evolved, the company’s strategies progressively shifted toward a more future-oriented communication, emphasizing experimentation, continuous innovation, and corrective action, which appear to have generated considerable public interest in

**Table 4**  
Evolution of SCCT Theory

Evolution of SCCT	Traditional SCCT	Extended SCCT
Crisis type	<ul style="list-style-type: none"> <li>• Single actor;</li> </ul>	<ul style="list-style-type: none"> <li>• Multi-actor;</li> <li>• Technologically opaque;</li> <li>• High uncertainty and risk;</li> </ul>
Responsibility attribution	<ul style="list-style-type: none"> <li>• Static input;</li> </ul>	<ul style="list-style-type: none"> <li>• Dynamic output;</li> <li>• Media framing;</li> <li>• Regulatory action;</li> <li>• Corporate communication strategy;</li> </ul>
Public response	<ul style="list-style-type: none"> <li>• Cognitive-dominant: Blame attribution drives reputational damage;</li> </ul>	<ul style="list-style-type: none"> <li>• Affect-dominant: Fear and uncertainty precede and shape cognitive attribution;</li> </ul>
Crisis phases	<ul style="list-style-type: none"> <li>• Pre-crisis → crisis response → post-crisis;</li> </ul>	<ul style="list-style-type: none"> <li>• Crisis response → corrective action → innovation signaling;</li> </ul>

Source: Authors’ elaboration

the resumption of activities. This strategic transition suggests that SCCT should be interpreted as a flexible and adaptive framework in crises in the context of emerging technologies, whose effectiveness depends on the organization’s ability to reconfigure corporate communication strategies in response to evolving emotional and cognitive public perceptions. Monitoring online discourse thus becomes crucial not only for assessing reputational impact but also for understanding how emotions such as anxiety and trust shape crisis sensemaking in AI-driven environments.

From a managerial point of view, this study offers useful recommendations for those involved in crisis management and crisis communication in the case of events involving new technologies, which are still little adopted and in which there is little public trust, such as events involving artificial intelligence or even new pharmacological technologies. The study offers useful indications for improving the resilience of these sectors, learning from mistakes made to better cope with possible future crises. This is particularly crucial given the trend towards greater adoption of such vehicles and, thus, the likely increase in the number of accidents involving AVs, for which it is difficult to attribute and understand blame (Zhang et al., 2024). This is especially difficult when one considers that in accidents involving non-autonomous cars, the human being always bears varying degrees of responsibility for what happened. In addition to keeping in mind the high level of media coverage that revolves around such events, which, therefore, requires particularly effective and timely management by the organizations involved.

Based on the findings, companies should structure their response to the crisis in phases. In the phase immediately following the incident, communication should prioritize rapid acknowledgment of the event, proactive engagement with regulatory authorities, and an empathetic approach toward those affected, while avoiding prematurely assigning blame before the facts have been established. In the consolidation phase, the focus should shift to corrective actions: transparently disclosing what has been suspended and why, while directly addressing emotional concerns, such as fear and uncertainty, that dominate the public’s sense-making process before blame is firmly assigned. Unlike the traditional SCCT, in which the post-crisis phase concludes the communication cycle, these findings identify a phase aimed at signaling innovation, in which communication should be forward-looking, designed to emphasize continuous technological improvement and the gradual resumption of activities to rebuild trust not only in the organization but in the

**Table 5**  
Operational guide

Crisis phase	Timing after crisis	Communication priorities	Potential errors
Immediate response	0-72 hours	<ul style="list-style-type: none"> <li>• Rapid acknowledgment;</li> <li>• Proactive contact with regulatory authorities;</li> <li>• No premature responsibility claims;</li> </ul>	<ul style="list-style-type: none"> <li>• Silence or delayed response;</li> <li>• Full responsibility admission before facts have been established;</li> </ul>
Consolidation	3-30 days	<ul style="list-style-type: none"> <li>• Corrective action;</li> <li>• Transparent disclosure;</li> <li>• Direct address of emotional concerns;</li> </ul>	<ul style="list-style-type: none"> <li>• Neglecting emotional dimension of communication;</li> <li>• Premature return to normal operations;</li> </ul>
Recovery and innovation signaling	+ 30 days	<ul style="list-style-type: none"> <li>• Forward-looking narratives framing resumption as evidence of learning;</li> <li>• Communication of concrete technological improvements;</li> <li>• Trust rebuilding in the technology;</li> </ul>	<ul style="list-style-type: none"> <li>• Ignoring residual public concerns;</li> <li>• Treating recovery as a one-off announcement;</li> </ul>

Source: Authors’ elaboration

technology itself (Table 5). Thus, the study emphasizes the importance of transparency, collaboration, continuous communication, listening to the public debate, and empathy towards the different stakeholders involved to nurture the resilience of the sector and promote greater public trust in this technology. The concerns that emerged from the public debate should be crucial aspects on which industry organizations should direct their efforts.

Useful recommendations also emerge for policymakers to stimulate greater public acceptance and take advantage of the economic, social, and environmental opportunities offered by this revolution in AVs-guided mobility. Public acceptance of AVs is not solely driven by rational evaluations of safety, but is also strongly influenced by emotional responses, such as fear, anxiety, and trust, that are amplified during crisis events. In technologically complex and uncertain contexts, emotions guide public sensemaking, influence responsibility attribution, and shape trust formation processes. Negative emotions such as fear and anger may rapidly spread through online environments, intensify reputational risks, and trigger reactive regulatory responses. Conversely, understanding and addressing public emotions through transparent, timely, and adaptive communication can foster trust, mitigate fear, and support long-term legitimacy and acceptance of AV technologies.

This new technology raises questions in terms of responsibility. Due to the different responsibilities at stake - contractual, civil, criminal, and administrative - there is a need for a supranational strategy aimed at coordinating the various efforts introduced in different countries. A supranational strategy could enable greater adoption and acceptance of AVs, capitalizing on the positive externalities of this new model of shared mobility. Therefore, normative regulation of the phenomenon requires a coordinated effort to guide and facilitate the development of cooperative, connected, and automated mobility, generating synergies between authorities, entities, and initiatives. Cross-sectoral cooperation will be a crucial element in ensuring the successful deployment of automated transport systems. Considering the complexity and multiplicity of relationships between the car manufacturer, the IT component manufacturer, the mobility service provider, and the end user. The repercussions of the adoption of this technology will also be felt in the insurance market regarding liability arising from damage caused by defective products, as well as issues concerning the protection of privacy and cybersecurity, in addition to the moral dilemmas that accidents involving AVs open up. Indeed, the increase in traffic and the use of AVs will increase the situations in which moral dilemmas will arise, i.e., situations in which the AV will be called upon to make difficult moral choices (Krügel & Uhl, 2022; Martinho et al., 2021). For these reasons, companies and policymakers should proactively engage in the development of shared safety standards and ethical guidelines, accompanied by transparent corporate communication strategies aimed at addressing emotional concerns and fostering trust. An approach that can help regulate and facilitate the movement of these vehicles under all these conditions, supporting the long-term legitimacy of automated mobility systems (MIT, 2022; Munari & De Maestri, 2018; Schepis et al., 2023). Specifically, regulators should distinguish between mandatory real-time reporting, which must be carried out immediately after an incident occurs, and broader safety-related reporting, which can follow standardized timelines. Requiring the publication of pre-approved crisis communication plans as a condition for obtaining an operating license would ensure responsibility by encouraging transparency without hindering innovation. Such measures would contribute to coordination efforts by providing a common foundation across jurisdictions and reducing the regulatory fragmentation that currently complicates the assignment of responsibilities in operations involving autonomous vehicles.

## 7. Limitations and future research agenda

The study, however, is not without its limitations.

First, the data collected could be further extended to enhance the

results generalizability. Future studies could also explore corporate communication on other social media to understand whether audience perceptions and emotional responses vary depending on platform-specific characteristics and media logics, such as algorithmic visibility, interaction affordance, and patterns of emotional amplification (Bucher & Helmond, 2018; Stieglitz & Dang-Xuan, 2013). Therefore, in addition to the role of corporate communication, it is also necessary to consider the effect and amplifying role of the media in the perception and debate surrounding a crisis. Future studies could compare the generation of public sentiment and emotions across multiple digital platforms such as LinkedIn, Reddit, or Weibo, in order to account for X's specific characteristics.

Secondly, future studies could explore similar events involving different organizations to compare their corporate communication strategies through a multi-case study analysis. Rather than understanding how public perceptions can change in the face of crashes involving AVs but different from the ones considered in this study, for example, in terms of the type of vehicles involved, perhaps only autonomous ones, and the number and severity of injuries. Furthermore, similar cases in different countries could be interesting for future research, as they could suggest different degrees of technology acceptance and trust in technology depending on the culture of individual countries. These differences are closely intertwined with national regulatory environments, which shape not only public expectations of AV safety but also the corporate communication strategies available during crises. Regulatory frameworks may constrain or enable specific corporate responses, including transparency requirements, and affect the credibility of corporate messages in mitigating reputational risks. In this regard, future studies could explore how regulatory policies and public debate on AV safety influence corporate communication choices and their effectiveness in managing public concern. Comparing countries with more permissive versus more restrictive AV regulations could provide valuable insights into how regulation mediates the relationship between crisis communication strategies and public perceptions (Othman, 2021).

Further research could explore differences in user perceptions, for example, through a survey, according to gender and age, as well as culture and country, but also the residence of people in urban or sub-urban areas. Currently, there is still considerable variation in people's perceptions in different countries, precisely because of regulatory differences. Age is also an element of reluctance towards the use of autonomous vehicles, as is gender. For example, according to the study by Hudson et al. (2019), women report higher scores in anxiety and lower scores in expected pleasure from driving autonomous vehicles than men. Therefore, differences in gender, age, and culture could be interesting aspects to investigate in future studies to better understand the nuances of public perception of the technology. In addition, challenges related to the limited accessibility of public transport services in non-urban areas could foster a greater readiness for the experiment and use of AVs (Manivasakan et al., 2021).

Therefore, the degree of public satisfaction with the technology and the company's handling of a crisis depends on several factors. Future studies could also explore the role of risk perception about incidents that have developed over time to understand how other factors may influence recent public attitudes towards AVs. Future research paves the way for analyses of other factors, such as ethical and moral dilemmas and the need for regulatory adaptation to keep pace with technological development (Brammer et al., 2022). Future research could, therefore, focus on aspects that have remained less discussed by the public in the aftermath of this event, such as moral dilemmas and ethical principles, which could emerge in public opinion with the occurrence of accidents that cause damage in terms of human lives, but also social and sustainable well-being caused by AVs.

Finally, future research could move beyond a dictionary-based approach to emotion detection and adopt machine learning-based methods, such as BERT-based language models, to better capture the

contextual nuances, irony, and emotional intensity, aspects that are difficult to grasp through the use of lexicon-based techniques such as dictionaries (Chutia & Baruah, 2024; Machová et al., 2023).

### CRedit authorship contribution statement

**Testa Ginevra:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Data curation, Conceptualization. **Ciacci Andrea:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Data curation, Conceptualization. **Ivaldi Enrico:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Data curation, Conceptualization. **Penco Lara:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Data curation, Conceptualization.

### Declaration of competing interest

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

### Data availability

Data will be made available on request.

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