

Success factors in communication campaigns to reduce risks in transportation

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Abstract

Transportation risk reduction through effective communication campaigns is a highly relevant topic in a context marked by the growth of mobility systems and increasing concerns about road safety and sustainability. This study focuses on identifying and analyzing the key factors that impact the success of these campaigns in different contexts. Through a comprehensive literature review and a structural analysis applying the MICMAC technique, nine key factors were identified, and key, determinant, autonomous, and result factors were highlighted. The results underline the relevance of addressing these factors in a comprehensive and coordinated manner to ensure the effectiveness of communication campaigns aimed at reducing transportation risks. Furthermore, the findings offer a deep understanding of the challenges and opportunities to improve transportation safety through communication strategies and provide a basis for the design and implementation of effective policies and practices in this area.

Keywords: road safety, communication campaigns, risk reduction, transport, public policies, behaviour change, sustainable mobility.

Introduction

Road safety (RS) remains a serious global public health issue, especially in areas with high road accident rates (Berhanu et al., 2023). The World Health Organization (WHO, 2019) estimates that 1.3 million people die in traffic accidents (TA) every year and 20–50 million people suffer serious injuries. South-Eastern Europe presents a special reality. In 2012, the number of road traffic fatalities per million inhabitants in almost all EU countries in the south-eastern regions was higher than the respective EU average. Factors such as poor compliance with regulations, poor road infrastructure, and limited risk perception contribute significantly to the high accident rate (Yannis et al., 2015).

In this sense, communication campaigns are a strategic way to change behaviors and introduce changes that lead to a reduction in the risks associated with transportation (Faus et al., 2021). RS communication campaigns have been widely studied. For example, Faus et al. (2023) showed that campaigns that combine emotional messages with the presentation of

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practical information are more likely to influence seat belt use behaviors or speed reduction, for example. Glik (2007) argues that risk perception is an effective determinant in the public's response to these messages. In addition, they state that campaigns often fail when they are not developed based on cultural elements.

Likewise, recent authors such as Siatwiko (2023) and Kulsum (2022) underline the importance of segmenting the target audience and implementing digital technologies to extend the reach of the message of these communication campaigns on RS. But even so, and despite these advances, it is difficult to identify other strategic variables to guarantee their success in specific contexts. Although communication campaigns are a common resource to motivate safe behaviors with regard to transportation, experience shows that their effectiveness can be uneven depending on the situation and the factors taken into account for their design or implementation (Faus et al., 2021).

In South-Eastern Europe, where TA morbidity rates are above the European average rates (European Transport Safety Council, 2021), there is no consensus about which variables achieve a distinction in the application of this type of campaign. The lack of an analysis that considers the relational system between all these variables significantly affects the development of effective and long-lasting interventions. This is why a structural concept is required to allow the prioritization and understanding of those factors that determine the impact of initiatives such as communication campaigns.

This article is relevant because it deals with a problem with a high level of commitment in terms of public health and sustainability, such as road accidents. The WHO (2022) points out that reducing morbidity rates in road accidents is a direct way of contributing to the Sustainable Development Goals and targets (SDGs) and especially to SDG 3 (health and well-being) and SDG 11 (sustainable cities and communities). Knowing the variables that determine the effectiveness of communication campaigns would allow the optimization of invested resources and improve the results in terms of accidents. Finally, this article also contributes to the academic field, since it adopts the MICMAC methodology, a systemic way of dealing with highly complex problems (Godet, 2001).

Therefore, the main objective of this study is to identify and analyze the strategic variables that determine the success of RS communication campaigns using the MICMAC technique, focusing especially on South-Eastern Europe. This study provides a structural map of the key variables that determine the design and implementation of RS communication campaigns, as well as evidence-based strategies to prioritize critical factors and improve the effectiveness of interventions, and a replicable methodological framework for the analysis of factors related to risk communication campaigns that can be adapted to other contexts, systems or spaces for risk communication.

Methodology

This study is exploratory and descriptive, as it seeks to identify the key variables that impact the success of communication campaigns in RS and analyze their interrelations using the MICMAC technique. According to Sampieri (2018), exploratory studies are suitable for understudied topics or when seeking to generate initial hypotheses, while descriptive studies allow for characterizing phenomena and their components. The design is non-experimental cross-sectional, as data is collected at a specific time without manipulating the variables (Alhazmi & Kaufmann, 2022). The MICMAC technique requires analyzing data obtained through documentary review and expert opinion, which is in line with similar studies that use structural analysis to prioritize strategic factors in complex systems (Godet, 1991).

The sample will be composed of 12 experts in RS, communication, and public policy, selected through purposive sampling. This technique is appropriate because it allows for

selecting individuals with specialized knowledge relevant to the problem (Patton, 2014). The experts were 4 professionals in the design and assessment of RS campaigns, 4 academic researchers in risk communication, and 4 representatives of government agencies related to transportation and security. The number of 12 participants is selected following recommendations from previous studies that indicate that a group of between 10 and 20 experts is sufficient to carry out structural analyses such as MICMAC, since it seeks quality in the responses rather than quantity (Godet, 2001).

To carry out this research, an exhaustive review of the academic literature, reports of RS campaigns, and previous assessments was carried out to identify the preliminary variables related to the success of these campaigns. For Snyder (2019), the literature review is especially relevant to offer a good basis for the subsequent analysis. Then, based on the literature review, the variables considered relevant and that affect the design, execution, and assessment of RS communication campaigns were established. These were compared with the selected experts.

A structured questionnaire was applied to measure the direct influence of each of the variables on the rest. The experts assessed the relationships on a scale of 0 to 3 (0 = no influence; 1 = weak influence; 2 = medium influence; 3 = strong influence). This procedure corresponds to the usual structural analysis methodology developed by Godet (1991). With the data obtained, a matrix was constructed that represents the relationships between the variables. In this matrix, each of the cells shows the degree to which one variable influences another. Subsequently, the interdependencies between the variables were analyzed using the MICMAC tool, which allows variables to be classified as determining, key, autonomous, or dependent (or results). This methodology would allow for establishing the strategic variables for the design of the campaigns.

Regarding the limitations of the study, despite having experts with specialized knowledge, the assessments may be conditioned by biases such as individual bias or limited experience in certain contexts, as indicated by Rowe and Wright (1999), this type of bias being inherent to studies based on expert judgment, and to mitigate this limitation, experts in various areas and sectors were included. In addition, although 12 experts are sufficient for this type of analysis, as it is also a small sample, it may not include all the diversity of perspectives that people can provide, which could restrict the generalization of the results obtained. Despite this, Godet (2001) also qualifies this aspect by indicating that the quality of the MICMAC analysis does not depend on the size of the sample, but on its representativeness and the experience that the participants have.

Results

To identify the strategic variables that influence the success of RS communication campaigns, a structural analysis was carried out based on the responses provided by 12 selected experts. Table 1 presents the 9 variables analyzed as a result of the literature review. The table shows a code that was assigned to each variable to be identified within the study, the name of the variable, the description, and the relevant source from which said variable was taken.

Table 1. Variables that influence the success of RS communication campaigns

Code	Variable Name	Description	Source
V1	Message design	Visual, textual and emotional quality of the message, including its persuasiveness.	Delhomme et al. (2009)
V2	Access to media	Availability and use of channels such as social media, radio, TV and print media.	Glik (2007)
V3	Cultural impact	Degree to which the message resonates with the audience's values, traditions and social norms.	Seeliger and Sevignani (2022)
V4	Risk perception	Level at which users perceive the dangers related to RS.	Faus et al. (2021)
V5	Participation of key actors	Involvement of organizations such as police, NGOs, businesses and government agencies.	Godet (2001)
V6	Trust in institutions	Degree of trust that the public has in the institutions issuing the messages.	European Transport Safety Council (2021)
V7	Budget assigned to the campaign	Financial resources available for the design and implementation of the campaign.	WHO (2023)
V8	Level of prior regulatory compliance	Historical compliance with traffic laws in the region where the campaign is implemented.	WHO (2023)
V9	Geographic scope of the campaign	Geographic coverage of the message (urban, rural, or regional).	Delhomme et al. (2009).

Source: Authors

The collected data were processed using the MICMAC technique, constructing a cross-influence matrix and analyzing the influence and dependency relationships between the variables. Each expert assessed the interactions between the 9 variables identified in the document review, assigning a level of direct influence (0 = none, 1 = weak, 2 = moderate, 3 = strong) for each pair of variables in a cross-influence matrix. Figure 1 below presents the Matrix of direct influence (MID), in which the first row reveals the values that represent the relationships of the variable V1 (Message design) with respect to the other variables of the system. In the case of the relationship of V1 with itself, this relationship is null, represented by a value of zero.

As for the relationship between V1 and the variable V2 (Access to media), this is considerably strong, indicated by a value of three. The same is true for the variable V3 (Cultural impact). Regarding the relationship between V1 and V4 (Risk perception), this is moderate, reflected by a value of two. Similarly, the relationship of V1 with V9 (Geographic scope of the campaign) is also moderate, evidenced by a value of two. Likewise, the relationships of the other variables in the matrix can be analyzed and interpreted, allowing those with the greatest influence or dependency within the system to be identified.

Figure 1. Matrix of direct influence/dependency (MID)

Influence →	V1	V2	V3	V4	V5	V6	V7	V8	V9
V1	0	3	3	2	2	2	1	0	2
V2	2	0	2	2	1	1	1	0	3
V3	1	3	0	3	1	2	1	0	2
V4	1	2	1	0	1	1	1	0	1
V5	2	2	2	2	0	1	1	1	3
V6	1	1	2	3	2	0	2	1	2
V7	0	1	1	1	0	1	0	1	1
V8	0	0	1	1	1	0	1	0	1
V9	1	2	1	2	1	0	0	1	0

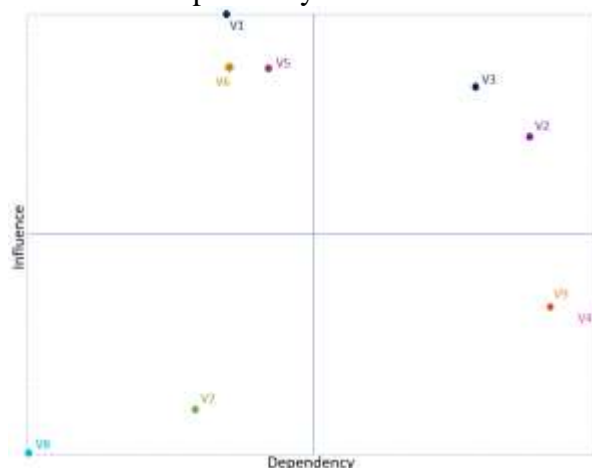
Source: Authors

After completing the matrix, each variable has been categorized according to its level of influence and dependency, being assigned to its respective analysis quadrant: Key (located in the upper right quadrant), Determinants (in the upper left quadrant), Autonomous (in the lower left quadrant) and Dependents or Results (in the lower right quadrant). In the quadrant of the key variables are those that exert a high influence and have a great dependency, playing a central role in the system. The determinant variables, located in the upper left quadrant, are characterized by being highly influential, but with a low dependency on other variables, which positions them as strategic variables in the design of the system.

In the quadrant of autonomous variables are those that have little influence and little dependency, so they have a limited impact in the general context of the analysis. Finally, in the quadrant of dependent or result variables are those that have a limited influence, but are highly dependent on other variables for their development or effectiveness within the assessed system.

The Plane of direct influence/dependency in Figure 1 and Table 2 shows the distribution of the ranking of these variables. The categorization provides a detailed view of how each variable will contribute to the system and its degree of relative importance in the design and implementation of transport safety communication campaigns. In addition, it facilitates strategic decision-making by prioritizing the key elements to be considered in future interventions.

Figure 2. Plane of direct influence/dependency



Source: Authors

Table 2 presents the results of the structural analysis using the MICMAC technique to classify the variables that determine the success of communication campaigns in terms of RS, which, as already shown in the previous figure, are grouped into four categories:

Keys (high impact, high dependency): In the upper right quadrant are the variables V2 (Access to media) and V3 (Cultural impact), which are crucial for the success of the

campaigns since they have a high power of influence in the system, while at the same time, they have a high dependency on other variables. Their good management is, therefore, of great importance for the success of the campaigns.

Determinants (high impact, low dependency): In the upper left quadrant are the variables V1 (Message design), V5 (Participation of key actors), and V6 (Trust in institutions); these are very influential variables and, as they have a low dependency, they can be managed strategically and autonomously.

Autonomous (low impact, low dependency): The variables located in the lower left quadrant are V7 (Budget assigned to the campaign) and V8 (Level of prior regulatory compliance). These variables have a reduced impact on the system and low dependency on other variables, which makes them relatively independent in the context analyzed.

Dependent or result variables (low impact, high dependency): The variables that make up this quadrant are V4 (Risk perception) and V9 (Geographic scope of the campaign) represented in the lower right quadrant of the graph. These variables have a limited impact on the system, but their implementation depends greatly on the actions taken on other key variables.

Table 2. Classification of variables by direct dependency influences

Variable type	Variable	Code
Key	Access to media	V2
	Cultural impact	V3
Determinant	Message design	V1
	Participation of key actors	V5
	Trust in institutions	V6
Autonomous	Budget assigned to the campaign	V7
	Level of prior regulatory compliance	V8
Result or dependet	Risk perception	V4
	Geographic scope of the campaign	V9

Source: Authors

V1 was the variable that showed the greatest direct influence on the rest of the variables, being present in all the experts' assessments as a critical variable in the sense that it determines how users interpret and respond to the campaigns, and V4 was, in turn, the variable that showed high dependency, thus obtaining high effectiveness only in those cases where the quality of the message design and the existence of trust in the institutions are managed. V3 and V2 were shown to be key variables, a type of variable that shows a certain influence on the rest of the variables but which at the same time are variables that depend largely on the levels of impact and dependency of other variables. V8 was considered an autonomous variable, with little influence on the general system, but with sufficient importance in specific contexts.

Discussions

This research has analyzed the variables that affect the success of communication campaigns for risk reduction in transportation, taking into account the MICMAC technique from the perspective of structure and relationships. The results obtained not only contribute to a better understanding of the dynamics of the variables that influence the interrelational processes of communication but also show the particularities of strategic communication in the field of transportation risk management and safe mobility.

The results of the study materialize a series of variables that are key to the success of communication campaigns for risk reduction in transportation. In particular, the clarity and accessibility of the message, the appropriate segmentation of the public, the integration of key actors (including transport operators and authorities), and the communication channels are variables that have an important impact on the success of these campaigns and that are strongly interrelated with each other, and they also turned out to be strategic foundations for the transmission of campaigns that encourage safe behavior and risk reduction in transportation.

Following the work of McCormack et al. (2013), it can be stated that the clarity and accessibility of a message are key for the message to reach the target audience, maximize its understanding, and facilitate the retention of the content. This aspect is especially important in communication campaigns on RS since the complexity of the message can reduce its effectiveness. In addition, in the field of transportation, using direct messages combined with audiovisual materials and practical examples can guarantee a better internalization of the public (Diegelmann et al., 2020).

Proper audience segmentation represents another of the most critical factors. According to Wakefield et al. (2010), campaigns that adapt their content to the demographic, cultural, and psychographic nature of the target audience are significantly more effective in promoting behavioral change. In the transportation environment, this means producing messages for a specific group of users such as drivers, pedestrians, or cyclists, according to Mundorf et al. (2018) in their study on attitudes toward sustainable transportation and health behavior change.

Coordination with the key actors themselves (transportation authorities, operating companies, and civil society) was also identified as another critical factor. As Borie et al. (2019) point out, a collaboration strategy with key actors serves to legitimize and multiply the number of actors in the campaigns. Cooperation between authorities and private companies in the implementation of systems to make transportation safer serves as an example that illustrates that this variable is fundamental to the success of the campaign, as mentioned by (World Health Organization, 2023).

Likewise, the proper selection and use of appropriate communication channels is also decisive. According to Danaher and Dagger (2013), using the combination of traditional channels (such as print media or television) with digital channels (such as social media or mobile resources) allows for maximizing the reach and spread of the message. This use of different channels has proven to be particularly effective in safe transportation campaigns, as exemplified by Faus et al. (2023) in their study on RS campaigns and interventions.

In addition to audience segmentation, the present study identified determinant factors such as training of transport operators and public awareness. According to Sussman et al. (2020), training and awareness strategies lead to sustainable changes in behavior by providing users with the knowledge or motivation to adopt or encourage safer practices.

For example, in the awareness campaign focused on public transportation drivers, driver training in defensive driving and proper attention to users can help significantly improve safety and reduce risks, as demonstrated for example by Faus et al. (2021). Community involvement in this type of campaign reinforces their legitimacy and effectiveness. For Hamann et al. (2021), community involvement in the design and execution of safety campaigns can lead to the emergence of self-efficacy, collaboration, and community acceptance of the actions to be carried out.

Finally, although this study has provided an overview of the success factors in communication campaigns for risk reduction in transportation, it has certain limitations. In

general terms, the MICMAC technique allows a global view of the interrelated aspects but does not delve into the determinism involved in the different dynamics, which may make its implementation in practice difficult. It should be noted that the implementation of the results may require adaptations according to the local context and the specific characteristics of the transportation system.

Conclusions

This research has explored the key variables that determine the success of communication campaigns aimed at reducing risks in transportation, providing a comprehensive view of the challenges and opportunities in this area. Through an exhaustive analysis of the literature and the application of the MICMAC technique, nine key factors that influence the effectiveness of these campaigns were identified. The results highlight the importance of addressing these variables in a comprehensive and coordinated manner to design communication strategies that achieve significant changes in the behavior of transport users.

In particular, the need to optimize the design of the message, ensure adequate access to the media, understand the cultural impact, and encourage the participation of key actors, such as government institutions, private organizations, and civil society, is highlighted. Likewise, determinant factors such as trust in institutions, risk perception, and the budget assigned to campaigns were identified, which, although they have a significant impact on the effectiveness of the strategies, also depend on other key elements for their successful implementation.

It is important to highlight that factors such as the geographic scope of the campaign emerged as dependent, underlining the need to contextualize and personalize communication actions so that they are relevant in different regions and populations.

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