Examining the Roles, Sentiments, and Discourse of European Interest Groups in the Ukrainian War through X (Twitter)

Aritz Gorostiza-Cerviño , Álvaro Serna-Ortega , Andrea Moreno-Cabanillas , Ana Almansa-Martínez , Antonio Castillo-Esparcia *

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Article

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Audiovisual Communication and Advertising, University of Malaga, 29010 Malaga, Spain; olivetti03@uma.es (A.G.-C.); amso@uma.es (A.S.-O.); amorenoc@uma.es (A.M.-C.); aam@uma.es (A. A.-M.)
* Correspondence: acastilloe@uma.es; Tel.: +34-952-13-29-04

Abstract: This research focuses on examining the responses of interest groups listed in the European Transparency Register to the ongoing Russia-Ukraine war. Its aim is to investigate the nuanced reactions of 2,579 commercial and business associations and 2,957 companies and groups to the conflict, as expressed through their X (Twitter) activities. Utilizing advanced text mining, NLP and LDA techniques, this study conducts a comprehensive analysis encompassing language dynamics, thematic shifts, sentiment variations, and activity levels exhibited by these entities both before and after the outbreak of the war. The results obtained reflect a progressive decreasing in negative emotions regarding the conflict over time. Likewise, multiple forms of outside lobbying are identified in the communication strategies of interest groups. All in all, this empirical inquiry into how interest groups adapt their messaging in response to complex geopolitical events holds the potential to provide invaluable insights into the multifaceted role of lobbying in shaping public policies.

Keywords: lobbying; European Union (EU); Russia-Ukraine war; X (Twitter); social media; groups of interest

1. Introduction

The conflict between Russia and Ukraine, which began on February 24th, 2022, constituted a major event involving numerous international actors. This geopolitical crisis triggered significant global consequences, leading to tensions and raising concerns within the international community. The events related to this invasion elicited a wide range of opinions and responses from governments, organizations, and interest groups worldwide. The political complexity and international dynamics make this conflict a crucial subject for research and analysis in academic and political spheres.

The theoretical contextualization of this paper introduces the concept of grassroots lobbying as a valuable political tool for interest groups and delves into how social media, particularly Twitter (onwards referred as X), has transformed the communication dynamics of these groups. Furthermore, it reviews research addressing the relationship between X and the conflict in Ukraine, emphasizing the need for studies in this field. In line with this perspective, the study aims to examine the potential participation of European interest groups in the context of the Russian invasion, with a specific emphasis on their activities on the social media platform X. The analysis focuses on two categories of interest groups: "trade and business associations" and "companies and groups". These groups represent a wide spectrum of the economic interests in the European Union.

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1.1. Grassroots Lobbying and Its Transformative Impact on EU Policy Dynamics

The practice of outside lobbying, also known as grassroots lobbying, has become a fundamental strategy in the realm of political influence and public policy formulation [1,2]. In contrast to direct interactions between interest groups and decision-makers, it relies on the use of public communication channels as the primary means to achieve its objectives [3]. Notably, in the European Union, outside lobbying has assumed a relevant role, influencing decision-making processes and responding to the growing politicization and public scrutiny that characterize policy formulation within this supranational entity.

This approach encompasses tactics that involve interaction with journalists, issuing press releases, conducting public campaigns, and organizing protest events [4]. While grassroots lobbying has traditionally been considered a tool used by political actors with limited influence or as a last resort in their strategic arsenal [5], prior research in the European context has revealed that numerous organized interest groups rely to varying degrees on such actions [6,7]. This suggests that outside lobbying may have evolved into a relevant and effective strategy for influencing EU policy decisions, especially in response to the increasing public attention in the policy formulation process. By utilizing public communication as a tool, these lobbying groups aim to demonstrate strong public support and attract a broad audience of stakeholders in the political debate. Their goal is to exert pressure on policy-makers to persuade them to take actions aligned with their interests. Failing to respond to this pressure carries the risk of eroding their reputation or facing negative electoral consequences [8].

In the academic sphere, a debate has arisen regarding the predominance of lobbying strategies, whether they are internal or external, in relation to the typology of interest groups. According to the perspective of Dür and Mateo [9], the frequency of employing outside lobbying actions, varies depending on the category in which the group operates. For instance, in the case of citizen groups, their reliance on these strategies is higher because their organizational viability often depends on public support. In contrast, business associations and companies typically do not require the same level of grassroots lobbying since they have the capacity to exert direct influence on policies. This divergence in the dependence on outside lobbying is partly attributed to its dual function: it allows interest groups for the promotion of policies aligned with their values while providing an opportunity to attract new supporters to their causes [10]. On the other hand, the opposing viewpoint argues that all interest groups, regardless of their typology, depend on outside lobbying. One of the key arguments in this regard is based on the pronounced politicization component characterizing the current social context, where the increase in visibility and controversy of a particular issue further accentuates the disparity in the use of these lobbying strategies [11–13].

Beyond this debate, it is undeniable that the advancement of technologies has radically transformed the paradigm of interactions among actors involved in public policy formulation, leading to an increase in the use of external lobbying strategies [14]. This shift has been evident in the substantial rise in the relevance of social media platforms, the dissemination of information online, and the capacity for mass mobilization through digital media in the realm of political influence or positioning [15]. These technological tools have empowered interest groups to expand their reach and exert influence more effectively in the public sphere, reshaping traditional lobbying methods [16]. Consequently, strategic adaptation to these technologies has become a critical component for the success of lobbying campaigns.

1.2. Social Media as a Key Component in Contemporary Lobbying Strategies

As previously mentioned, in the landscape of outside lobbying strategies employed by interest groups, those related to the use of social media and digital platforms have gained increasing prominence in the contemporary communication of these organizations [17,18]. Technological tools of this nature enable the rapid and widespread dissemination of messages, while also providing the capability to interact directly and personally with the audience [19]. In fact, acquiring online audiences is now an essential goal in lobby communication strategies [20].

The role of social media in the array of strategies implemented by interest groups extends beyond mobilizing their support bases in front of legislators. These platforms also offer the

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opportunity to establish strategic positions in the political agenda. Social media allows interest groups to closely monitor real-time political debates, identify emerging trends, and actively engage in the public sphere. This represents a shift from traditional channels of influence, requiring the construction and effective management of a strong digital presence as a fundamental requirement in the process of influence [19]. Besides that, globalization influences communication strategies by extending the reach of messages to an international audience, making it a factor to consider [14].

Furthermore, it is necessary to recognize that the digital communication of lobbies also impact the social context from an informative point of view, as it contributes to keeping citizens informed about current political issues. Therefore, social media platforms serve as an important channel for disseminating information and promoting public discourse, empowering recipients to critically formulate their own opinions and develop a more comprehensive understanding of the issues at hand. This enrichment fosters active citizen participation in the democratic process [21]. In this regard, it should be noted that citizens tend to consume messages related to issues that have a direct repercussions on their lives more frequently, at the expense of those that do not immediately relate to their specific needs [14]. However, this trend does not apply uniformly in all cases, underscoring the importance of considering individual and contextual variations in the perception of the relevance of the topics addressed. This, in turn, highlights the need to adapt messages according to the objectives pursued and the target audience [19].

Indeed, this strategic imperative for interest groups to comprehend the context and actors involved in their communicative processes, serves as a determining factor in formulating the study's second objective. This objective seeks to discern the discursive frames employed by European interest groups both prior to and subsequent to the Russia-Ukraine conflict.

Besides the indirect impact of communications through social media, there is also a potential for direct influence, ensuring that messages reach legislators. In such instances, the receptive atmosphere for these messages facilitates lawmakers' consideration of the arguments during the decision-making process [22].

In the digital sphere, X stands out as one of the most prominent tools for interest groups [23,24]. This platform offers unique versatility by allowing these organizations to communicate across the three key dimensions. Firstly, it proves to be an effective tool for mobilizing their bases, generating strong media attention, and actively participating in real-time public debates. Secondly, X provides the capacity to establish a clear positioning for lobbying groups regarding current issues. Lastly, it offers the opportunity for direct interaction with political figures, government officials, and other stakeholders involved in the decision-making process, facilitating the building of close relationships and effective promotion of their political agendas.

1.3. X Data Exploration of the Russia-Ukraine War

Several datasets containing information about activities related to the war in Ukraine have been compiled, enhancing the understanding of different aspects of the conflict [25–28]. Academic research has analyzed different features from these datasets, such as hashtags, presidential references, and contextual words, focusing on sentiment analysis and the polarization in discussions about the invasion [29–31].

Each of the studies takes a unique approach and delves into aspects of the Russia-Ukraine war. For example, Sazzed [28] concludes that negative feelings towards the conflict in general prevail, while there are positive feelings associated with humanitarian support and Ukrainian resistance.

Building upon these findings and with the aim of conducting a more comprehensive analysis of message sentiment, a third goal is introduced. This objective utilizes an evolutionary analysis approach to evaluate the shifts and trends in both positive and negative sentiments within messages emanating from interest groups following the Russia-Ukraine conflict.

Likewise, the most discussed topics on the platform have been thoroughly investigated, revealing high interaction on issues such as fundraising, sanctions, and gas and oil prices, among others [26–28]. For example, the analysis carried out by Nisch [31] regarding the speech of Volodýmyr Zelenski (President of Ukraine) on X revealed the use of eight different frames of reference in his

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communications. During the study period, the most prominent frames were those related to dialogue, solidarity, defense and love, indicating an optimistic orientation in communication aimed at promoting unity and resilience.

Despite the breadth of topics investigated so far, there have been no studies focusing on the behavior and role of interest groups on X in relation to the conflict. Therefore, it is pertinent to develop research in this direction to enrich the understanding of the communication used by these international actors. This study not only contributes to the detailed analysis of their participation on the platform but also provides a scientific basis for understanding the strategies employed by these interest groups in promoting their lobby agendas on a global scale, particularly in the context of pressing contemporary issues. Considering that, the last objective of this study is designed to analyze those interest groups that have exerted significant influence through retweets and original tweets during the post-war period, thereby offering insight into their impact on the discourse surrounding this critical international event.

2. Materials and Methods

2.1. Objectives and Hypothesis

Although the research objectives have been progressively detailed throughout the previous section, in this one, they are explicitly presented along with their corresponding hypotheses.

Objective 1: Investigate whether there is involvement by European interest groups in the Russian invasion through their digital communication activities on X.

Hypothesis 1: European interest groups are communicatively involved in the Russian invasion by actively posting tweets related to the conflict on X.

Objective 2: Analyze the changes in discursive frames employed by European interest groups on X before and after the outbreak of the Russia-Ukraine war.

Hypothesis 2: There is a shift in the discursive frames employed by European interest groups on social media before and after the onset of the Russia-Ukraine conflict, indicating a change in communication paradigms and including the conflict in their agendas.

Objective 3: Examine the evolution in positive and negative sentiment within tweets from European interest groups after the outbreak of the conflict.

Hypothesis 3: There is a decrease in negative sentiment in the messages from European interest groups as the conflict progresses.

Objective 4: Identify the interest groups that have had the greatest influence through original tweets and retweets during the post-war period.

Hypothesis 4: There are significant differences in the influence exerted by interest groups through original tweets and retweets during the post-war period.

2.2. Groups of Interests Data Collection

This study utilizes the European Union's Transparency Register [32] as the primary data source, a key platform for registering and disclosing lobbying activities in the European Union. To guarantee data integrity and reliability, a filtering process was implemented to selectively include only those groups of interest that fall into the two relevant categories for the study: "trade and business associations" and "companies and groups".

Through the filtering process, a total of 5,548 distinct groups of interest registered in the European Transparency Register were identified.

2.3. X Activity Data Collection

Due to the dynamic nature of social media and recent policy updates on platform X, verifying the authenticity of accounts presents a challenge. To enhance the validity of the dataset, only accounts

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listed on the official websites of the respective interest groups were included. This approach aimed to minimize the inclusion of potentially misleading or unverified accounts.

As mentioned, initially, 5,548 groups were identified, of which 112 organizations did not have a published website on the Transparency Register. Wickham's [33] method was then applied to extract the available X accounts from the respective organizations' webpages, resulting in the identification of 3260 accounts. Further refinement of the data involved excluding accounts with incomplete information, those that were closed, and accounts where the username could not be extracted, resulting in a total of 2,722 X accounts. The reduction from 2,722 to 2,260 accounts in the final sample, is due to the absence of published tweets during the study period.

To gather tweets from the selected interest groups, the 'rtweet' tool developed by Kearney [34] was used, leveraging the X API. The data collection took place intermittently between April 4th and April 10th, 2023, due to limitations of the X API. All tweets posted by these groups from February 14th to March 6th, 2022, were collected.

Lastly, to enhance the focus and relevance of the analysis, the sample of tweets was narrowed down by excluding those associated with interest groups headquartered outside the European Union and tweets that could not be translated into English. This stringent selection criterion resulted in a final sample size of 36,831 tweets, which will serve as the basis for the analysis.

2.4. Comprehensive Methodological Explanation

This study adopts a quantitative approach to analyze the X discourse of trade and business associations, companies and groups registered in the EU Transparency Register before and after the outbreak of the Russia-Ukraine war. It utilizes numerical data and statistical techniques, such as frame analysis, sentiment analysis, and network analysis, to examine the discursive framing, changes in sentiment, and network dynamics in this specific context.

The first phase encompassed the cleaning of the 36,831 available tweets throughout text mining techniques [35–38]. When dealing with a multilingual perspective, it is advisable to first translate all texts into the language that is most prevalent in order to proceed with a more appropriate cleaning and standardization of the texts. In this case, the Lucas and Tingley [39] tool is utilized to translate all non-English languages using Google API Translate. This approach provides other researchers the option to conduct further analysis using both the data and the code employed in this study.

The second step of this investigation entails frame analysis before and after the invasion began. To initiate this analysis, the research team applies topic modeling technique Latent Dirichlet Allocation (LDA) [40–43]. The intention is to assess the differences in discursive topics using the outbreak of the war as a turning point for comparison.

Despite the acknowledged limitations of this method [44], utilizing the R package developed by Grün and Hornik [45], and assuming that each document is a mixture of various topics and each topic is characterized by a distribution of words, it is possible to observe which topics are present before and after the war.

Once the relevant topics are identified, sentiment analysis using Natural Language Processing (NLP) is performed to assess the emotions and attitudes associated with each tweet. This involves categorizing the sentiment expressed in the tweets as positive, negative, or neutral. Furthermore, the sentiment analysis is refined by focusing on the topics related to the Russia-Ukraine war. The sentiment evaluation tools used are Affin and Bing, which allow for distinguishing sentiments through the use of lexical datasets [46]. Weekend data is excluded from the sentiment analysis to improve accuracy and clarity of results. This is because weekends tend to show significantly lower tweet activity from the target groups, which could distort the study's findings.

Finally, network analysis is used to explore the connections and interactions between groups. By examining patterns of retweets, mentions, and replies among these entities, the analysis aims to identify influential actors based on original tweets and the most retweeted content. Additionally, it offers insights into the formation of alliances, collaboration, and the spread of sentiments among network participants.

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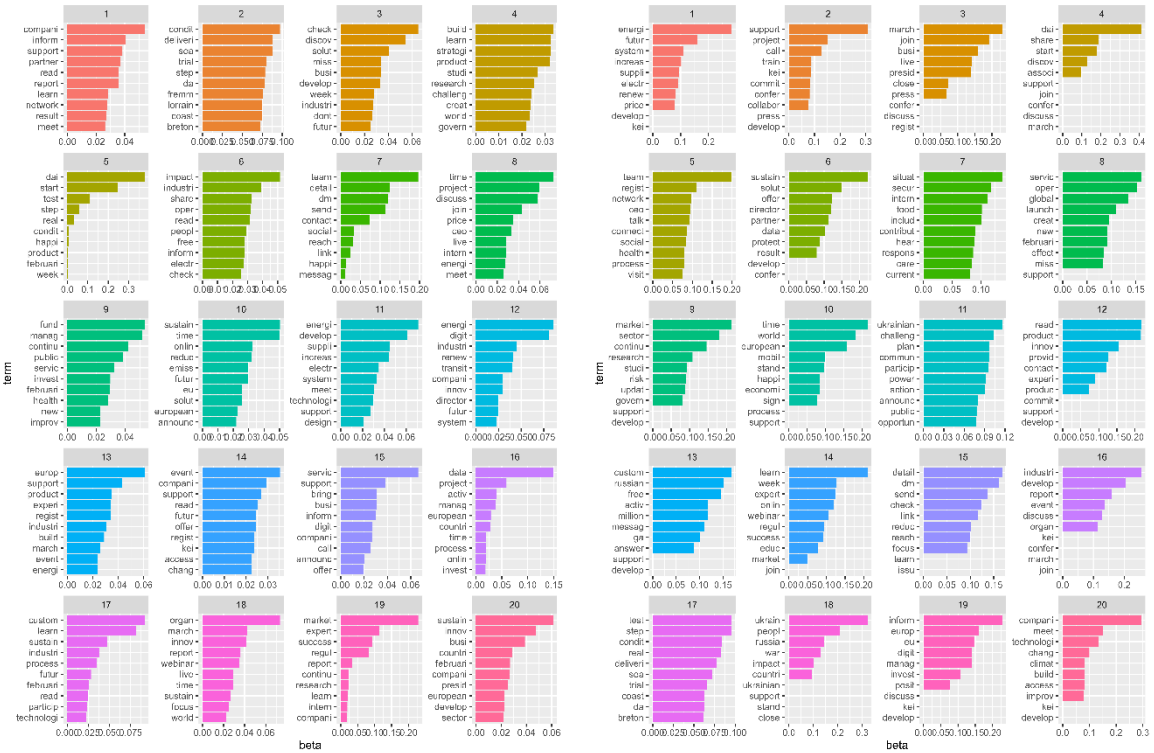
3. Results

3.1. Content Analysis: Which Topics Are Prevalent before and after the War?

As mentioned, the proposed LDA model aims to assess variations in the discourse of interest groups before and after the war between Ukraine and Russia. The first step is to conduct the Griffiths & Steyvers [47] test, which allows for the establishment of a mathematical index of explainability of a discourse based on a number K of topics. In other words, it numerically evaluates the coherence, quality, and interpretability of a dataset through a reduced number of themes. The nature of this test necessitates the intervention of researchers to ensure the representativeness of the approach. After a systematic qualitative analysis of the different possible combinations, it is determined that the ideal number of topics to select is 20 (K=20), and the optimal number of descriptive terms for each topic is 10. This ensures a sufficiently broad representation of different discursive lines to determine temporal variations. Furthermore, the explainability index obtained in the Griffiths & Steyvers [47] test with K=20 exceeds 0.80, confirming the relevance and validity of the selection process.

Using the specified value of K and number of terms, the LDA model was run separately on tweets from before (N=19734) and after (N=15573) the Russian invasion of Ukraine on February 24th, 2022. Comparative analysis shows distinct shifts in the discourse of interest groups. Notably, Topic 18 in the post-invasion data shows a strong link to the conflict, with key words including “Ukraine”, “Russia”, “War”, and “Impact”. To confirm the relevance of these messages to the topic, two researchers and a third party reviewed them, ranking each based on its connection to the conflict as defined by the model. This review confirmed that a high percentage of the tweets were directly related to the conflict. A further analysis to pinpoint when the tweets shifted away from war-related topics revealed that the first 1,500 messages were predominantly about the war, and these were selected for subsequent sentiment analysis. The comparison of topics in the discourse in X of European interest groups before and after the outbreak of the conflict can be seen in Figure 1.



(**a**) (**b**)

Figure 1. (**a**) LDA topics representation for tweets before the Russia-Ukraine war; (**b**) LDA topics representation for tweets after the Russia-Ukraine war.

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3.2. Sentiment Analysis: How Do Sentiments Differ before and after the Outbreak of the War?

According to the results obtained from the Bing algorithm, there was no statistically significant relationship between positive sentiment and time (standard error = 1.7926e-07, statistic = -0.146, p-value = 0.883). Similarly, the results from the Affin algorithm indicated a lack of statistical significance between positive sentiment and time (standard error = 3.90e-07, statistic = -0.005, p-value = 0.995). Therefore, the evidence does not support the conclusion that positive sentiments exhibit an increase or decrease over time.

In contrast, both the Bing and Affin algorithms yielded statistically significant results concerning the relationship between negative sentiment and time. The Bing algorithm estimated a sentiment coefficient of 5.479e-07 (standard error = 1.651e-07), with a statistic of 3.317 and a p-value of 0.001. This suggests that as time increases, negative sentiments tend to decrease. In a complementary manner, the Affin algorithm also shows a statistically significant sentiment coefficient of 6.775e-07 (standard error = 3.323e-07), with a statistic of 2.038 and a p-value of 0.042. These findings further support the notion that negative sentiments diminish as time progresses. In summary, there is a statistically significant drop in negative sentiments over time. The detailed information can be seen in Table 1.

Table 1. Sentiment analysis of tweets during the Russia-Ukraine conflict: Multiple Linear Regression (MLR) using Affin and Bing algorithms (February 24th - March 6th, 2022).

Term	estimate	standard error	statistic	p-value*
Positive Bing	-2.626350e-08	1.792441e-07	-0.146523613	0.883
Positive Affin	-2.016360e-09	3.908429e-07	-0.005159005	0.995
Negative Bing	5.479683e-07	1.651721e-07	3.317559707	0.001**
Negative Affin	6.775845e-07	3.323500e-07	2.038767728	0.042*

* (* p < .05, ** p < .01, *** p < .001).

3.3. Network Analysis: Who is Related to Whom? Who Are Important Users?

3.3.1. Original Messages

The top 10 most retweeted original messages from lobbying groups are posts from the following profiles: WithSecure Corporation (@withsecure), ExxonMobil Petroleum & Chemical (@exxonmobil), Planet Labs Germany (@planet), Volkswagen Group (@VWGroup), Elisa Oyj (@ElisaOyj), Suomen Osuuskauppojen Keskuskunta (@sryhma), Valio Oy (@ValioFi), KPN (@kpn), Vodafone Belgium (@VodafoneGroup), and A.P. Møller - Mærsk A/S (@Maersk). Table 2 shows the total number of retweets each message has received along with the text.

Table 2. Most retweeted original posts from interest groups following the outbreak of the Russia-Ukraine war (February 24th, 2022 - March 6th, 2022).

X username	Retweets	Original tweet text*
withsecure	584	F-Secure FREEDOME VPN is now available for free in all of Ukraine. Protect your online privacy. Download from the link above.
exxonmobil	489	We issued the following statement regarding the situation in Ukraine today.
planet	378	Latest from Chuhuiv Airbase in Ukraine Imagery captured on February 21 and today February 24 2022.
VWGroup	324	Against the background of the Russian attack on has decided to stop the production of vehicles in Kaluga Nizhny Novgorod until further notice. Vehicle exports to Russia will also be stopped with immediate effect.
ElisaOyj	273	We want to show our support for Ukraine and we have decided to close the Russian Today channel.

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sryhma	206	SOK has decided to give up business in Russia. SOK has 16 prisms in St Petersburg and three hotels and about 1000 employees. Business shutdown has begun.
ValioFi	191	We condemn the Russian attack on Ukraine and hope that the situation will stabilize as soon as possible. We immediately stop export from Finland to Russia.
kpn	185	The situation in Ukraine is dear to us. That is why we will not charge any costs for mobile calling and texting until the end of March calling and SMS and fixing it. We also make roaming calling data and SMS free of charge for our customers who are in Ukraine.
VodafoneGroup	176	A statement on the situation in Ukraine.
Maerks	139	We are deeply concerned by the crisis in Ukraine. We closely follow government posing new sanctions on Russia impacting operations from direct amp indirect restrictions. New Maersk bookings from Russia will be temporarily suspended except food, medical and humanitarian supplies.

* The text of the tweets are translations provided by the Google API.

The top original message in terms of retweets, posted by WithSecure Corporation, received 584 retweets and announced the free availability of FSecure Freedome VPN in Ukraine. Similarly, a tweet from ExxonMobil, which received 489 retweets, shared the company's official stance on the situation in Ukraine, further enhancing its reach and engagement. The remaining messages encompass various subjects, such as generic information about the Russian attack on Ukraine, the suspension of vehicle production in specific regions, solidarity with Ukraine, business closures in Russia, condemnation of the attack, the provision of free communication services to Ukrainian customers, and attempts to influence legislators.

To provide a more detailed understanding, Table 3 showcases a network analysis of the top 500 most retweeted original tweets from the European Union interest group community concerning the Russia-Ukraine war. This analysis assesses the centrality of users within the network by focusing on three metrics: degree centrality, betweenness centrality and eigenvector centrality. It is important to note that some users in the table have missing values. These gaps indicate either a lack of original tweets from those users in the analyzed network or insufficient data to accurately calculate their centrality measures.

Table 3. Network metrics for original tweets by European interest groups related to the Russia-Ukraine war, using Fruchterman-Reingold algorithm (February 24th - March 6th 2022).

X username	Degree centrality	Betweenness centrality	Eigenvector centrality
ceskedrahy_	24	770	0.0045
BGK pl	8	621	NA
ZPPnetpl	7	126	NA
Itonederland	7	NA	NA
UNESID	7	976	0.0088
Elinkcinoelama	6	112	NA
dzbank	6	NA	NA
withsecure	5	NA	NA
Metinvest_group	5	NA	NA
bdzvpresse	NA	240	NA
Meta	NA	174	NA
vnoncw	NA	173	NA
ZDH news	NA	144	NA
CDCargo	NA	NA	0.0131
Sjaak VanDerTak	NA	NA	0.0088

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spcr	NA	NA	0.0088
BusinessEurope	NA	NA	0.0088
mapagob	NA	NA	0.0066
efpia	NA	NA	0.0044
TechFinland	NA	NA	0.0044

In the context of original tweets, degree centrality measures the number of connections a user has based on their tweets. České Dráhy (@ceskedrahy_) shows a high degree centrality of 23, indicating a substantial network presence. Other users like Bank Gospodarstwa Krajowego (@BGK_pl) and Land en Tuinbouw Organisatie Nederland (@ltonederland) have moderate connectivity, with centrality scores of 8 and 7, respectively. Additionally, betweenness centrality gauges a user's role as a conduit among other users in the network, influencing information flow. A higher value indicates greater influence. Thales Group (@thalesgroup), for instance, has a betweenness centrality of 62, playing a critical role in linking various users. Finally, eigenvector centrality evaluates a user's significance based on both the quality and the quantity of their connections. High values indicate connections to other influential users. For example, Thales Group (@thalesemploi) registers an eigenvector centrality of 0.004, close to zero, suggesting minimal influential connections despite their central role.

The graphical representation of the network analysis of the original tweets can be seen in Figure 2.

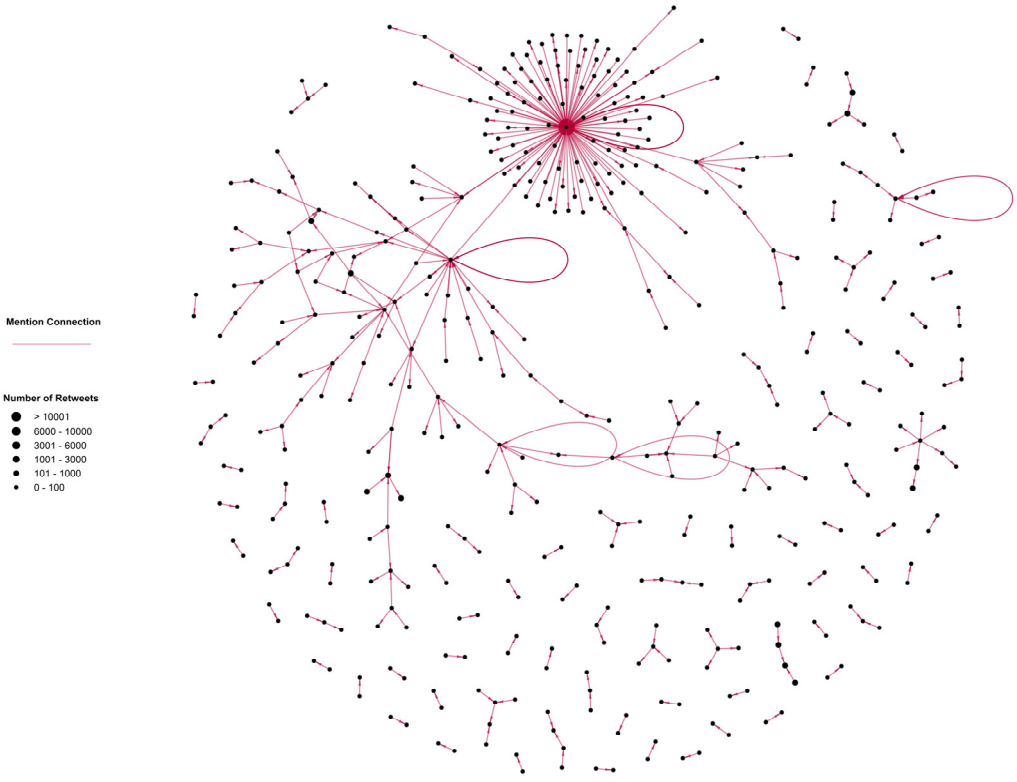

Figure 2. Network graph of the top 500 most retweeted original tweets by European group of interest (Fruchterman-Reingold algorithm).

3.3.2. Retweeted Messages

The top groups of interest in terms of retweets related to the conflict, from profiles inside or outside the network, include Hotelverband Deutschland (@hotellerie_de), Polish Chamber of Milk (@PolskaIzbaMleka), Gesamtverband der Arbeitgeberverbände der Metall- und El-ektro-Industrie (@MEArbeitgeber), Spitzenverband Fachärzte Deutschlands (@SpiFa_eV), and Polskie Zrzeszenie

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Producentów Bydła Mięsnego (WierzbickiJerzy). The information about the top 10 most retweeted retweets by these groups can be seen in Table 4.

Table 4. Most retweeted retweets posts from interest groups following the outbreak of the Russia-Ukraine war (February 24th, 2022 - March 6th, 2022).

X username	Original tweet text*	Retweets	Original tweet X username
hotellerie _de	@ZelenskyyUa's TV address to the Russian people might be the most moving speech that I've ever seen in my entire life. The whole world needs to see, understand and share this crucial Ukrainian message.	137,624	PMoelleken
hotellerie _de	Starlink service is now active in Ukraine. More terminals en route.	130,671	elonmusk
PolskalzbaMleka	People marching through central Moscow this evening chanting "No to War!".	118,396	mjluxmoore
hotellerie _de	1/12 We - Russia - want to be a nation of peace. Alas, few people would call us that now.	29,093	navalny
hotellerie _de	Bloody hell. Looking at a message from the Ukraine Library Association concerning the cancellation of their forthcoming conference. It basically says "We will reschedule just as soon as we have finished vanquishing our invaders". Ukrainian Librarians, I salute you.	27,019	NickPoolel
MEArbeitgeber	Russia's "liberation".	24,624	LukeDCoffey
SpiFa_eV	More than 100,000 people attended a peace rally and demonstration in Berlin on Sunday in support of Ukraine. Organizers, which included peace and environmental groups, unions and churches, had expected 20,000 to gather.	19,065	nytimes
WierzbickiJerzy	Ukraine has officially filed a lawsuit against the Russian Federation to the International Court of Justice in the Hague.	18,806	ZelenskyyUa
hotellerie _de	Estonia is banning Russian airlines from our airspace. We invite all EU countries to do the same. There is no place for planes of the aggressor state in democratic skies.	18,280	kajakallas
WierzbickiJerzy	According to Putin's plan, Belarus' troops had to enter Ukraine a week ago. But something went wrong. Some officers resigned, some fled Belarus and contacted us. Conscripts are massively fleeing. Apparently, some generals opposed the participation of Belarus in the war.	15,685	franakviacorka

* The text of the tweets are translations provided by the Google API.

The Hotelverband Deutschland (@hotellerie_de) group recorded the highest number of retweets related to the related to the Russia-Ukraine war, with 30 tweets that collectively garnered 395,019 retweets. Their most retweeted involvement featured a tweet with 137,624 retweets, highlighting a compelling speech by Patrick Moelleken, a Ukrainian actor and filmmaker. Furthermore, the group Polish Chamber of Milk (@PolskaIzbaMleka) retweet a tweet of 118,396 retweets. The tweet describes people marching through central Moscow, chanting "No to War". The remaining groups of interest also contribute to the retweet activity, mentioning topics such as Russian liberation, peace rallies and demonstrations, legal actions, air-line bans, and troop movements.

Once again, to provide a more detailed view of the networks formed through interactions, a network analysis is conducted, focusing on the retweets of European interest groups rather than their original messages. This analysis covers the top 500 most retweeted retweets by these entities,

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regardless of whether the original poster is part of the network or not. Table 5 delves deeper into the three centrality measures.

Table 5. Network metrics for retweets by European interest groups related to the Russia-Ukraine war, using Fruchterman-Reingold algorithm (February 24th - March 6th 2022).

X username	Degree centrality	Betweenness centrality	Eigenvector centrality
WierzbickiJerzy	34	1520	1.0001
hotellerie_de elpia	30	1515	0.9111
efpia	14	730	0.1991
danske research	14	NA	0.0999
PolskalzbaMleka	12	1305	0.2000
jnaervig	12	NA	NA
grupa pfr	11	1535	0.0888
MVFP_Presse	8	778	NA
ECG_Association	8	NA	0.0707
belzypresse	7	573	NA
DanskIndustri	NA	648	NA
GrainClub	NA	502	NA
FinanceLatvia	NA	474	NA
ecosia	NA	NA	0.1888
ASCER_comunica	NA	NA	0.1322
Semantic Visions	NA	NA	0.1222

In the assessment of degree centrality, Polskie Zrzeszenie Producentów Bydła Mięsnego (@WierzbickiJerzy) shows the highes value, indicating a network of retweet connections. Following closely is Hotelverband Deutschland (@hotellerie_de), which also demonstrates influence with a value of 30. This trend of leadership continues as Polskie Zrzeszenie Producentów Bydła Mięsnego also leads in betweenness centrality with a value of 1520. This confirms the organization's function in facilitating the flow of information and connecting disparate users within the network, reinforcing its central role in network communications. Further solidifying its position at the nexus of the network, Polskie Zrzeszenie Producentów Bydła Mięsnego achieves the highest eigenvector centrality score. This indicates not only its connection to other influential users but also its influence over the network's structure and reach.

The graphical representation of the network analysis of the retweets can be seen in Figure 3.

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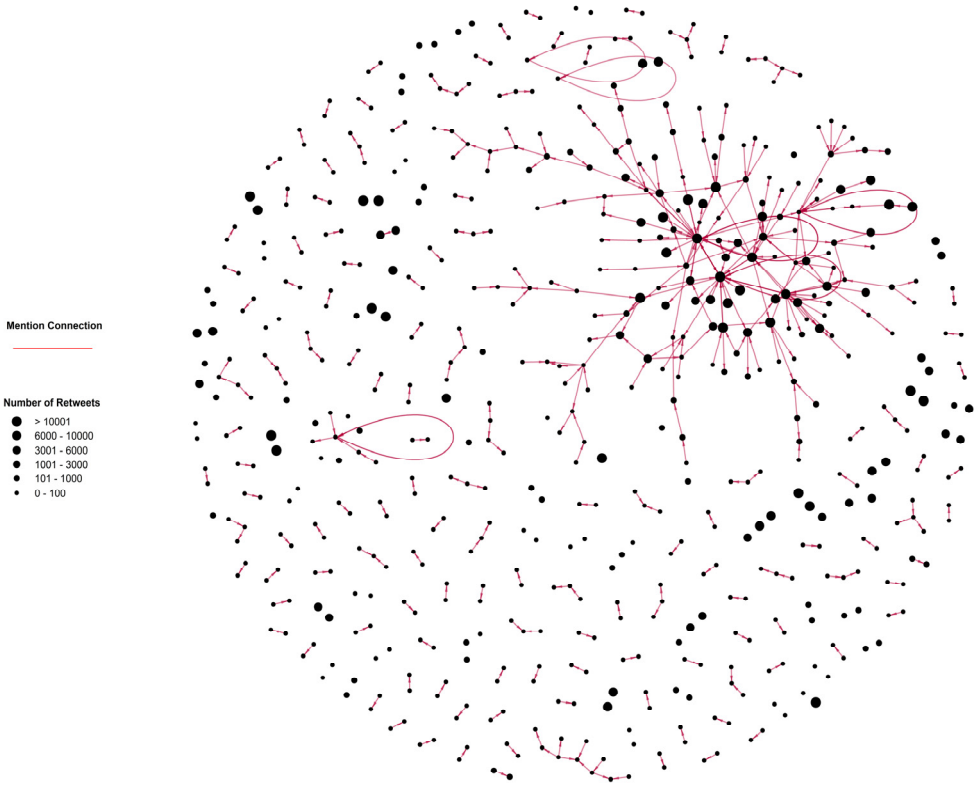

Figure 3. Network graph of the top 500 most retweeted retweets by European group of interest (Fruchterman-Reingold algorithm).

4. Discussion

In the first instance, using a LDA analysis, two discursive frameworks were identified in the tweets of the interest groups: one ten days before the invasion of Ukraine and another after the conflict began. The comparison reveals that the war influenced the digital communication agenda of these organizations. In addition to messages explicitly related to the conflict, there was a shift in other discursive themes, which began to focus mainly on issues such as energy and price increases, effects derived from the war. This influence of the war on communication strategies has been documented and verified in various studies [48–50]. These findings confirm the first two hypotheses of the research, demonstrating that European interest groups actively participate in this issue and that there is a change in the dominant discursive lines in their online communication.

Delving into the topic directly related to the war, it is noteworthy that the ten key words identified by the algorithm reveal that the majority of the included messages express their support for Ukraine against the Russian invasion. This finding is consistent with the prevailing argument in the scientific literature [4,14], which argues that interest groups incorporate external lobbying activities into their communication strategies not only to mobilize the masses but also to position themselves on current relevant issues. In this regard, the strategies employed by interest groups include actions aimed at amplifying external messages to mobilize support for protests, closures of Russian offices or productive sectors as a pressure tactic, and the promotion of solidarity activities in support of Ukraine. Additionally, efforts were made to intensify messages aimed at influencing policymakers and promoting the imposition of sanctions on the Russian government. These tactics align with findings from previous research on similar situations [11–13].

In terms of sentiment analysis, the third hypothesis of the research was confirmed: there was a decrease in negative sentiments in the 10 days following the invasion, as suggested by Sazzed [28].

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Typically, the most negative messages appear in the early days of the conflict, indicating that interest groups took a more radical initial stance, which moderated as the event unfolded. Other research [51–53] also highlights the high level of extremism in messages on X about a topic in the initial days following its occurrence, especially considering the context of the event. In contrast, no correlation was observed between positive sentiments and the passage of time.

Finally, regarding the specific behavior of interest groups on the network, significant differences were observed between the original tweets issued by the groups and their participation in the amplification of messages through retweets. Original tweets generally included statements from companies and commercial organizations about their activities, while retweets tended to enhance support for Ukrainians in various aspects.

The most influential entities inside the original tweets network were those that used the platform for promoting coordination among various interest groups. These organizations provided mutual support, fostering a collaborative environment. Several companies were specifically identified as employing this strategic approach to communication.

Contrastingly, when examining the retweet network, a different picture emerged. There was a noticeable lack of clear coordination efforts for amplifying messages, whether those messages originated within the network or came from external sources. This discrepancy confirms the fourth hypothesis and suggests that while original content from certain influential companies focused on unity and mutual aid, the broader retweeting behavior did not reflect a unified strategy to enhance message dissemination.

5. Conclusions

This study enhances knowledge of digital communication in outside lobbying strategies by analyzing how interest groups adapt their messaging on X in response to geo-political events like the Russia-Ukraine conflict. Researchers can utilize the insights from this study to develop a deeper understanding of crisis communication, specifically war situations strategies, within social networks.

Specifying the explanatory potential of the techniques used in this study, LDA analysis provides information on the evolution of public discourse and event-driven conversations on social network X. Similarly, sentiment analysis is used to assess organizational responses to the conflict, while network analysis helps identify dynamics of influence, highlighting which entities have more impact and influence within the network. By integrating these techniques and aligning them with the stated objectives, it is possible to contribute to understanding how interest groups shape public discourse on social networks and lay a foundation for exploring the implications this has for policy development.

In this regard, it is important to note that a significant limitation of this study is that the evolution of discursive frameworks analyzed cannot be considered longitudinal. Although it covers a broad period before and after the start of the war, which serves as a turning point for comparisons, future research could involve analyzing discursive development using other events as comparative markers. This could also deepen the observed trend of a decrease in messages with negative sentiments. On the other hand, studying the impact of the conflict in areas such as energy policies and price increases through case studies could provide a more detailed view of these issues, since, as mentioned, they do not directly condition the discourse about the war; but they do mark important elements in agendas caused as an indirect consequence of the conflict itself.

Closely related to the previous limitation, it should be considered that this research focuses on understanding the influence of interest groups during conflicts, primarily focusing on the short-term effects, which may overlook the broader and long-term impact of the conflict. Although it analyzes how these groups coordinate their actions, there is a risk of not fully capturing the extent of their influence. To overcome this limitation, it is suggested to conduct research focused directly on the effects of these communications, beyond their form and the connections and dependencies that exist between the senders. It would also be valuable to explore the differences in influence based on the alliances and communication strategies employed.

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