Chapter 1

Infodemic as a global threat: disinformation and conspiracy theories of the SARS-CoV-2 era

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Abstract: The SARS-CoV-2 pandemic provoked a radical rise in the number of unverified information. The rapid development of the pandemic led to permanent chaos caused both by misinformation and disinformation, coined "infodemic" by the World Health Organization. The study aims at identifying primary and secondary sources of false information, describing their impact on the modern digital environment, examining whether it is possible to stop or significantly limit the problem of infodemic through appropriate institutional measures, and proposing policy changes to limit the negative impact of the infodemic. By analyzing multiple case studies, the study proposes a number of solutions such as transnational cooperation of tech giants, governments, and NGOs, improvement of social media algorithms, and the further development of social media departments responsible for verifying harmful content. The study also stresses the importance of including information verification in the curriculum at all levels of education.

Keywords: Infodemic; SARS-CoV-2; COVID-19; Coronavirus; Disinformation; Fake news; International Security; Information Security

Introduction

The SARS-CoV-2 pandemic provoked radical changes in the functioning of many countries and has had a significant impact on societies. The rapid development of the epidemic introduced chaos and permanent information noise. Isolated communities rely more than ever on Internet resources, both by consuming and generating huge amounts of data. By combining information from official channels (media, governments,

NGOs), private companies, and friends, Internet users create their coronavirus reality. Fake news, disinformation, misinformation, and conspiracy theories have become common in the era of social media. Since the beginning of the COVID-19 pandemic a significant increase in their number has been observed[1]. The situation is becoming grave because it undermines citizen's confidence in public institutions, health professionals, and epidemic prevention programs, which are currently the only effective way to control the pandemic.

The increased activity of societies on the Internet has led to a significant increase in generated network traffic, exceeding previous estimates of various experts. According to OpenVault Broadband Insights Report 2020, the amount of generated data is already as high as it was prognosed to be in 2021, reaching 47% growth in relation to the same period last year[2]. The enormous amount of generated data, the exceptional situation of pandemics, and the lack of unanimity of governments and experts in the joint approach to combat the pandemic have caused an infodemic.

The concept of infodemic, in the context of the SARS-CoV-2 pandemic, was officially used for the first time by Tedros Adhanom Ghebreyesus, Director-General of the World Health Organization (WHO), at the meeting of foreign and security policy experts in Munich in mid-February this year[3]. According to the WHO, infodemic is an information overload that makes it impossible to reach the merits of the problem in the event of a coronavirus pandemic. Infodemic can hinder an effective public health response and can cause confusion and distrust among citizens in the medical services, the authorities, and official sanitary and epidemiological recommendations.

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[1] PWC, "How fake news has exploited COVID-19", https://www.pwc.co.uk/issues/crisis-and-resilience/covid-19/how-fake-news-has-exploited-covid19-cyber.html, access 26.08.2020.

[2] Open Vault, "Broadband Insights Report (OVBI) 2020", https://openvault.com/wp-content/uploads/2020/08/Openvault_Q220_DataUsage_OVBI.pdf, access 26.08.2020.

[3] UN Department of Global Communications, 2020. "UN tackles 'infodemic' of misinformation and cybercrime in COVID-19 crisis", https://www.un.org/en/un-coronavirus-communications-team/un-tackling-%E2%80%98infodemic%E2%80%99-misinformation-and-cybercrime-covid-19, access 26.08.2020.

This is how the concept of infodemic was explained by Ph.D. Marek Łaziński from the Institute of Polish Language at the Faculty of Polish Studies, University of Warsaw:

> This is an interesting word, it reflects the threat of another virus, a symbolic virus of unverified information. It is an extremely interesting combination of two elements. Just as interesting as the word "epidemic" in the current context. The combination of "epi" and "demos", currently means a situation in which germs are transmitted between people. In the case of "epidemic", "infodemia" was created, and so the Greek "demos" ceased to mean "people" and became a definition of a threat. The creation of new words is an expression of a human need to orient oneself in a new reality[4].

The problem of infodemic has been described before, as it has been proven that if it is accompanied by a pandemic, it can have a negative impact on its course, provoking more infections and increasing mortality[5]. Social media plays a special role, serving as the first source of information for a growing number of recipients[6]. Continuous presence in an environment that provides unproven information can change the attitudes and behavior of individuals. Even if users do not belong to groups that propagate false information, they still may be exposed to such content on a regular basis[7].

This study aims to identify main infodemic trends and analyze the course of infodemic to indicate possible directions of its development and

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[4] Dziennik Naukowy, (2020). "„Koronakryzys", „infodemia", „koronagedon" – jak pandemia wpływa na język", https://dzienniknaukowy.pl/czlowiek/koronakryzys-infodemia-koronagedon-jak-pandemia-wplywa-na-jezyk, access 26.08.2020.

[5] Kim, L., Fast, S.M., & Markuzon, N. "Incorporating media data into a model of infectious disease transmission." Plos One, 2019, https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0197646, access 27.08.2020.

[6] Mitchell, A., Gottfried, J., Barthel, M., & Shearer, E. "The Modern News Consumer. *Pew Research Center's Journalism Project.*", 2016, https://www.journalism.org/2016/07/07/the-modern-news-consumer/, access 27.08.2020.

[7] Weeks, B.E., Lane, D.S., Kim, D.H., Lee, S.S., & Kwak, N. "Incidental Exposure, Selective Exposure, and Political Information Sharing: Integrating Online Exposure Patterns and Expression on Social Media." *Journal of Computer-Mediated Communication, 22*(6), 2017, https://academic.oup.com/jcmc/article/22/6/363/4675094, access 28.08.2020.

effective methods of prevention. The study examines whether it is possible to stop or significantly limit the problem of infodemic through appropriate institutional measures and to highlight suggested fields and sectors, the strengthening of which may be crucial to achieving satisfying results.

Comprehensive completion of the analysis was possible thanks to the extensive source material. The problem of infodemic was recognized at an early stage of the SARS-CoV-2 pandemic and attracted the attention of researchers from all around the world. So far, numerous detailed research on infodemic has been carried out. This study organizes them and marks the main directions of change to efficiently combat infodemic. The author's professional involvement in fact-checking (analysis and verification of information) made it possible to gather a rich database of case studies.

The analytical part of the paper consists of two sections. The first section examines the threats posed by infodemic, indicates the causes and sources of disinformation, and presents the vectors used by disinformation and misinformation to reach network users. The second part contains an evaluation of the previous prevention initiatives, both institutional and grassroots, and recommendations. Both sections are enriched by materials obtained in the author's professional work.

Infodemic and its sources

Without a doubt, the primary cause of the infodemic is the SARS-CoV-2 pandemic itself. The completely new (on such a scale and in such form) crisis from the first days of the epidemic caused an unprecedented flood of false information. Sources of infodemic can be divided into primary, i.e., those that are the direct cause of the current situation, and secondary, i.e., those created on the ground of early information chaos. The catalog of primary sources is not extensive and seems to remain closed. It consists of a serious epidemic situation and the development of the information society in the era of the digital revolution, with coexisting imperfections of information filtering and classification. Secondary sources are an open catalog with some

major issues to be emphasized; deliberate disinformation, insufficient risk communication, conspiracy theories, and ordinary rumors.

In modern history, we may easily find cases of information chaos caused by an epidemic. One of the most prominent examples is the Spanish flu pandemic of 1918–1919. An unprecedented flood of harmful rumors, resulting from misinformation and lack of access to reliable news, has been reported from the very beginning of the pandemic, especially in the province[8]. However, the digital revolution has changed the scale of misinformation's spread. In the age of the digital society, the expansion and ubiquity of data have become key factors in the shaping of the modern informational landscape. The accelerated development of media, especially social media, and digital communication technologies mark a new era[9]. Therefore, the infodemic during the SARS-CoV-2 pandemic should be treated as a precedent event, as it never occurred before in such conditions and on such scale.

Since the beginning of the pandemic, an avalanche of fake content on the Internet was forecasted by experts[10]. When officials called on the public to stay at home and flatten the disease curve, experts raised the alarm that their messages were competing with the enormous wave of disinformation on the web[11]. The uncertainty related to the coronavirus, combined with the intense global demand for information, created an excellent base for speculation, gossip and conspiracy theories. In early 2020, complicating the situation, celebrities and politicians became one of the main drivers of disinformation about COVID-19[12]. A prime example is the early position of governments on

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[8] Jan, Wnęk. „Pandemia grypy hiszpanki (1918–1919) w świetle polskiej prasy". *Krakowska Akademia im. Andrzeja Frycza Modrzewskiego, Archiwum Historii i Filozofii Medycyny, 77, 16–23.*

[9] Hiranya, Nath. "The Information Society." *Space and Culture India*, *4. 19–28*. 2017.

[10] Brandy, Zadrozny. "These disinformation researchers saw the coronavirus infodemic coming." NBC, https://www.nbcnews.com/tech/social-media/these-disinformation-researchers-saw-coronavirus-infodemic-coming-n1206911, access 01.09.2020.

[11] Institute for Strategic Dialogue Digital Research Unit. "Covid-19 Disinformation Briefing No.1." 2020. https://g8fip1kplyr33r3krz5b97d1-wpengine.netdna-ssl.com/wp-content/uploads/2020/03/Briefing-Covid-19.pdf, access 01.09.2020.

[12] Jim, Waterson. "Influencers among key distributors of coronavirus misinformation", *The Guardian*, 2020. https://www.theguardian.com/media/2020/apr/08/influencers-being-key-distributors-of-coronavirus-fake-news, access 01.09.2020.

the futility of wearing disposable masks, which later radically changed[13]. In the early stages of the epidemic, when there were significant shortages of masks and disinfectants, such rhetoric was beneficial for governments, but after the change of position, the credibility of official guidelines was noticeably affected[14]. Reuters Institute's analysis showed that misinformation disseminated by politicians, celebrities, and other public figures accounted for 20% of the total pool of misinformation and at the same time generated as much as 69% of users' involvement in social media, which are the key sources of knowledge for the information society[15].

False information about the coronavirus turns out to be so common in social media that it becomes really difficult for the average user to avoid participating in spreading false or misleading content. Facilitating the search for reliable information about COVID-19 is also complicated by dynamic changes in researchers' positions and a lack of consensus in the scientific community. SARS-CoV-2 is a new virus, which raises several problems in developing a uniform strategy and forming proper risk communication. From the network user's perspective, the situation resembles absolute information chaos, in which the positions of governments are challenged by medical authorities, who also often turn out to be wrong. This leads to a lack of trust in official recommendations and provokes an increased vulnerability of content recipients to disinformation.

The information chaos associated with the SARS-CoV-2 pandemic is eagerly exploited by the parties and people who, thanks to disinformation, achieve their goals. Among them, there are two main groups – institutions, accounts, or channels that disseminate content that supports the narrative of states or political groups and those based on disinformation as a means to achieve their financial gain.

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[13] BBC News. "Wear Masks in Public, WHO Says in New Advice", https://www.bbc.com/news/health-52945210, access 01.09.2020.

[14] Zeynep, Tufekci. "Why Telling People They Don't Need Masks Backfired", *The New York Times*, 2020. https://www.nytimes.com/2020/03/17/opinion/coronavirus-face-masks.html, dostęp 01.09.2020.

[15] Scott, Brennen, et al. "Types, Sources, and Claims of COVID-19 Misinformation", *Reuters Institute for the Study of Journalism at the University of Oxford*, 2020. https://reutersinstitute.politics.ox.ac.uk/types-sources-and-claims-covid-19-misinformation, access 02.09.2020.

Motivations of those resorting to disinformation can be varied. Often it is to build the image of a strong leader, as was the case with Alaksandr Lukashenka, who publicly stated that the virus is harmless and that it can be eradicated by drinking vodka and bathing in the sauna[16]. He also accused the World Health Organization (WHO) and the International Monetary Fund (IMF) of offering a bribe for the introduction of sanitary restrictions in Belarus, even though he applied for a loan himself[17].

The false information that the country was free of SARS-CoV-2 was also spread by Tajikistan. The authorities insisted that there can be no epidemic in a country so well managed[18].

Polish Prime Minister Mateusz Morawiecki also committed a similar manipulation in July, urging citizens, especially the elders, to participate in the elections, stating that the SARS-CoV-2 virus "was in retreat", despite all the data indicating that the number of coronavirus infections was rising[19]. Less than two weeks later, the virus's reproduction rate increased significantly, and the epidemic situation deteriorated dramatically[20]. This manipulation aimed to convince the undecided voters to participate in elections and increase the chances of the ruling party.

In the case of Russia, Alexander Morozov, the political scientist from the Boris Nemtsov Academic Center in Prague, emphasized that the Kremlin's behavior did not deviate from expectations, and he accurately predicted further development of Moscow's rhetoric. Moscow has developed two

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[16] Andrei, Makhovsky. "Nobody will die from coronavirus in Belarus, says president", *Reuters*, 2020, https://www.reuters.com/article/us-health-coronavirus-belarus-idUSKCN21V1PK, access 02.09.2020.

[17] Gerry, Rice. Press conference speech. 21.05.2020, https://www.imf.org/en/News/Articles/2020/05/21/tr052120-transcript-of-imf-press-briefing, access 03.09.2020.

[18] Eurasianet. "Tajikistan says it has no COVID-19, attributes new death to swine flu", 20.04.2020, https://eurasianet.org/tajikistan-says-it-has-no-covid-19-attributes-new-death-to-swine-flu, access 03.09.2020.

[19] Rzeczpospolita. „Koronawirus w odwrocie" Jest zawiadomienie do prokuratury", 28.08.2020, https://www.rp.pl/Covid-19/200829332-Koronawirus-w-odwrocie-Jest-zawiadomienie-do-prokuratury.html, access 03.09.2020.

[20] European Centre for Disease Prevention and Control. "COVID-19 daily epidemic forecasting", *Johns Hopkins University,* https://renkulab.shinyapps.io/COVID-19-Epidemic-Forecasting/_w_813c29 53/?tab=ecdc_pred&country=Poland, access 04.03.2020.

narratives simultaneously presented to internal audiences as a comprehensive picture of Moscow's superiority and Western helplessness. The first narrative includes headlines stating "The virus was brought to China by the American army" and pro-Kremlin commentators continue to write about the "hysteria of the Western elite" and the "collapse of the European Union". The second narrative used by the Kremlin's media is that of "global solidarity" because the Russian government is beginning to take the same precautions as European governments. The Kremlin's media now creates a mixture of these two narratives according to the following principles: The Russian authorities are calmly and effectively combating the virus, and the governments in Europe and the USA are creating hysteria, making mistakes, and provoking criticism from citizens.

For external audiences, the narrative will go in two directions: it will address the European and other governments with a proposal of partnership and Moscow's participation in global solidarity, which cannot be rejected. But on the other hand, it will reach out to European audiences who are looking for "alternative opinions" to their rulers. This is a large audience, consisting not only of some Russian-speaking people in Europe but also the electorate of the new right-wing, eurosceptics, and populists in various countries.

The Kremlin will use this real European material to quote out-of-context criticism of national antivirus programs that will appear in European discussions; criticism of Brussels actions by eurosceptics and statements by panicked European bloggers about the disastrous economic consequences of the measures taken."[21].

Anonymity and the ability to create free websites facilitate the creation of disinformation on the Internet. The low entry threshold is very tempting for individuals and groups who want to make money by spreading unreliable information. This type of activity can be very profitable if it reaches the right target group. The measure of commercial success for online

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[21] Karol, Orzeł. „Jak wygląda propaganda dotycząca koronawirusa w Rosji?", *Fakenews.pl*, 26.03.2020, https://fakenews.pl/blog/jak-wyglada-propaganda-dotyczaca-koronawirusa-w-rosji/, access 04.03.2020.

publications is the so-called clicks, i.e. unique article views. The more people open an article, the higher the income from advertisers becomes.

Creators of false content are based on emotional, popular, and controversial topics. Statistically, false messages based on negative emotions, especially those that include titles that are shocking, pejorative content, are more popular than neutral or positive ones[22]. The so-called "clickbait", a headline that is supposed to provoke the recipient to click on an article thanks to false suggestions, is experiencing a particular boom in the COVID-19 era. This technique originated from tabloid publications, however, it has already been taken over by the largest portals, and its use has become widely accepted, although according to experts' opinions it is a form of manipulation that seriously intensifies information chaos[23].

An in-depth study by the Global Disinformation Index (GDI) in 2019 on a sample of about 20,000 websites that were classified as unreliable sources by Poynter/PolitiFact, Snopes, and other fact-checking portals, found that advertising technology companies spend about $235 million a year on running ads on such sites. Google supported about 70% of the websites in the sample. It also provided 37%, or $86 million per year of revenue to its owners[24]. One of the reasons for this dangerous situation is the ease with which Google makes money on website ads. Anyone with a domain can apply for AdSense and, if accepted, can start placing ads on their website. According to GDI, verification is not effective, and the vast majority of unreliable websites cooperate with Google. This ease is very tempting for fake content creators who use free hosting or services such as YouTube to reach vulnerable audiences to make a profit.

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[22] Jeanette, Paschen. "Investigating the emotional appeal of fake news using artificial intelligence and human contributions", *Journal of Product & Brand Management*, 06.05.2019, https://www.emerald.com/insight/content/doi/10.1108/JPBM-12-2018-2179/full/html, access 05.09.2020.

[23] Chen, Y.; Conroy, N.J.; Rubin, V.L. "Misleading online content: Recognizing clickbait as false news", *International Journal of Advance Research, Ideas and Innovations in Technology,* 2018, p. 817–819.

[24] Global Disinformation Index. "The Quarter Billion Dollar Question: How Is Disinformation Gaming Ad Tech?", 2020, https://disinformationindex.org/wp-content/uploads/2019/09/GDI_Ad-tech_Report_Screen_AW16.pdf, access 05.09.2020.

In the context of infodemic, the biggest players of the advertising market, Google and Facebook are crucial. The most famous search engine, social network, and their direct subsidiaries, such as Whatsapp, Instagram, or YouTube, according to experts' estimates, generate about 20% of global network traffic[25]. It should be kept in mind that at the same time these services are the main social platforms on which direct interaction between Internet users takes place. The key to the success of these brands is a strategy of increasing user engagement. Facebook's algorithm determines the level of engagement based on a huge amount of constantly collected data. The service adapts the relevant content to the recipient so that what each user sees is unique. When such a user logs in to their Facebook or YouTube account, they see many posts or videos on their newsfeed. That is the sum of all the content that is generated and processed by the community, with particular emphasis on the profile of the person who is the direct recipient of the content[26]. It largely contributes to the creation of filter bubbles in which users are being closed. They are mainly reached by information shaped according to their interests, views, and beliefs, which further enhances the natural effect of confirmation. As it has been proved, it directly leads to polarization and radicalization of social media users[27]. Continuous exposure to false information can further catalyze these processes.

Conspiracy theories

The COVID-19 pandemic caused an avalanche of dangerous disinformation and gossip in the form of conspiracy theories, including false explanations of the origin of the virus, how it should be treated, and who is guilty of its spread. Conspiracy theories undermine science, facts, and trust in institutions posing a direct threat to individuals and communities. Social

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[25] Sandvine. "The Global Internet Phenomena Report", https://www.sandvine.com/hubfs/Sandvine_Redesign_2019/Downloads/Internet%20Phenomena/Internet%20Phenomena%20Report%20Q32019%2020190910.pdf, access 05.06.2020.

[26] Facebook. Reklamy na Facebooku – informacje, 2020, https://www.facebook.com/ads/about/?entry_product=ad_preferences, access 10.09.2020.

[27] Uthsav, Chitra & Christopher, Musco. "Analyzing the Impact of Filter Bubbles on Social Network Polarization", 2020, https://www.researchgate.net/publication/338758106_Analyzing_the_Impact_of_Filter_Bubbles_on_Social_Network_Polarization, access 10.09.2020.

media are the primary channels for the spread of such content. The latest version of the Facebook algorithm promotes content with active user participation. It facilitates interaction and favors topics and groups that are highly active[28]. The author's observations show that with the new (2020) algorithm, the model of spreading disinformation has also changed, which almost perfectly matched with the outbreak of the SARS-CoV-2 pandemic.

The specificity of infodemic has led to the creation of numerous groups and communities focused on controversial assumptions resulting from disinformation or misinformation. The largest Polish group undermining the very existence of the pandemic, at the time of writing this study, had about 115,000 users. Such groups based in the United States often reach over 500,000 members. This is a significant number and in the context of the rules that govern the new Facebook algorithm – very effective. Such a large number of supporters generates a huge number of interactions. The communities involved in conspiracy theories show extremely high responsiveness, which in the context of the 2020 algorithm gives them a huge influence on other users of social media[29].

Building these types of communities, which are bonded by the syndrome of a besieged fortress, inevitably leads to group polarization, i.e. a situation in which the group is willing to make more radical demands than its original individual members. Such ideas effectively proliferate beyond digital reality, leaving a mark on the world's strategies of fighting the pandemic[30].

According to months-long research by the author, the most popular conspiracy theories of the COVID-19 era are divided into two main groups – those that completely deny the pandemic and those that attribute the pandemic to a conspiracy of governments/secret groups. The second group

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[28] UnboxSocial. "How does Facebook algorithm work and step-by-step guide on how to make it work for you", 2020, https://www.unboxsocial.com/blog/how-does-facebook-algorithm-work/, access 10.09.2020.

[29] Paul, Hitlin & Lee, Rainie. "Facebook algorithms and personal data", *Pew Research Center*, 2019, https://www.pewresearch.org/internet/2019/01/16/facebook-algorithms-and-personal-data/, access 12.09.2020.

[30] Bavel, J.J.V., Baicker, K., Boggio, P.S. et al. "Using social and behavioural science to support COVID-19 pandemic response", *Nat Hum Behav 4*, 2020, https://doi.org/10.1038/s41562-020-0884-z, access 12.09.2020.

often includes those who accept the pandemic, but who believe that SARS-CoV-2 is no different from the usual flu and sanitary restrictions are pointless. As time passes and the number of infections and deaths increases, we can observe a gradual transition of people from the group that denies the pandemic to the group that is skeptical about sanitary and epidemiological recommendations. At the same time, radicalization and further activation of such people are observed more and more often. Conspiracy theorists tend to move their activities beyond virtual reality, organizing marches, happenings, and provocations.

Research on social media has shown that these two groups are particularly active in sharing fake content. People over 65 and ultra-conservatives distribute more than seven times more fake messages on Facebook than any other group[31]. Similar results were obtained in a study using Twitter data, which found that people most exposed to false sources of information were conservative, elderly and politically committed[32].

The study published in the American Journal of Tropical Medicine and Hygiene in August, confirms that the problem is very serious, especially when conspiracy theories lead to the spread of false information that is potentially dangerous to health. Researchers identified more than 2,300 rumors and conspiracy theories related to COVID-19 from 87 countries. Most of these (89%) were classified as rumors or unverified claims about coronavirus; about 8% were classified as conspiracy theories and 3.5% as stigmatizing or discriminatory due to healthcare occupation or illness. Some conspiracy theories suggested that COVID-19 was developed as a biological weapon, and about 15% of cases of disinformation were related to the causes or sources of the disease[33]. The harmful content identified

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[31] Guess A, Nagler J, Tucker J. "Less than you think: Prevalence and Predictors of Fake News Dissemination on Facebook", *Science Advances 5*, 2019.

[32] Grinberg N, et al. "Fake News on Twitter during the 2016 US Presidential Election", *Science Vol 363*, 2019.

[33] Islam, Saiful, et al. "COVID-19–Related Infodemic and Its Impact on Public Health: A Global Social Media Analysis", *American Journal of Tropical Medicine and Hygiene*, p. 1–9, 2020, http://www.ajtmh.org/docserver/fulltext/10.4269/ajtmh.20-0812/tpmd200812.pdf?expires=1601389063&id=id &accname=guest&checksum=01C62DF017567B0A47A061A03B746AAA, dostęp 13.09.2020.

was very varied; drinking bleach, eating garlic, keeping the throat moist, avoiding spicy foods, taking vitamin C, and even drinking cow's urine were supposed to cure COVID-19. Bill Gates appeared routinely as the person standing behind the epidemic. SARS-CoV-2 was also combined with the implementation of 5G technology. Some theories became so popular that Clorox, an American manufacturer of bleach, posted a message on its website alerting customers of the dangers of drinking their product.

Combating disinformation and misinformation in the age of SARS-CoV-2

The exceptional situation did not create new problems but increased the existing ones, which in most cases result from the mechanisms of social and traditional media. The aforementioned user profiling algorithms and the transfer of media into a virtual environment, along with the widespread digitalization of societies, are responsible for the development of the infodemic.

Analysis of international actions taken so far by governments, NGOs, and social media giants & additional measures aimed at combating infodemic

Fact-checking portals were the first to respond to widespread misinformation. The fact-checking departments of organizations such as PolitiFact, Snopes, and Agence France Presse (AFP) intensified their work significantly. The importance of initiatives such as Health Feedback, which specializes in medical verifications, has also increased.

For several reasons, such portals do not seem to be sufficient to effectively combat the infodemic. First of all, they only reach Internet users, thus excluding the elderly, digitally excluded, and particularly vulnerable during the SARS-CoV-2 pandemic[34]. In communities where access to technology is limited, misinformation and disinformation about COVID-19 may continue

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[34] Centers for Disease Control and Prevention. "COVID-19 Death Data and Resources", 2020, https://www.cdc.gov/nchs/nvss/vsrr/covid_weekly/index.htm#AgeAndSex, access 13.09.2020.

to spread. Extremely comprehensive strategies are needed to provide accurate information on disease prevention and treatment.

Secondly, fact-checking portals are not able to significantly influence people already involved in conspiracy rhetoric. Such people have well-established views and automatically classify fact-checking organizations as hostile and "on the other side of the barricade". Finally, these types of portals have limited strength and resources and are unable to keep up with the development of infodemic. Creating false information is much simpler and less time-consuming than carrying out factual verification. When large, radical social media groups were created and YouTube was overtaken by conspiracy vloggers, fact-checkers stopped keeping up with the amount of false content.

Governments also tried to fight infodemic from the very beginning. However, their messages often provoked widespread skepticism as they changed with new scientific findings and resembled incompetence. The different models of fighting the epidemic in different countries also generated criticism and raised new doubts.

The case of disposable masks caused much controversy. The World Health Organization changed its guidelines on the wearing of masks, recommending that they should be worn, while earlier it claimed that there was not enough evidence to support their effectiveness as a standard procedure in everyday life. Also, the WHO has taken the stand that the widespread wearing of protective masks could lead to a shortage of masks for medical workers and create a false sense of security in society[35].

Such position was quickly changed, but after a few months, there were again noticeable divergences in countries' approach to masks. The Netherlands announced that it was giving up non-medical masks in public space due to their unconfirmed effectiveness and returning to the concept of social distance[36]. Throughout the pandemic, the Swedish model, which did

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[35] Ralph, Ellis. "WHO Changes Stance, Says Public Should Wear Masks", *WebMD*, 08.06.2020, https://www.webmd.com/lung/news/20200608/who-changes-stance-says-public-should-wear-masks, access 14.09.2020.

[36] Reuters. "Dutch government will not advise public to wear masks – minister", 29.07.2020, https://www.reuters.com/article/us-health-coronavirus-netherlands-idUSKCN24U2UJ, access 14.09.2020.

not introduce lockdown and was based on recommendations rather than orders, also aroused controversy.

It is still too early to assess which solutions proved to be particularly effective when fighting SARS-CoV-2. However, various local strategies for combating the epidemic provoked misinformation and the creation of theories that unjustifiably assumed the superiority of specific, local solutions. Due to frequent changes in the guidelines and the introduction of completely random restrictions in some countries (such as the ban on entering forests in Poland), effective risk communication was not possible.

The fight against infodemic was also undertaken by social media. Thanks to the digital revolution and progress in the field of online communication, many people tend to use social media as the only source of information. Every day, users generate gigantic amounts of data that appear on platforms such as Twitter, Facebook, and YouTube. Many people consider posting, sharing, and discussing daily news and events on the social network as a daily routine.

With the rapid increase in the amount of daily information displayed by users, they face the challenge of filtering content themselves. In such a large data flow, it is extremely difficult to choose reliable information and avoid false ones. Systematic application of appropriate filters in search results by companies such as Facebook or Google was supposed to limit the spread of false information on websites and groups by limiting their reach and reducing the likelihood that people will share false content or even fake news.

Facebook decided to limit the visibility and reach of posts including misinformation about vaccines. The drastic increase in the costs of advertising the content related to anti-vaccine movements and excluding groups and sites with such topics from search results was supposed to remove the problem. Facebook also intensified its cooperation with organizations associated with the International Fact-Checking Network within the initiative of the American Poynter Institute. Thanks to such agreement fact-checkers were given the possibility to mark false content on the portal and Facebook started to display appropriate messages with verified materials, covering posts with misinformation. Facebook has also supported the fight

against disinformation with $300 million[37]. YouTube replicated this solution and started to mark false information in cooperation with verified fact-checkers.

The efforts of Facebook and YouTube show that these platforms prefer to limit the reach of false information rather than remove it. According to the author's analysis, Facebook usually tried to limit the spread of false messages by reducing their visibility, reach, blocking the display of such content on the newsfeed, or marking it as verified as fake news by fact-checking organizations.

YouTube's strategy usually consists of presenting the full context, or facts, on the board covering the video, with limiting reach of potentially harmful content as the last resort. Both portals have only decided to remove the videos and groups when there was harmful information about COVID-19 (such as the aforementioned bleach drinking conspiracy theory). However, this usually took weeks or even months.

Updating its security policy and extending the definition of harmful content, Twitter announced that it prohibits tweets that "may increase the risk of spreading COVID-19". It meant, undermining the recommendations of experts, promoting harmful medical practices, contradicting scientific facts about coronavirus, or spreading unverified news that causes panic and the development of dangerous rumors. The platform has also implemented new procedures to verify and promote verified content on SARS-CoV-2[38].

Traditional media mostly underestimated the problem of infodemic, limiting themselves to providing current statistics and official sanitary and epidemiological recommendations. The only real efforts have moved the fight to the digital environment.

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[37] Kristen, Hare. "Facebook is putting $300 million toward stabilizing local news", *Poynter*, 15.01.2019, https://www.poynter.org/business-work/2019/facebook-is-putting-300-million-toward-stabilizing-local-news/, access 14.09.2020.

[38] Matt, Derella / Twitter. "An update on our continuity strategy during COVID-19", 2020, https://blog.twitter.com/en_us/topics/company/2020/An-update-on-our-continuity-strategy-during-COVID-19.html, access 15.09.2020.

Recommendations

The development of infodemic is still not sufficiently managed by governments and technology giants. It is noteworthy, however, that the latter, especially social networking platforms such as Facebook, Twitter, or YouTube, has already taken concrete steps to combat misinformation and disinformation. The successes are not spectacular, but the efforts are beginning to bear fruit and practical recommendations can be formulated based on the observations of their actions in recent months.

It should be kept in mind that these are still only preliminary assumptions, based on a limited amount of data, which only, in theory, seem to be the right way to control or significantly reduce the infodemic of the SARS-CoV-2 era. The fact that large social networks are subject to different jurisdictions also causes significant difficulties, so effective legislative solutions should be based on international law. As Ph.D. Łukasz Iwasiński from the Faculty of Journalism, Information, and Bibliology of the University of Warsaw rightly points out:

> Reducing the scale of the fake news phenomenon requires the involvement of the institutions responsible for its publication and distribution – not only online news services but also, and more importantly, social networks and search engines. Research on automated identification of fake news is already underway. However, it is difficult to expect that algorithmic control will solve the problem. Traditional methods of regulation also seem to be ineffective – due to the vastness of information circulating on the Web, as well as the fact that online publications not originating from registered electronic journals, i.e. the vast majority of the content present on the Internet, are not subject to Polish press law[39].

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[39] Łukasz, Iwasiński. „Fake news i post-prawda. Krótka charakterystyka", *Przegląd Edukacyjny 2 (109)*, 2019, https://depot.ceon.pl/bitstream/handle/123456789/15579/Fake%20news%20i%20postprawda.%20Kr%C3%B3tka%20charakterystyka.pdf?sequence=1&isAllowed=y, access 15.09.2020.

The situation is similar in other countries and Poland is not an exception.

It should also be noted that the effective influence of governments and corporations on the content appearing on the Internet can have a censorship effect. The examples of Israel, China, Singapore, and South Korea show that solutions that seriously infringe on citizens' privacy and freedom of speech are being implemented during the SARS-CoV-2 pandemic[40]. Introducing methods that are permanently implemented in internal security systems under the guise of fighting infodemic should be avoided.

In times of crisis, such as the SARS-CoV-2 pandemic, people may be more willing to accept restrictive solutions, but these emergency measures must not go beyond a strict framework. It is important to criticize any solution that is not precisely aimed at the infodemic and not allow its permanent implementation if it can contribute to restricting freedom of speech without proving its necessity beyond any doubt.

Radical actions to limit the scope of harmful theories seem indispensable to stop their dangerous impact on communities. As the measures for the prevention of further spread of the infodemic six recommendations emerge.

1. Governments, in cooperation with scientists, should actively cooperate with transnational social media corporations to actively monitor and eliminate conspiracy theories, groups, and the most involved user accounts when an exceptional commitment to spreading disinformation is confirmed.

    So far, limiting the reach of posts, tweets, and videos has failed to produce tangible results in terms of slowing down the development of the infodemic. This is, by all means, ineffective and raises reasonable doubts as to the actual involvement of social media giants in the fight against disinformation and misinformation, because their

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[40] Arjun, Kharpal. "Use of surveillance to fight coronavirus raises concerns about government power after pandemic ends", https://www.cnbc.com/2020/03/27/coronavirus-surveillance-used-by-governments-to-fight-pandemic-privacy-concerns.html, 26.03.2020, access 16.09.2020.

financial results are directly related to the activity of users. Corporations such as Facebook and YouTube benefit financially from the activities of individuals and groups distributing false content, so a clear conflict of interest can be seen in this case. Governments and international organizations should therefore commit more to influence corporations to support the implementation of solutions that are partly unfavorable for them in accordance with the principles of broadly understood corporate social responsibility.

Also, it should be borne in mind that any solutions should be accepted by the international community to prevent specific countries from influencing social networks to spread their agenda under the guise of combating disinformation.

2. Trade unions, medical chambers, etc. should speed up and improve disciplinary proceedings against their members so that representatives of professions of public trust have to face serious consequences for spreading unproven, harmful information about medical procedures.

    The scientific and medical community should maintain consensus while conducting a substantive debate on concrete solutions. Representatives of professions of public trust should not be allowed to spread fake news, giving conspiracy theorists arguments for harmful or dangerous actions, backed by medical or scientific authority.

3. Social media giants should improve current algorithms to support information verified by independent verifiers and fact-checkers, while drastically reducing the reach of harmful misinformation. At the moment, faulty algorithms often limit the range of posts of organizations combating disinformation, basing only on keywords.

    With no doubt, it is important to oblige social media platforms to disclose the principles of algorithms. Their impact on society is significant, often leading to addiction and radicalization, and should therefore be monitored by specialized institutions, just as the composition and operation of medical products or stimulants are monitored.

4. Social media should further develop departments responsible for verifying harmful content, especially those reported by users. Currently, corporations have mostly engaged algorithms to verify content, which has not proved to be effective in case of less obvious misinformation. To operate in specific areas, portals should take care of an adequately large team of verifiers, or establish cooperation with local fact-checking organizations.

    This is essential for the further efficient operation of such portals. The radicalization and disinformation vulnerability of societies can have potentially very serious consequences for social and political changes. Therefore, the influence of corporations should not be underestimated and should be regulated by international law.

5. Organizations, media, and portals spreading dangerous and false content in public space should be subject to quantifiable financial penalties, imposed by appropriate entities due to the high potential social harm of this type of misinformation.

    Just as social networking sites profit from the traffic generated by harmful content, traditional media often use gossip, controversy, and clickbait to attract the public. Such practices, in the case of infodemic, nullify all efforts to combat disinformation, so they must be properly controlled and made unprofitable.

    In this context, the potential susceptibility of this type of solution to censorship should also be highlighted. Thorough control of the content may silence the national social debate, which is very important for people coping with the complex consequences of a pandemic. An appropriate compromise must be found between discouraging the media from publishing potentially false information and freedom of expression (and/or freedom of the media). Criticism of the government's actions and whistleblowing (disclosure of the organization's harmful activities by its employees or members) should be supported, and therefore an appropriate remedy should be provided in local and international law.

6. It is essential to include information verification in the curriculum at all levels of education.

    Infodemic proves that information chaos is a threat that will appear more and more often in public space. The SARS-CoV-2 pandemic only revealed a problem that will continue to be one of the most serious challenges of the digital revolution era. Nowadays, the most basic skill of a human being is to analyze data sets, as opposed to the old model of knowledge acquiring and restoration. The basic elements of information analysis and verification, treated comprehensively, should be included in the curriculum as soon as possible.

    Above all, successful actions require the goodwill of technological giants and effective cooperation on an international level. Further research should also be conducted to assess newly implemented solutions. Infodemic, just as pandemic, requires increased joint actions by states, NGOs, and transnational corporations. The bottom-up activities, although they bring visible effects, are not capable of combating the infodemic, which, like an incompletely eradicated virus, will recur.