From Social Media to Truth:

Countering Misinformation for a Thriving Digital Economy

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EXECUTIVE SUMMARY

Social media platforms offer assertive communication and interaction among governments, businesses, and civil society. Such platforms become progressively critical for establishing successful and sustainable businesses and steering the growth of the digital economy. They equip users with the ability to share and spread information instantly and timely. However, distorted content on digital platforms affects entities and creates confusion for individuals to distinguish whether they get true or false information.

The proliferation of false or incorrect information, particularly during significant events like the COVID-19 pandemic, also can minimize trust in social media and poses significant threats to the adoption of digital platforms and, hence, affects the digital economy. The issue of misinformation in social media platforms is getting worse as the young population of the world favors such digital platforms over journalism for their source of information. There is an essence to building a better-informed society so that people, particularly the youth, can engage in healthy public dialogue on social media platforms.

This paper aims to explore the misinformation phenomenon and the role of social media platforms and examine the impact of misinformation on the digital economy through a systematic literature review. We described misinformation and its typologies, challenges faced by stakeholders, like policymakers, social media platform managers, journalists, civil society, while combating online misinformation. This paper also highlights stakeholders' perspectives about misinformation, discusses a set of fact-checking tools, their limitations, and the way forward to co-design a state-of-the-art fact-checking tool to assist the worldwide community in tackling the misinformation epidemic across the globe.

This paper concludes with a set of key recommendations, including suggestions for stakeholders' policies, non-regulatory proposals (e.g., state-of-the-art fact-checking tool, launching campaigns to raise public awareness, promoting the use of emerging technologies, like encouraging active participation of civil society), and stressing the importance of digital cooperation amongst stakeholders, to protect their communities from this societal challenge, raise users' confidence in social media platforms, and make the most of their use to grow the digital economy.

Through this paper, we anticipate contributing to the ongoing deliberations to understand this societal problem better, co-create policy interventions to fight against misinformation, enhance consumer trust on social media platforms, and protect the digital economy from such potential hazards.

01.INTRODUCTION

Much online content, including news, is currently freely accessible to users. They can choose articles from different sources on their own and no longer have to purchase a bundled package of articles in a print version. Such a situation raises demand for online content and enables access to diverse news sources. Apart from direct online content, including news distribution via publishers' websites, two-thirds of online content consumption is channeled through algorithm-driven platforms, like search engines and news aggregators, social media platforms. [1, 7]. The spread of false, biased, or inaccurate online content has drawn much concentration in recent years, especially with the proliferation of social media platforms that enable users to share and spread information quickly and timely.

The real-time nature of the contents and the speed and volume of propagation have posed significant challenges to assessing the quality of the information in an acceptable time frame [1, 2]. Various terms are used to describe false information, such as "misinformation", "fake news", "disinformation" "rumors", "urban legends". A search on the Google platform today indicates that the most prominent ones are "misinformation", and "fake news", which are often used interchangeably.

In this work, we adopt "misinformation" term, which refers to incomplete, or factually incorrect information usually spread through different sources, including social media platforms [3, 4, 5, 6, 7]. According to a survey report published in 2021-22 [8, 9], concerns regarding

misinformation on the internet have amounted to 58% globally, with the most occurring in Africa (74%), followed by Latin America (65%), North America (63%), Asia (59%), and the lowest in Europe (54%). The impact of misinformation is far-reaching, affecting not only the quality of
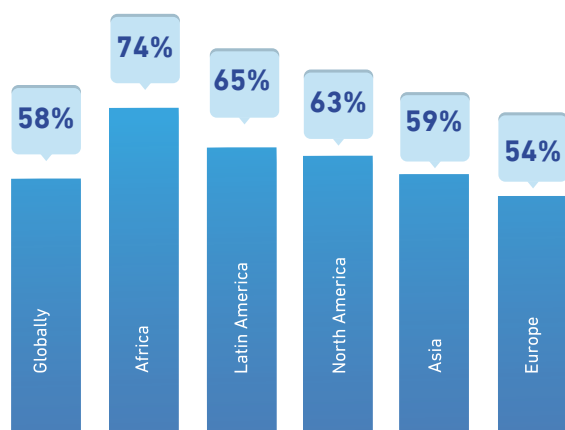

online-generated content but also can have severe effects on consumers and users and extending to the broader digital economy [10, 11, 2, 9].

The stakeholders have critical roles in identifying, preventing, and mitigating the spread of misinformation in today's modern world. These stakeholders include decision-makers, social media platform managers, journalists, and citizens [12]. The citizens usually generate and consume the social media platforms' content; journalists usually publish online content.

The journalists represent a group of sectors, like public and private sectors news media, and Nonprofit Organizations (NGOs). At the same time, policymakers have a critical role in formulating global, regional,

and national policies and regulations on socio-technical, psychological, and economic aspects [13]. There is an essence to considering stakeholders' perspectives regarding misinformation and possible solutions to manage misinformation on social media platforms.

Misinformation spreads faster than accurate information through various sources, like social media platforms[3]. Such platforms, like Facebook, Twitter, Instagram, YouTube., may act as an instant information exchange medium for users, including consumers, and suppliers of goods and services, to share critical information that is required to complete their businesses transactions and to obtain desired economic values [11, 15].

A diverse set of fact-checking tools enables users to verify the authenticity and credibility of information, thereby mitigating the spread of fake news [15].
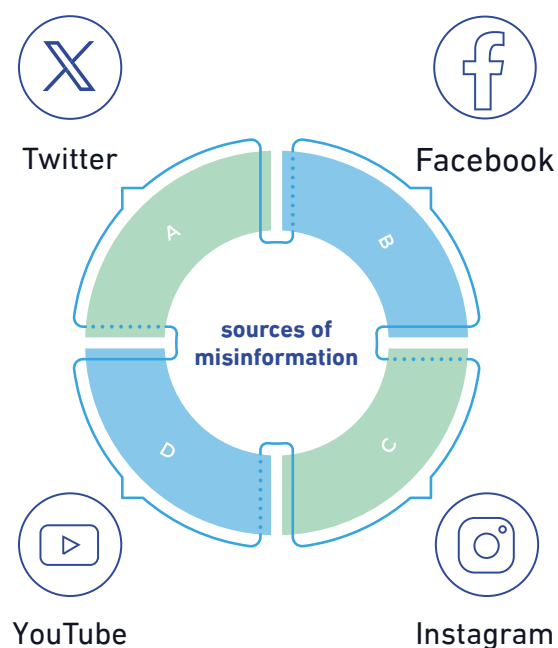
However, these tools have limitations, requiring continual improvement and refinement to remain effective [16]. Such limitations include but are not limited to the following: latency in detecting misinformation, scalability challenges, specific purpose-built, mostly reliance on human interventions, difficulties in verifying certain types of claims. [17, 18].

There is an essence to co-create a state-of-the-art fact-checking tool by addressing the above-mentioned limitations through international cooperation. We explain existing fact-checking tools, their limits, and way forward to mitigate the above-mentioned shortcomings of the tools in the forthcoming section of this paper.

The digital economy has emerged as a crucial driver of growth, innovation, and development, comprising various socio-technical and economic interactions [19]. It is characterized by the interconnectedness of people, processes, data, and devices transforming how we live, work, and interact [20].

Social media platforms are considered a vehicle for the digital economy for faster communication and exchange of information, goods, or services between producers and consumers [18,19,11]. However, spreading misinformation through social media platforms poses unique challenges to the digital economy, including the potential of losing consumer trust, leading to financial losses and reputational damage, increased regulation, and legal liabilities for governments, businesses, and individuals [3, 10, 11]. This rapid spread of online misinformation has been considered a vital threat to the digital economy [6,20]. As such, it is important to address this issue through collaborative efforts between policymakers, citizens, and social media platform managers to develop comprehensive strategies and practical solutions that safeguard the integrity of the digital economy [12].

We noted stakeholders' diverse challenges while combating misinformation in today's digital age. Examples of such challenges include: limited efforts to integrate media literacy into educational curricula [24], the high speed of misinformation spread [22,7], less focus on introducing special norms aligned with international human rights law by the governments to tackle misinformation [26], use of incorrect, misleading contents for online advertising through social media platforms [24,25], individual and collective biases [24,25,26], lack of global cooperation for coordinated efforts across diverse cultural, and political contexts [30], lack of all-inclusive and interoperable fact-checking tools within social media platforms [31].

It is difficult for policymakers, journalists, and civil society to have a holistic view of them so that they can take suitable actions to handle the challenges. We mention other such challenges in the forthcoming section of this study.

As a result of this paper, we offer a set of recommendations, including policy suggestions for the stakeholders to tackle misinformation on social media and digital platforms. Examples of such proposals cover a wide range of areas to manage misinformation that includes but is not limited to the following: adoption of effective mechanisms for misinformation correction on social media platforms; implementation of

corporate standards to address misinformation, formulation, and implementation of a holistic framework for better transparency reporting by social media companies, launch campaigns to raise awareness on this societal challenge, advocacy to governments for the formulation of strategy & policy, and to develop norms, the development, and use of technological fact-checking tools, as digital public goods, and increase digital cooperation to combat misinformation in the global community.

In this white paper, we conducted a Systematic Literature Review (SLR) methodology [32] with the following motivations: to search, examine, consolidate, and describe stakeholder interventions about misinformation, fact-checking tools, their limitations, way forward to manage these limitations, challenges that stakeholders face while combating online misinformation and proposed solutions in the form of policy recommendations. Therefore, we framed the following Research Questions (R.Q.s):

RQ1 What are the key challenges stakeholders face while combating misinformation in the current digital world that such issues also hinder the progress toward the digital economy?

RQ2 What are the stakeholders' perspectives on misinformation?

RQ3 What are the key features of fact-checking tools, their limitations, and stakeholders' viewpoints for the design of such technological tools?

RQ4 What are the recommendations, in the form of collaborative actions, for the stakeholders including policymakers, social media, and digital platforms companies, to fight against misinformation?

The remainder of the research article is structured as follows:

Section 2 '**Background**' mentions the critical aspects of misinformation, social media platforms, and the digital economy.

Section 3 '**Results and Findings**' presents our findings regarding stakeholders' perspectives on misinformation, fact-checking tools, their limitations and way forward, misinformation challenges, and their associated recommendations for the stakeholders to cope with them.

Section 4 '**Conclusion**' we illustrate our conclusions and limitations, and propose future work.

02.BACKGROUND

Misinformation and its Typologies

Misinformation has become a common element of our digital media environments, compromising our societies' capability to establish informed opinions in today's digital world. Misinformation incites social conflicts, establishes mistrust between citizens, authorities, and social media platform providers, and affects citizens' perception of reality, challenging the development of the digital economy.

In the literature, there are various terms to describe false information ranging from broader concepts like "fake news", "misinformation", "mal-information" and "disinformation", to narrower ones like "rumors", "clickbait", "fake reviews". Mal-information is when truthful information is shared to cause harm and stir things up, often by shifting information designed to stay private into the public sphere [29,30,31,32]. Disinformation is intentional and malicious, and it aims to deceive, mislead, or manipulate people by spreading false information or narratives [37].

Fake news refers to news articles or stories intentionally fabricated or distorted to mislead readers [29,5,30,31,32]. Misinformation is often used interchangeably with "fake news" and "disinformation". However, there is no commonly agreed typology for information disorders, although both academia and researchers work toward this direction [6,34]. The common essence is that "misinformation" is false or inaccurate information [11].

For example, in 2015, the World News Daily Report published an article about a ship carrying Ebola-infected rats on its way to the Florida coast. The article contained fake photos and imaginary quotes from non-existent officials. This fraudulent information overwhelmed public opinion, with many readers spreading the news on social media platforms [39].

The health, finance, immigration, democracy, and education sectors require complete and accurate information to contribute better to boosting the digital economy of a state [3]. However, during the COVID-19 pandemic, misinformation about COVID-19 propagated extensively on social media platforms, ranging from peddling fake "cures", like gargling with lemon or salt water and ingesting bleach.

Sources of misinformation

There are various sources of information, like television, radio, printed newspapers and news magazines, online newspapers, social media platforms, messaging apps, social media bots, news aggregators, video hosting websites. [40]. The spread of misinformation online impacts everyone online and offline. However, the speed of dissemination of misinformation through social media platforms is alarming. Misinformation spreads like wildfire on social media platforms [6,36].

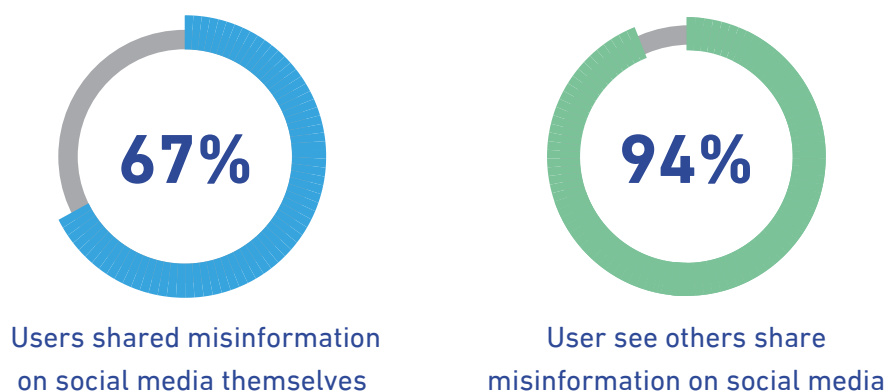| Social Media Platforms | Socialbots | Digital Platforms | TV Channels | Newspapers |
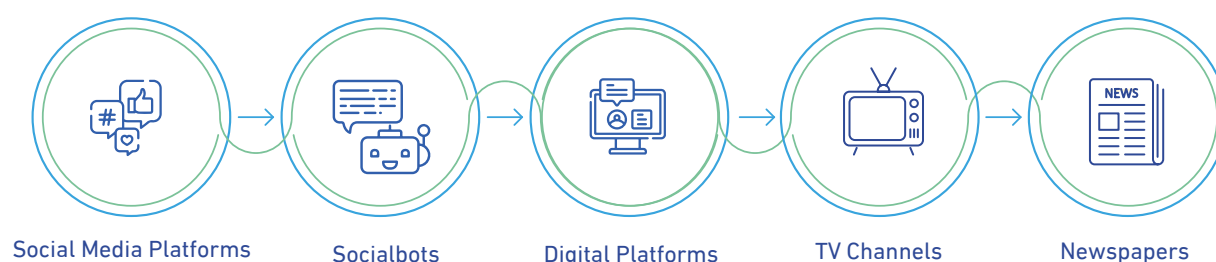
Sources of Misinformation

Another crucial source is SocialBots, i.e. software-driven user accounts on social media and digital platforms, acting autonomously, intending to influence users' opinions or spread targeted misinformation for specific objectives. They are usually blamed for spreading misinformation that has been shown to widen political divides and distrust among online and offline communities and threatens the digital economy [41].

The most popular online sources that foster the spread of misinformation are social media platforms, like Facebook, Twitter, LinkedIn, Instagram, and digital platforms, like websites, email software. [3,18,38].

Social Media Platforms

Social media platforms are technological architectures that facilitate innovation and the economic view and are considered vehicles for market exchange and interactions [18,19]. As individuals rely more on such digital platforms for information, the impact of misinformation can have significant consequences for individuals, businesses, and society. They can lead to decreased consumer confidence, lowered investment in the digital economy, and an economic downturn [39,40,41].

A recent quantitative study on misinformation on social media platforms [46] showed that about 67% of users indicated that they had shared misinformation on social media themselves. A much higher percentage of users (94%) stated that they had seen other users share misinformation on social media [43,11,44].

67%

Users shared misinformation on social media themselves

94%

User see others share misinformation on social media

There are various reasons for spreading misinformation via numerous sources, mainly social media and digital platforms. Examples of such bases include a lack of resources to support cross-validation of information on the platforms, interoperability of platforms with fact-checking tools, lack of media literacy, analytical thinking, and awareness of the users of how to deal with the misinformation on social media and digital platforms. [45,20,46].

Stakeholders

Misinformation is a complex and multifaceted phenomenon that involves multiple stakeholders, including policymakers, journalists, and citizens: Policymakers develop and implement policies and regulations that can promote the accuracy and reliability of information and protect citizens from the impacts of misinformation. Journalists are responsible for verifying and reporting accurate and truthful information and exposing and debunking false or misleading narratives. Citizens are the ultimate consumers and sharers of information while possessing the power to demand and promote accuracy, transparency, and accountability in the information ecosystem [30,34]. The active engagement of these stakeholders can positively impact the digital economy, promoting a healthy and reliable information ecosystem [51].

Finally, information validation practices are key to misinformation detection [52]. Hundreds of independent fact-checking organizations known as fact-checkers, materialized online globally over the past decade, like Full Fact (U.K.), Snopes and Root Claim (U.S.), FactCheckNI (Northern Ireland), Pagella Politica (Italy) [31].

Policymakers

Journalists

Citizens

Digital Platform Mangers

International Organizations

Stakeholders' perspectives on misinformation

The stakeholders' perspectives on misinformation, including combating online misinformation which is mainly concentrating on technical solutions and trusted information in terms of different aspects, like types of data sources (e.g., public institutions issued statistics, Nonprofit Organization data banks), kind of information providers (e.g., government servant, scientists), news story evidence (e.g., author's name under an article, use of multiple references).

Digital Economy

There is no general agreed definition of digital economy. However, researchers, international organizations, and well-reputed IT firms presented digital economy definitions to somehow fulfil their own motives. According to the EU, the digital economy refers to the fact that digitalization affects all businesses, albeit to altering degrees. It comprises businesses that sell goods and services via the internet, and digital platforms that link spare capacity and demand [96]. Digital economy refers to the use of Information and Communication Technologies (ICT) in forming goods and services and their utilization, transforming how we live, work, and interact [49,50,51].

Complete and accurate data and information with sufficient evidence are vital elements of the digital economy which assists industry leaders in making evidence-based decisions [56].

The digital economy is a swiftly nurturing sector comprising all economic activities involving digital technologies and networks, such as e-commerce, social media, online platforms, and digital services [57].

Misinformation and digital economy

Misinformation significantly impacts the digital economy, posing serious challenges and risks for individuals, businesses, and society.

Misinformation can lead to financial losses, reputational damage, and legal liabilities for companies and individuals, undermining the trust and credibility of online platforms and services [16,12,39].

For example, in 2013, a fake tweet about an explosion in the US White House asserted that President Obama, President US, was injured in this explosion, which caused a USD 130 billion loss in the U.S. stock market [58].

During the COVID-19 pandemic, misleading information about the effectiveness of treatments and cures led to confusion and mistrust among health authorities [23].

Fact-checking Tools

Fact-checking is the procedure of validating the accuracy and truthfulness of information, and it plays a crucial role in combating misinformation.

Fact-checking tools and strategies have evolved in response to the challenges and complexity of the misinformation landscape.

They rely on various technologies, like artificial intelligence, machine learning, and natural language processing [59]. Examples of such fact-checking tools include the following: TinEye [56,57], Fakespot [58,57], Co-inform plugin [63], Greek Hoaxes Detector [60,57].

Global, regional, and national efforts to combat misinformation

Various national, regional, and international entities are struggling to fight against misinformation.

For example, the European Union Digital Services Act, the E.U. code of practice on misinformation, forces social media companies to combat misinformation and restrict certain online advertisements [65].

The E.U. also discusses misinformation with tech companies like Twitter [23].

Section two hundred and thirty of the Communications Decency Act in the USA policy focuses on managing the various aspects of misinformation [66].

The OECD is also trying to understand and counter misinformation [36]. The U.N. implemented multiple initiatives to fight against misinformation during COVID-19 [63,64]. The GARM - Global Alliance for Responsible Media and The GPAI - Global Partnerships on A.I., are establishing close liaisons with online advertisers and digital platforms to combat online misinformation [65,66].

Facebook has fact-checking partnerships with civil society organizations that help them mark and manage misinformation on their digital platform. Similarly, Twitter offers labels for warning messages and context on Tweets containing misinformation.

The Myanmar ICT for Development Organization (MIDO) is making efforts to promote technology for social change in the state and to promote media and digital literacy through various initiatives like building a Facebook page incorporating a Messenger chatbot to raise media literacy in the country [71].

Despite the variety of acts against the phenomenon of misinformation, most of the proposed measures are inadequate to effectively respond to the problem, as they serve specific objectives within a specific jurisdiction, focus on certain areas, and the governments require more efforts to balance responses to misinformation concerning freedom of expression.

Research Gaps

We found broad research articles on each topic, like misinformation, the digital economy, social media platforms, and misinformation. However, we hardly find a piece that thoroughly examines together the concepts of misinformation, social media platforms, and their impacts on the digital economy, along with the following vital aspects:

- Critical challenges faced by the stakeholders while combating misinformation.
- A set of stakeholders' perspectives on misinformation, including tackling online misinformation.
- Fact-checking tools, their limitations, and proposals to tackle these limitations.
- The analysis of the misinformation phenomenon and the above-mentioned key aspects.
- Possible recommendations regarding policy interventions and actions to tackle the misinformation.

Our Contribution

The focus of this paper is to address the above-mentioned literature research gaps proposing recommendations and a set of actions for the stakeholders to articulate a policy about the function and responsibilities of social media platforms to fight against misinformation and its effects on the digital economy.

03.RESULTS AND FINDINGS

In this section, we answer our R.Q.s through a detailed analysis of the 81 research studies we retrieved as an outcome of our adopted SLR research methodology.

3.1 Misinformation Challenges

Following, we mention the key challenges that stakeholders face while fighting against misinformation on social media and digital platforms and hinder the progress toward a sustainable and all-inclusive digital economy:

• **The speed of misinformation spread:**
Misinformation spreads rapidly, especially through social media and digital platforms. This challenge is exacerbated by the misinformation amplified through AI-based tools, like bots, making it appear more widespread and influential than it is [22,7].

- **Difficulties in detecting and verifying misinformation:**
  Accessible online, it is cumbersome and a challenge for stakeholders to detect and verify misinforming content, especially on social media platforms [69,40]. Such situations pose undesirable effects on the credibility of such platforms, user trust, emotions, perceptions, quality of content, and social & economic values [11,40].

- **Challenges in countering misinformation:**
  Even when misinformation is detected, it can be challenging for the stakeholders, as humans are affected by emotional attachment. Misinformation can be emotionally compelling and attempts to correct it can be met with uncertainty or outright resistance. The inexperienced online user might fall into the trap of encroachers and prematurely believe the misinformation source is valid.

- **Misinformation and online advertising campaigns:**
  Online advertisement is a popular strategy on the modern web that financially supports most content websites. The Native advertising appears to be first-party content on the hosting website, like inline search results or recommended articles. However, there are different concerns about native ads. For example, a case of deceptive ads content may direct the user to click on them using exaggerated or misleading context (clickbait) [2,20,15].

- **Difficulties maintaining objectivity and neutrality by the media organizations while reporting on different media, including social media platforms:**
  The media organizations face challenges in maintaining objectivity and neutrality. Such organizations should opt for limited approaches for fact-checking and information verification for truthful and unbiased reporting, especially in critical areas like the digital economy and its related aspects [24,25,26].

- **Individuals and groups of people's cognitive biases:**
  The individuals and groups of people's cognitive biases are critical to differentiate between genuine and fake information on social media due to various reasons, like lack of knowledge, resources, critical thinking, as people believe information that fits their pre-existing beliefs [22,33].

- **Lack of inclusion of media literacy in educational curricula:**
  Educational curricula through which the youth (as potential consumers) will learn to analyze messages critically, evaluate the credibility of information sources and wisely produce and disseminate information through social media platforms to safeguard the digital economy from the threats of misinformation [7,22].

- **Lack of global cooperation for coordinating efforts across diverse cultural and political contexts to fight against misinformation:**
  Global cooperation can be challenging due to various factors, like cultural norms, governance systems, literacy, digital development stages, and priorities among countries [30]. Such cooperation is critical to developing socio-technical solutions, like collaborative platforms, to enable intra-organizational collaboration and boost an accessible, inclusive, and equitable digital economy.

- **Non-availability of dashboards for the stakeholders to combat misinformation:**
  There is a non-availability of technology tools with appropriate functionalities, like dashboards connected to social media platforms, that would facilitate stakeholders, particularly for the policymakers to liaise with relevant experts (i.e., subject-matter experts) and external collaborators (i.e., journalists or fact-checkers), and civil society [61].

- **Lack of global standards for tackling misinformation:**
  There is a lack of efforts to develop and enforce global standards for combating misinformation [2].

- **Shortage of State-of-the-Art (SOTA) fact-checking tools to combat online misinformation:**
  Various fact-checking tools somehow assist users in combating misinformation on social media. However, such tools have different impediments, like latency in determining misinformation, scalability issues, bias, subjectivity [57,70,71,72,73]. Moreover, these tools usually provide limited open access, limited use of SOTA AI algorithms, and lack clear transparent procedures for their functionalities.

- **Allocation of resources, including financial, to manage misinformation:**
  International nonprofit organizations and governments have limited dedicated human, technology, and financial resources to fight against misinformation globally. There is also limited resource allocation at a national level due to a lack of awareness about spreading misinformation through novel A.I. technologies, like deep fake A.I., and its consequences, and there is no holistic strategy to tackle misinformation on social media platforms [74,75].

- **Lack of all-inclusive advertising AdTech publisher dis-misinformation policies and their limited implementation by the AdTech firms:**
  Currently, advertising technology (AdTech) publishers are still unable to explicitly tackle narrative-led misinformation as they do not adequately capture the cumbersome tactics and narratives adopted by the misinformation creators. Moreover, the AdTech companies are also not appropriately implementing related quality policies that explicitly tackle such misinformation [8].

- **Lack of appropriate strategy and procedures by the public sector to keep a balance between freedom of speech and controlling misinformation:**
  In the public sector, there is a lack of appropriate strategies and procedures to tackle misinformation from diverse sources, including digital platforms, without restricting the individual's ability to express themselves freely [23, 39]. In this regard, a holistic strategy from the public sector will be helpful to contribute to building an all-inclusive digital economy.

- **Transparency issues in digital platforms:**
  Currently, social media and digital platforms lack transparency regarding the removal of accounts and contents, the design of associated algorithms, and their applications to deal with misinformation cases reported by users [30,34].

- **Raise personal data privacy issues:**
  The existing initiatives that attempt to mitigate misinformation are raising privacy issues. For example, certain misinformation measures that detect or remove false information could infringe on individuals' data privacy. [39, 23,22]. Moreover, due to the non-provision of appropriate data privacy mechanisms for social media platforms, there is minimal user trust in digital platforms, and users are hesitant to utilize social media platforms. This situation poses a negative effect on the global digital economy.

- **Insufficient digital research on misinformation:**
  Digital research professionals and academic institutions are researching misinformation through different sources, including digital platforms and related aspects. However, there is still an essence to conduct more collaborative research to fulfill the digital research gaps to manage this societal issue through evidence-based approach. Therefore, there is an essence to encouraging the said institutions to increase digital research on misinformation to learn novel ways and means to fight against misinformation [21].

- **Limited existence of collaborative platforms to enable intra-organizational cooperation to fight against misinformation:**
  There is finite existence of collaborative platforms for the stakeholders, particularly for the policymakers and public administration, that may allow intra-organizational collaboration in terms of information sharing or sharing of expertise, particularly in larger, more complicated institutions, to combat misinformation within the local and global communities [59].

- **Lack of awareness campaigns and deliberation sessions on misinformation:**
  Misinformation is a critical issue that needs awareness campaigns for the global community on various aspects of misinformation, like consequences and possible socio-technical solutions to tackle misinformation [45, 46].

- **Limited use of emerging technologies, like A.I., in digital solutions to fight against misinformation:**
  In most fact-checking tools, there is little use of A.I. to prevent the spread of misinformation in the digital economy. Thus, there is a need to emphasize the use of responsible A.I. in digital solutions to cross-check social media platforms' messages as false information or otherwise [67].

- **Lack of credible data for making decisions to tackle misinformation:**
  The stakeholders, including policymakers, could have minimal access to credible data about the number of fact-checks or official refutations to make critical decisions while combating misinformation in their ecosystems [59].

3.2 Stakeholders' Perspectives on Misinformation

In this part, we explained stakeholders' perspectives on misinformation regarding their realm-specific concerns, ways to combat online misinformation, use of fact-checking tools, and consideration of trusted information regarding types of data sources, kind of information providers, news story evidence, etc. We gathered the stakeholders' perspectives on misinformation from different research studies, and international and regional entities, like EU, research projects published documents.

The following are the key stakeholders' perspectives:

- Perspectives on misinformation about realm-specific concerns: Civil society, including citizens, usually have concerns about the impact of misinformation on their personal lives, like health or financial decisions [79, 80]. They may also worry about spreading misinformation on social media platforms leading to social or political unrest. Policymakers may view misinformation as threatening the sustainable digital economy, democracy, and social stability, particularly in elections and public health crises. The journalists may view misinformation as a threat to their profession and to the public's trust in the news media [81, 52 , 82, 80, 83, 84, 85].

- Perspectives on key barriers to managing misinformation on social media: Civil society, including citizens, may lack the time or resources to verify the information and may be susceptible to confirmation bias and cognitive dissonance [79, 80]. The policymakers face several issues, like resistance from industry groups and civil liberties advocates who view their efforts as censorship or government overreach. The journalists face various constraints, like time, resources, including financial, in the current media landscape, which may limit them to produce in-time, and high-quality, fact-based reporting. They may also face challenges in reaching and engaging with audiences susceptible to misinformation [81, 52 , 82, 80, 83, 84, 85].

Civil society, have concerns about the impact of misinformation on their personal lives.

The journalists view misinformation as a threat to their profession and to the public's trust in the news media.

Policymakers view misinformation as threatening the sustainable digital economy, democracy, and social stability.

misinformation could be one of the key responsibilities of social media platforms and news organizations. However, they also recognize their role in fact-checking and verifying information. They further added that media literacy education and accountability for those who spread false information are critical factors in combating misinformation [79, 80]. The policymakers thought that tackling misinformation requires the following aspects: investment in high-quality journalism, media literacy education, and legal and regulatory measures, like anti-disinformation laws and platform liability [52 , 82]. Journalists usually require to do the following aspects to tackle the misinformation: fact-checking procedures, responsible reporting, accountability, and media literacy education [81, 52 , 82, 80, 83, 84, 85].

• Perspectives on fact-checking tools to handle misinformation on social media: The stakeholders, particularly journalists and policymakers, stress the essence to co-create holistic encoded and non-coded policies and rules to be incorporated in the software solutions (e.g., web service, browser plugin, dashboard.) to tackle misinformation on the social media platforms. Such automated and non-automated policies may assign an appropriate verdict on the credibility of the posts / tweets. The stakeholders, particularly civil society, and journalists, demand numerous features to showcase the following different aspects, like labeling tweets with a credibility assessment, nudging the user when visualizing non-credible tweets, collecting users' feedback on the tools' credibility assessment, and influencing users' intent to take misinformation-resilient actions. They believed that software solutions providers must investigate how to enhance trust in technological solutions while combating misinformation on social media platforms [80, 83, 84, 85].

• Perspectives for the consideration of trusted information in respect of types of data sources, kind of information providers, and news story evidence: **Civil Society**, including citizens, usually trust news that is based on the types of data sources, like NGOs, news agencies, and other institutions, due to the succeeding motives: good reputation, inherent professional requirements (e.g., code of conduct and fact-checking procedures) embedded in the bodies and institutions, and accountability. The citizens trust news fed by certain information providers, like scientists, civil servants, family and friends, professional journalists, national media, fact-checking organizations. [80, 83, 84, 85]. They also consider news

stories as trustworthy if they have sufficient evidence, like a description of the author's name, professional credentials visibility, publisher information, news publication date, sources diversity, reliable references.

Journalists need consistent access to information to authenticate or refute questionable news. In this regard, they frequently query trustworthy official public sources for confirmation of the news, and attempt to find multiple prime sources of the information. They also consider news stories as trustworthy if a story has sufficient evidence, like news statistics from a reliable source, videos / photos from a reliable source, citing the name of the author, the origin of the story, story title mapping with its contents, news publication date, reliable references. Journalists commonly trust news that is based on the types of data sources, like quality newspapers, agencies, media organizations, media outlets, and public and private institutions that produce news based on primary data. They trust news issued by certain kinds of information providers, like news fed by the government statistics, reliable

& experienced journalists, official state authorities, and public service media.

The policymakers majorly reveal that if they have prior knowledge or expertise on a certain topic, information could thus be more easily validated and considered trustworthy. They trust international news media organizations, especially in the case of mega news stories, since such organizations are capable of cross-checking information with a variety of news sources. The policymakers typically trust news that is based on the types of data sources, like data published on governmental and international bodies (e.g., UNCTAD, World Bank), credible websites, and research studies by the universities. They trust news that is issued by certain kinds of information providers, like established national & foreign news organizations, fact-checking organizations, nonprofit organizations. The policymakers judge news stories as trustworthy if a story has sufficient evidence, like the name of the author / journalist, access to the author's contact details, the news organization's reputation, the journalist's reputation, objective reporting, reliable references to sources.

3.3 Existing Fact-Checking Tools, Limitations, and Way Forward

In this section, we explain a few existing fact-checking tools, their limitations, and the way forward proposed by the key stakeholders to tackle the misinformation.

Fact-checking, a process to investigate and verify facts, is critical because misinformation can influence stakeholders' opinions. Stakeholders' opinions can mainly inform their actions [52, 80].

Fact-checking tool, a software solution that assists the stakeholders, including policymakers, journalists, citizens, and fact-checkers, in their work to determine the accuracy and truthfulness of an artifact, like a news story, article, post, tweet, to prevent stakeholders' opinions from misinformation bias.

3.3.1 Existing Fact-checking Tools

Several fact-checking tools are available today, with specific functionalities, that aim to combat the spread of misinformation [128]. Here are a few examples:

NewsGuard:
A browser extension that rates news websites based on their trustworthiness and transparency. The tool provides a "nutrition label" that indicates whether a site is reliable, biased, or has a history of publishing false information[86].

Foller.me:
An online tool that helps users to analyze the engagement of a profile on Twitter. It provides information such as the number of followers, retweets, impressions, and mentions that a profile receives[87].

FactCheck.org:
A nonpartisan, nonprofit project of the APPC - Annenberg Public Policy Center that aims to reduce deception and confusion in U.S. politics. The website examines claims made by politicians, political groups, and the media, to determine their accuracy [88].

Snopes.com:
A website that investigates urban legends, myths, rumors, and misinformation. The site provides evidence-based information to help readers distinguish between fact and fiction [89].

Google Fact Check Explorer:
This feature displays fact-checking information from independent sources alongside Google Search results [90].

Full Fact:
A fact-checking organization in the U.K. that works to improve the accuracy of public debate. The organization uses a combination of human fact-checkers and automated tools to verify claims made by politicians, the media, and other sources [91].

ClaimBuster:
A tool that uses natural language processing and machine learning to identify factual claims and check their accuracy in real-time [92].

TinEye:
A reverse image search software tool that helps you to search for matches of an image online. It can detect manipulated or edited photos and videos [60].

Rbutr:
A web platform that connects webpages with rebuttals and criticism. It allows web users to debunk existing content, comment on it, and link rebuttals to original content [93].

Fakespot:
This algorithmic tool can identify counterfeit and fraudulent reviews on websites by analyzing sentences, structures, and other factors. It also provides an analysis of the authenticity of the reviews and a rating for the product [62].

The stakeholders also use technology tools to identify satire, sarcasm, or language that may have multiple meanings.

However, fact-checking tools possess certain constraints. For example, the fact-checking process can be time-consuming, and some fact-checks may not be completed until after widely circulated misinformation. Therefore, there is still a human element involved in fact-checking, which means errors can still occur.

Nevertheless, the continual refinement and improvement of these tools can help in the fight against misinformation [61, 73]. We describe a few limitations of fact-checking tools in the forthcoming paragraphs.

While technology has facilitated the spread of misinformation, it can also be a portion of the solution. The above-mentioned fact-checking tools can help users to identify misinformation and false claims. However, in addition to this technological solution, there is an essence to raise awareness, improve media literacy, and revise education curricula, and enhance cooperation for joint initiatives at global, regional, and national levels to manage the spread of misinformation. Without a coordinated effort, the consequences of misinformation can continue to undermine the digital economy and society [73, 74].

In a later section of this paper, we detail a comprehensive proposal in the form of policy recommendations to tackle the misinformation.

3.3.2 Limitations of the Fact-Checking Tools

We mention a few limitations of the fact-checking tools [82], [28], [18] as below:

01

Latency in detecting false information: Fact-checking tools can sometimes be slow in identifying and debunking incorrect information, which allows online misinformation to spread quickly

02

Scalability challenges: The vast amount of digital content makes it difficult for fact-checking tools to cover every information that needs verification

03

Bias and subjectivity: Some fact-checking tools may exhibit bias or subjectivity, undermining credibility and objectivity

04

Difficulty in verifying certain types of claims: Ambiguous or opinion-based claims can be challenging for fact-checking tools to verify, as they normally rely on factual data

05

Reliance on human intervention: Despite technological advancements, fact-checking tools still require human input and expertise to analyze complex claims, limiting their efficiency

06

Limited to specific features: Most fact-checking tools offer certain functionalities, like how the TinEye tool can assist the stakeholders in detecting manipulated or edited photos and videos to be used in the fake news

3.3.3 Way forward to Co-create a State-of-the-art Fact-Checking Tool

In this part, we detail the way forward, proposed by the stakeholders, including citizens, policymakers, and journalists, that expect fact-checking tools to work in the following ways [94]:

- **Increased scalability:** The tools should process large volumes of information while maintaining accuracy and efficiency.
- **Improved objectivity:** Users desire unbiased fact-checking tools that present accurate, balanced information without political or ideological bias.
- **Enhanced real-time detection:** Fact-checking tools should identify and flag misinformation quickly, along with appropriate reasoning for the tags, minimizing the potential harm caused by its rapid spread.
- **Better handling of ambiguous claims:** Fact-checking tools should handle nuanced or opinion-based claims more effectively, providing context and helping users understand the underlying issues.
- **Integration of transformative technologies, including Artificial Intelligence (A.I.) and Machine Learning (ML):** Incorporating A.I. and ML technologies can make fact-checking tools more efficient, accurate, and scalable by minimizing human intervention and automating complex verification processes.
- **Collaboration with stakeholders:** Fact-checking tools should work closely with citizens, policymakers, and journalists to continually improve their features and meet the evolving needs of users.
- **Assistance to improve online users' behavior:** Fact-checking tools may extend assistance to social media platform users by offering them related summarized data and analytics about the artifact before the submission of their reactions to the online news via posts / tweets on social media platforms to improve online user behavior.

- **Tools, like a dashboard, integrated with social media platforms:** The tools should be integrated with social media platforms through standard mechanisms, like Application Programming Interfaces (APIs) and web services, to have two communications between them to expose data and information without compromising personal privacy.
- **Tools should offer data, and information from authentic sources,** like government-published statistics, to validate the contents that are published on social media platforms and inform the users about their facticity.
- The stakeholders, including journalists, require that such tools should **offer opportunities for people to interact with tools and encourage their feedback,** particularly by indicating the posts / tweets on social media platforms.
- The subject tools should be **capable of performing cross-validation of numerical data** through official sources of related data.
- Tools should **perform fact-checking on all types of data,** like audio, video, images.
- The fact-checking solutions should contain appropriate features to develop the critical thinking abilities of the community so that they can apply such capabilities to the news in the form of posts / tweets to minimize the chances of believing misinformation.
- The tools should be **capable of identifying illegitimate user accounts,** like bots.
- **The fact-checking tools should be consistent with reliable,** best theories about how we process data and information, should make appropriate decisions, and form good beliefs that should be developed and designed.

3.4 Recommendations for the stakeholders to tackle misinformation on social media platforms.

Following are the key recommendations, including policy recommendations for the stakeholders, particularly international organization to combat misinformation on social media platforms and to positively impact the global digital economy:

● **Use of Blockchain technology to detect and tackle misinformation on social media platforms:** The stakeholders, particularly academia, may research blockchain technology-based solutions to detect and tackle misinformation on social media platforms by investigating news source reliability and establishing the traceability of the news. It is pertinent to mention that blockchain technology offers various interesting features, like decentralization, immutability, record keeping, tamperproof, and non-repudiation of transactions, which make this emerging technology exploitable to verify the truth and integrity of content in the form of digital assets [42].

● **Launch media literacy initiatives to identify and verify misinformation:** It is essential to launch initiatives, like upgrading educational curricula, organization of workshops, and seminars, capacity building of teachers, to foster stakeholders' abilities in terms of media literacy, digital skills, and critical thinking. Media literacy and the digital skills of the people are at the heart of the digital economy. There is a high demand to launch such digital literacy programs at all levels, as described by the Digital Cooperation Organization (DCO) in their 'Bridging the Gap' report [95].

● **Co-Design dashboards as digital public goods to visualize data about key misinformation aspects:** A dashboard is a kind of web application and mobile app, as digital public goods, for the stakeholders to manage misinformation on social media. It offers non-classified data visualizations about the misinformation detected against different categories of contents, its origin, spread, and predictions of the public perceptions. Such digital public goods may have broad functionalities, like credibility timelines, data filtering, misinformation data correlations graphs, and many more.

● **Collaborative efforts with digital platforms to mitigate misinformation in online advertising campaigns:** False online advertising campaigns are problematic and illegal under existing regulations [2]. Therefore, collaborative efforts with digital platforms to manage false information are highly required in terms of holistic policies and technological solutions, like web browser extensions, to detect, warn, or assist digital platform users in managing problematic content in ads campaigns. It is proposed that holistic advertising campaign moderation standards across advertising platforms should be established.

● **Stakeholders may adopt best-fit standards and creation of balanced norms to manage the spread of misinformation on social media and digital platforms** aligned with international freedom of expression norms. Social media platform companies may adopt corporate responsibility standards to manage misinformation on digital platforms. They may ensure the following procedures: implementation of corporate responsibility standards outlined in the U.N. – United Nations, UNGPs - Guiding Principles on Business & Human Rights, adherence to the company's own business models or platform law, and maintaining consistency with international human rights law for freedom of expression [2].

● **Formulating generic ethical guidelines for all forms of responsible journalism:** Objectivity, accuracy, editorial independence, and truth-telling are the fundamental principles of responsible journalism [28]. Therefore, there is an essence to developing generic ethical guidelines across all forms of journalism, through multistakeholder collaboration, that

may cover various related aspects of journalism. Such guidelines will be helpful for media organizations to adhere to ethical standards, verify their sources, avoid sensationalism to maintain their credibility, contribute to mitigating misinformation, and create trust in media, which is crucial for the development of the global digital economy.

● **Digital research and innovation initiatives to manage misinformation globally:** The stakeholders, including the governments, may launch digital research and innovation initiatives on

the various misinformation aspects. Such aspects may include the following: causes, consequences, and effective countermeasures against misinformation; use of emerging technologies to tackle misinformation on social media platforms; formulation of stakeholders' strategies and policies to tackle misinformation without infringing individual rights for free speech and nudging user behavior to think before to share information with others through digital platforms.

● **A holistic framework for better transparency reporting by social media companies:** Social media companies may create a framework for transparency reporting as a policy tool to become more transparent while managing and reporting misinformation through their content moderation policies and practices across the global instead of selective states. For the proposed framework, they may consider various elements that include, but are not limited to the following: stakeholders' consolidated needs across the globe instead of one jurisdiction, mention a detailed purpose and criteria of the reporting for more clarity of the policymakers, platforms algorithmic impact valuation, and adoption of an independent third-party audit to investigate the performance of the transparency report by the social media companies.

● **Formulation of Advertising Policies:** The advertising policies cover policy interventions for relevant advertising ecosystem actors, like Ad publishers and AdTech companies. It is essential to develop such policies in consultation with relevant stakeholders, like governments, international organizations, businesses, civil society, academia, NGOs. The stakeholders may further deliberate on possible pillars to be covered in the advertising policies, like target-oriented monetization of misinformation and disrupt the monetary incentive for making such destructive content, creating a repository of such policies for the digital platforms.

● **Adoption of effective mechanisms of misinformation correction on social media**: Correction is an essential countermeasure to clarify misunderstandings, enhance users' trust in digital platforms, and maximize stakeholders' use of digital platforms to perform economy-related activities[30]. Therefore, adopting an effective cognitive mechanism of misinformation correction on social media is crucial to mitigate misinformation on social media platforms. The effective mechanisms of correction that significantly affect people's acceptance consist of numerous factors. Examples of such factors include the following: Social network structure, concise contents of corrections, the influence of publishers, source credibility, audience's role in dissemination theories, persuasive, richness in graphics, mild tone, explanation about corrections, and avoiding repeating a proportion of original misinformation in corrections.

● **International I.T. firms may promote using A.I.-based algorithms to identify and flag misinformation without compromising the user's privacy:** The international I.T. firms may define or reformulate responsible A.I algorithm-based solutions to detect, flag and prevent the spreading of misinformation on social media platforms without compromising the user privacy. Moreover, the stakeholders, including journalists, can also play a role by reporting on using A.I. and big data to combat misinformation and highlighting instances where emerging technologies have successfully prevented the spread of misinformation. The adoption of emerging technologies, coupled with the growth of the digital economy, made the successful deployment of such A.I.-based systems possible. Moreover, they can help raise awareness about the limitations of technology systems in providing a complete solution to the problem of misinformation.

● **Media organizations may invest in fact-checking and verifying information while reporting on social media, & digital platforms:** It is suggested that media organizations invest in fact-checking and validating data. To do so, they may hire dedicated fact-checking teams and / or obtain third-party services, and they may also maximize the use of sophisticated fact-checking tools to maintain objectivity and neutrality while reporting through their platforms. Moreover, by partnering with fact-checkers, media outlets can ensure the accuracy of their content and promptly correct any errors.

● **Active participation of civil society to manage misinformation:** Civil society is a vital source of information and has a major role in framing a sustainable, and inclusive digital economy. Reporting against false content on social media platforms by the civil society would be helpful to combat false information spread and as well as hold content creators liable. Ensure combat misinformation by design and civic consensus in relevant policy implementations.

● **Engage with the ecosystem to minimize mistrust in public authorities:** Governments may engage with journalists, digital platforms companies, and civil society by embracing co-creation with grassroots society, and considering users' perspectives and suggestions to fight against misinformation.

● The owners of the websites / portals / digital platforms may be encouraged to **mention legal coverage for 'combating misinformation statement' on their websites** on the same pattern as they described privacy and modern slavery statements disclosure on their websites.

● **The stakeholders, like international organizations, may create a forum** to deliberate and investigate the feasibility of certified contents associations to develop standards and certification for the world of modern journalism to deal with misinformation on social media platforms and continue the platforms' role as a communication tool, to boost the global digital economy.

● **Policymakers may adopt a thematic approach while defining or revising social media platforms policies to fight against misinformation:** Examples of such themes include:
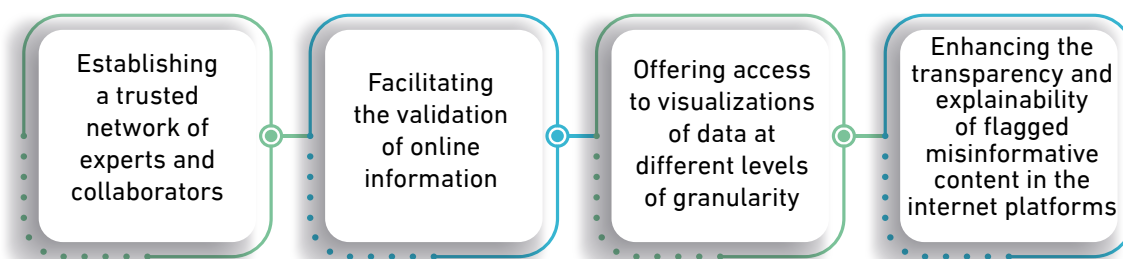
● **Creation of research bots to combat misinformation on social media platforms:** Technical I.T. firms, academia, and international organizations may co-develop a research bot that may work with social media platforms like Twitter. Such bots will offer legitimate fact-checks after searching unreliable sources and assist online users in getting more clarity on the misleading content and deciding whether to share it with others [3, 30].

● **Launch campaigns to raise public awareness, build partnerships, and advocate for respective strategies and policy changes to fight against misinformation:** The stakeholders, mainly Nonprofit Organizations, may launch campaigns to raise public awareness regarding the hazards of misinformation and the importance of fact-checking. They may pool resources and expertise to create a united front against misinformation. The NGOs would advocate for the governments for requisite strategy & policy changes to address the societal issue of spreading online misinformation on social media platforms, ensuring that appropriate measures are in place to protect the global community and boost the digital economy.

● **Development of holistic fact-checking tools to fight against misinformation:** It is suggested that international organizations may collaborate with stakeholders to co-create a holistic fact-checking tool, as digital public goods, to detect and flag misinformation on social media platforms for secure and efficient communication between consumers and sellers to perform online business transactions to generate online revenue and to contribute to enhancing the global digital economy. Such tools should be human-centered, based on open-source software, open data, open A.I., and aligned with privacy acts / laws [20,70,71,62].

Despite the above recommendations, the following are other recommendations for the stakeholders, particularly international organization to combat misinformation on social media platforms: Sharing of best practices and success stories amongst countries of the world and developing global standards to provide a unified approach to tackle misinformation across borders.

Limitation of our Work

The IEEE, ScienceDirect, ACM, and Springer digital research libraries were chosen, and we investigated them. But there are other digital research libraries out there that might have key articles on this crucial subject that we might be missing.

04. CONCLUSION

Social media platforms are considered a vehicle for disseminating news, market exchange, and establishing interactions between online buyers and sellers to boost businesses. However, misinformation spreads on social media platforms like fire. The digital economy has been impacted by misperceptions caused by misinformation spread through such digital platforms.

Nevertheless, countering misinformation is a complex problem, and safeguards for people's rights and freedoms must be carefully considered. A more reliable and trustworthy information ecosystem will be made possible through continued dedication, innovation, and the application of cutting-edge technology, such as A.I. However, putting into place particular methods to identify or discard incorrect / misleading material may violate privacy rights or limit freedom of expression; as a result, it needs to be carefully balanced between accuracy and reliability, and personal freedoms. To combat the new societal challenge of misinformation, stakeholders, including international organizations, governments, and businesses, including social media platform companies, need close cooperation to take diverse joint initiatives to ensure the accuracy and reliability of the information essential for a healthy information ecosystem.

This cooperation should focus on creating an informed society better equipped with appropriate socio-technical solutions to identify and counter the harmful effects of false information on social media platforms. The stakeholders, including governments, may develop strategies & policies and formulate and enforce global standards to provide a unified approach to tackle misinformation across borders. Moreover, countries of the world may also share their successful strategies and lessons learned with each other so that they can learn from one another's experiences and build more effective interventions to combat online misinformation.

We plan to conduct future research in this area, maybe supplementing our qualitative study with quantitative research. By comparing the results of the two studies, we hope to gain more insightful information and conclusions about addressing this social problem of misinformation on social media platforms by creating comprehensive and cooperative related strategies, policies, standards, and norms that adhere to international human rights laws and standards.

The Digital Cooperation Organization (DCO) team is also in the process of establishing thematic groups of experts to further design proposed solutions to address the identified challenges of online misinformation through a DCO initiative called The Digital Space Accelerator (DSA). This DSA will provide pathways to enhance collaboration for the players in digital economy and they will receive socio-technical solutions to tackle the misinformation on social media platforms. One of the key results of the DSA is that it will offer the DCO future research publications on misinformation.

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