The Role of Digital Media in Environmental Awareness in Karachi – Investigating the Effectiveness of Digital Media in Spreading Environmental Awareness

Ahsan Ahmed Khan[1*] iD | Muhammad Irfan [2] iD | Masroor Khanum [3] iD

Abstract

Environmental issues in Karachi is increasing significantly nowadays and this is becoming an alarming sign for the health of the citizens these issues are often promoted through digital media.. The purpose of this study is to explore how digital media is spreading awareness regarding environmental issues to the people in Karachi. Qualitative research method was followed, while in-depth interviews were conducted with 50 residents of Karachi. Thematic analysis was performed to analyze the interviews. Findings suggest that digital media is a key source in spreading environmental awareness. Social media platforms, like facebook, Instagram, twitter, tiktok, whatsapp, snapchat, online news portals, and digital campaigns are particularly effective at getting that message across. The study also reveals some clear patterns. Accessibility and engagement are key. Influencers and activists have a big role to play in environmental awareness through social media. Misinformation and skepticism are major challenges. Government and institutional involvement is essential. Social media can foster awareness and discussion, but it also creates challenges like information overload, credibility issues, and limited behavioral change. It is recommended that a collaborative effort from content creators, policymakers, and educational institutions to make the most of digital media's impact on environmental awareness in Karachi.

Keywords: *digital media, environmental awareness, Karachi, social media, environmental challenges.*

Author's Affiliation:

Institution: Federal Urdu University of Arts, Science and Technology, Karachi [1,2,3]

Country: Pakistan

Corresponding Author's Email: *ahsankhan258@hotmail.com

1. Introduction

Environmental issues have become a pressing global concern. Cities like Karachi are on the frontlines of that concern. Pollution, waste management, and climate change are the biggest challenges Karachi faces (Ali & Khan, 2020). To tackle these challenges, you need effective communication strategies that can get people engaged and policymakers to take action (Smith et al., 2019). Digital media has proven to be a game-changer in raising awareness about environmental issues and shaping public opinion (Hansen, 2018). That's especially true in Pakistan, where the internet and smartphones have become ubiquitous. Social media platforms have become the go-to sources of information and activism for many Pakistanis (Qureshi & Rehman, 2021).

Karachi, Pakistan's largest city, is suffering from severe environmental degradation. Industrial emissions, deforestation, and inefficient waste management are the main culprits (Rehman & Shah, 2020). Traditional media has historically played a role in highlighting these issues- television and newspapers have been doing that for years (Ahmed, 2017). But digital media offers something new: interactive and participatory communication methods that can genuinely engage citizens in the conversation about the environment (López & Rodriguez, 2022).

McLuhan and Powers (2018). Argued that social media sites like Facebook, Instagram, and Twitter play a significant role in organizing environmental movements around the world (Castells 2020). Initiatives such as CleanKarachi and SayNoToPlastic have gained momentum in Pakistan thanks to digital activism (Yousaf & Farooq 2023). Argued that Real-time updates, petitions and awareness campaigns that reach a variety of demographics can be shared by people and organizations via social media (Bennett & Segerberg 2013). Argued that not enough is known about how well digital media can raise environmental consciousness in Karachi. Although social media conversations and online campaigns encourage participation more research is necessary to fully understand their real effects on changing policies and environmental behavior (Shirky 2011). Issues like disinformation, digital divides, and the government's slow response to online activism have all been noted in earlier studies (Khan et al. 2019) while (Zubair 2021). Argued that the purpose of this research is to assess how social media and digital platforms contribute to increased environmental consciousness in Karachi. It looks at the effectiveness, influence, and reach of digital platforms in energizing the public. This research aims to ascertain how digital media can support a more sustainable and knowledgeable society by examining case studies, user engagement metrics, and interviews with Karachi's residents (Jenkins 2006). Moreover, (Dobson 2021). The results will provide guidance for using social media to promote environmental change and provide insights into the potential of digital communication in environmental advocacy (Manzoor & Raza 2024).

1.1 Problem Statement

Karachi stands as Pakistan's largest metropolitan area, yet it faces overwhelming environmental problems. Air pollution combined with waste disposal practices, deforestation and water contamination are big threatens both for public health and

sustainable development in the city. Despite awareness of these problems officials choose to ignore them. The traditional media outlets have had historical influence, but they still struggle to initiate essential conversations about environmental matters. Digital media platforms like online news pages and social network sites, along with multimedia tools, serve as effective tools for information distribution and societal mobilization. The research gap on this topic shows how digital media is essential in supporting environmental awareness within Karachi, Pakistan. Citizens frequently use Facebook, Instagram, YouTube, and Twitter to gather information about activism and news, yet researchers have not determined how these platforms influence public perceptions and behaviors concerning environmental sustainability. We need to investigate if the use of digital media campaigns and online debates results in heightened awareness or activism among Karachi residents. The effectiveness of digital media is determined by people's socioeconomic status, together with their education level and their access to information technology. Environmental awareness campaigns. Environmental content rarely appeals to those from economically weaker sections because it lacks alignment with their particular needs yet remains focused on general environmental issues. The availability of misleading information along with scarce credible environmental data on social media platforms, prevents the development of an informed public. The research investigates how digital and social media platforms help to educate Karachi residents about environmental challenges. The research seeks to examine digital media's ability to develop environmental concern through analysis of user involvement, content success, behavioral influence, and additional variables.

1.2 Significance of the Study

This research examines how digital media shapes environmental awareness in Karachi one of Pakistan's cities facing severe ecological challenges. Karachi struggles with deforestation, waste management, air and water pollution, and growing climate change effects. As digital and social media platforms gain popularity and clout, people use them more to spread knowledge, boost awareness, and get the public involved in pressing social and environmental matters.

This study aims to gauge how much digital platforms like Facebook, Instagram, YouTube, and Twitter inform Karachi's public about environmental issues. It also seeks to understand how these platforms sway people's views and actions regarding environmental sustainability. The research will look at how online talks, campaigns, and content boost knowledge, spark personal behavior shifts, and back local environmental protection efforts.

The research findings have the potential to help various key groups. Advocacy and environmental organizations can use this data to develop more targeted and impactful campaigns. The potential of digital outreach to supplement conventional environmental communication techniques will be better understood by policymakers. Digital content producers will also be more capable of crafting messages that captivate audiences and promote deep interaction.

From an academic perspective, this study contributes to the growing body of literature on digital media's role in environmental communication, particularly in the context of urban areas in developing countries. By identifying both the strengths and limitations of digital media in this field, the research will help in creating more strategic and effective digital communication models aimed at fostering a stronger culture of environmental responsibility in Karachi.

1.3 Justification of the Study

The public's lack of engagement with the ever-growing environmental problems of Karachi, including air pollution, water pollution, waste mismanagement, and climate change, requires enhanced concern at different levels. Social media, a sub-set of digital media, serves as an essential means of opinion and information dissemination as well as community mobilization at the local and global level. This research studies how effective digital and social media are in creating general environmental awareness in the context of Karachi, a city where traditional media rarely pays adequate attention to the environments.

Digital media is an important tool to reach and educate people in Karachi, which has a diverse population and advanced internet facilities, because it is more adaptable than conventional media. Unlike traditional media, digital media allows for two-way and instantaneous communication which enables citizens to interact with environmental issues, discuss, and be actively involved. In addition, social media campaigns and advocates have great influence on the public and are actively changing attitudes towards taking positive active steps for environmental sustainability. There is an increase in the volume of content focused on environmental issues on the internet, but there is no significant research work done on its impact in Karachi.

This research fills the literature gap by assessing the coverage, participation, and impact of different forms of digital media in promoting environmental awareness. Through the assessment of user participation, content effectiveness, and audience perception, the study aims to contribute to the understanding of how digital environments enable communication and advocacy concerning the environment within the context of cities.

The primary audience for this study was policymakers, environmental practitioners, and digital marketers who focus on advocacy for sustainable development initiatives aimed at the public in Karachi. The study intends to highlight the importance of digital media with the understanding that it will enable concerned parties to formulate precise impact-oriented campaigns to cultivate environmental concern among the public.

1.4 Research Objectives

The study was conducted to explore the environmental challenges faced by the people of Karachi, and digital media is playing its role in providing awareness about the environmental challenges to cope with challenges. The following are the research objectives of the study:

RO1: To explore how digital media is spreading environmental awareness to the people of Karachi.
RO2: To explore the challenges faced by the people in spreading environmental awareness.
RO3: To investigate how people perceive and present solutions to the air pollution, water pollution, land pollution and climate changes.

1.5 Research Questions
Following are the research questions of the study:

RQ1: How digital media is spreading environmental awareness among the people of Karachi.
RQ2: What are the challenges faced by the people in spreading environmental awareness through digital media.
RQ3: How people perceive and present solutions to the air pollution, water pollution, land pollution and climate changes.

2. LITERATURE REVIEW
The study was conducted to explore the environmental challenges faced by the people of Karachi, and digital media is playing its role in providing awareness about the environmental challenges to cope with challenges. Digital media's rise has shaken up environmental communication. To raise eco-awareness in places like Karachi, web pages and social networks now play a key role. This study looks at how well digital media tools grab people's attention and spread environmental awareness challenges.

2.1 Digital Media and Environmental Awareness
Digital media plays a hefty role in shaping how folks see environmental problems. Schultz (2002) says online spaces help spread the word and create spaces folks can talk about nature stuff. Social media popping up has bumped up how many people get into fighting for the environment, Cox (2013).

In Pakistan digital campaigns are key educators on environmental issues such as managing waste dirty air, and shifts in the climate, as noted by (Ali & Rahman in 2020). while (Ullah and Yousaf 2021) reveals that Karachi's eco-focused groups are now turning to FB and tweets to hook in folks and push them towards projects that get them doing stuff.

2.2 The Effectiveness of Social Media in Environmental Campaigns
Social media's interactive nature means groups get moving and talk happens on the spot. Anderson (2017) claims these platforms let campaigners and groups reach lots of folks making more people know about nature stuff. Take #GreenKarachi and #SaveMangroves from Karachi, their online campaigns pulled in the crowd support, according to Jamil & Ahmed (2022).

Even with advancements, issues linger. Social media activism in Pakistan doesn't hit the mark, according to Khan (2019) all because false facts are everywhere and it's hard to tell what eco-friendly is. Also, not everyone's online, which makes it tough to spread the green word.

2.3 Comparative Analysis with Global Trends

Digital media around the world has helped out environmental activism. Studies from the West show that young folks have gotten together to fight for the climate because of online movements, like #FridaysForFuture. Hasan and Patel did some comparing in 2023, and they saw the same sort of online involvement in Karachi. Still, it's not getting as wide of an effect 'cause of money problems and stuff about the city's setup. (Wahlstrom et al., 2020).

2.4 Policy Implications and Future Directions

Karachi's eco-friendly groups and leaders gotta step up their game with digital spaces to teach folks about the environment. Teaming up with social media hotshots running official online ads, and sharing stuff made right in the neighborhood could get people involved (Zafar & Siddiqui 2021). If folks knew more about the web, they'd trust the green messages more and not fall for fake news.

3. METHODOLOGY

Qualitative research method was followed to explore how people in Karachi perceive, experience, and interact with digital media when it comes to environmental awareness issues. This study is all about looking at the influence digital media has on making citizens of Karachi in providing awareness of environmental issues.

3.1 Research Approach

The study uses a thematic analysis method to explore the perception of people from semi-structured interviews. Doing it this way lets us spot consistent patterns, major themes, and opinions in what the people we talked to said. That way, we get a more detailed picture of how well digital media does the job of making people more aware of environmental issues.

3.2 Sampling Method

The study uses a purposive sampling method to pick out 50 Karachians. This bunch comes from all walks of life, including students, pros, campaigners, and folks running households. This mix makes sure we get a wide view on how the population gets involved with green matters online. The main thing we're looking for in our participants is that they know their way around online spaces and use them often so they know what they're talking about when it comes to the research.

3.3 Data Collection

Data is gathered through the semi-structured interviews conducted in person and via online mode, depending on the availability of participants. Each interview follows a flexible guide covering key themes, including:

- Awareness of environmental issues through digital media.
- Frequency and type of digital platforms used for environmental information.
- Perceived effectiveness of digital campaigns and content.
- Engagement in online environmental discussions or initiatives.
- Challenges in accessing and trusting digital environmental information.

3.4 Ethical Considerations

The study follows ethical research principles, ensuring voluntary participation, informed consent, and confidentiality. Participants are briefed on the study's purpose, and their identities are anonymized to protect privacy. The collected data is securely stored and used solely for academic purposes.

3.5 Validity and Reliability

To ensure credibility, the study incorporates triangulation by comparing responses across different demographics. Member-checking is also conducted, where participants review summarized findings to confirm accuracy.

This methodological framework provides a structured approach to investigating how digital media contributes to environmental awareness in Karachi, allowing for comprehensive and meaningful insights.

4. DATA ANALYSIS

4.1 Coding and Categorization

Interviews were coded in order to formulate the thematic analysis following words were coded from the interviews in order to extract the context of the answers in the interviews.

1. Accessibility
2. Engagement
3. Misinformation
4. Credibility of content
5. Message effectiveness
6. Barriers in messages
7. Environmental activists

4.2 Themes and Analysis

This thematic analysis explores the effectiveness of digital and social media in spreading environmental awareness among Karachi residents. Based on interviews with 50 participants, key themes were identified regarding digital media's role, influence, and limitations in fostering environmental consciousness.

A. Accessibility and Reach of Digital Media

Participants of the study highlighted that digital platforms, especially social media (Facebook, Twitter, Instagram, and WhatsApp), have made environmental information more accessible. They emphasized that digital media has facilitated quick and widespread dissemination of news on environmental issues such as air pollution, water scarcity, and climate change.

B. Engagement and Community Mobilization

Interviewees mentioned that digital media allows interactive engagement, enabling people to participate in discussions, sign petitions, and attend awareness campaigns. Hashtags and viral trends on platforms like Twitter (#SaveKarachiBeaches, #GreenKarachi) were noted as effective in mobilizing collective action.

C. Misinformation and Credibility Issues

A common concern among participants was the prevalence of misinformation. While social media spreads environmental knowledge, the reliability of sources remains questionable. Several interviewees expressed the need for fact-checking and official verification of shared content.

D. Influence of Influencers and Environmental Activists

Many respondents noted the role of social media influencers and activists in shaping public perception. Bloggers and environmentalists like those associated with WWF-Pakistan and Karachi's Green Initiatives have successfully raised awareness, particularly among younger audiences.

E. Impact on Behavior and Attitudes

There was a divided opinion on whether digital media has led to actual behavioral change. While some participants stated that exposure to environmental campaigns influenced them to adopt eco-friendly practices (such as waste segregation and reducing plastic use), others argued that awareness does not always translate into action.

F. Barriers to Digital Media Effectiveness

Despite its advantages, certain barriers were identified. Limited internet access in lower-income areas, language barriers (as most content is in English or Urdu), and a general lack of interest in environmental issues were cited as challenges to digital media's effectiveness in Karachi.

5. Discussion

RO1: To explore how digital media is spreading environmental awareness to the people of Karachi

Theme 1: Accessibility and Reach of Digital Media

Accessibility of digital media makes it an effective tool for raising environmental

consciousness throughout Karachi. The increasing ownership of smartphones combined with internet access has fully transformed social media platforms into essential environmental campaign vehicles which reach most of Karachi's residents. Through social media platforms organizations together with individuals can post videos and infographics and editorial content regarding environmental problems regarding air and water pollution. Local environmental organizations use WhatsApp groups together with Telegram channels to share regional content in Urdu ensuring understanding among speakers of different languages. The people who live in central Karachi enjoy regular digital access but peripheral and underdeveloped areas lack solid internet infrastructure resulting in unequal reach. The restricted spread of awareness efforts hinders their impact on communities which experience the highest environmental consequences.

Theme 2: Engagement and Community Mobilization
Digital media allows people to organize communities more effectively in order to bring about environmental change. Environmental advocacy groups find success through their implementation of hashtag campaigns and online petitions and virtual events that unite people with similar beliefs. Through digital mobilization volunteers successfully organized beach clean-ups at Clifton beach locations and staged protests to stop the felling of trees due to urban construction plans. Environmental organizations develop interactive browser tools including live sessions together with comment sections and polls which enable user participation. Participatory educational methods empower people to make direct choices rather than offering limited opportunities to observe which education that brings both training and power becomes.

RO2: To explore the challenges faced by the people in spreading environmental awareness
Theme 3: Misinformation and Credibility Issues
Digital media faces significant difficulties in delivering environmental awareness because wrong details have spread widely throughout the online world. The basic information available on the internet about environmental studies lacks enough detail to satisfy researchers since most aspects prove incorrect. False scientific approaches coupled with exaggerated declarations fill up digital platforms thus taking away room for genuine sustainable learning programs. The public views digital sources of information with suspicion about their authenticity. Even though respected organizations correctly share evidence-based content they experience lower search rankings because social media networks surpass them by distributing content that quickly achieves high engagement. People find it challenging to verify accurate information because alarming content prevails in mainstream digital media platforms.

Theme 4: Barriers to Digital Media Effectiveness

Several additional barriers impede the effectiveness of digital media in environmental awareness. Digital literacy remains a major hurdle because it affects both older persons and disadvantaged social groups. Users who browse the internet struggle to perform accurate website information evaluations and online educational tasks. Environmental issues fail to reach priority status due to the urgent matters of political instability as well as economic inflation rates and escalating crime statistics. Digital platforms distribute multiple quality content items that compete with numerous significant issues while attracting public attention effectively. Audience participation levels remain difficult to maintain across digital media campaigns due to ongoing struggles between them. Algorithms use processed data to display environmental contents toward users who have established a pattern of browsing this specific type of content. Through algorithmic systems in social media platforms users receive repetitive content which creates isolated audience sections referred to as echo chambers. The goal of reaching uninterested audiences with new environmental awareness initiatives becomes difficult due to this obstacle.

RO3: To investigate how people perceive and present solutions to air pollution, water pollution, land pollution, and climate change

Theme 5: Influence of Influencers and Environmental Activists

Environmental issues experienced significant public transformation through digital media platforms which both influential people and activist groups actively shaped political choices. Electronic discussion of environmental topics involves local influencers collaborating with environmental NGOs and governmental institutions. By applying information to individual locations influencers explain complex worldwide environmental challenges in ways that people can relate to through friendly associations. Natural content creators hold more trust from people than official sources because they drive their viewers to start meaningful dialogue about resolving issues. Activists responsible for addressing Karachi's air quality crisis illustrated to the public two essential solutions by advocating both industrial emission regulation and tree planting programs. Through their use of figures activist groups simplify complicated problems by linking stories to factual evidence to generate emotional connections with meaningful solutions. Users face various challenges whenever they attempt to access content from influencers. Persons without specialized knowledge face challenges when providing exact answers to complex technical questions. People remain uncertain if the basic content delivery and over-exaggerated problem descriptions by influencers magically mislead public masses even if their efforts were genuine.

Theme 6: Impact on Behavior and Attitudes

Digital media implementations have led public opinion to become more environmentally conscious. Public outreach regarding reusable bags together with water conservation and plastic reduction initiatives through mass media has developed effective marketing to younger populations. The rise of people sharing their environmental habits through online platforms produces a chain reaction which motivates others to join them. More people view environmental responsibility through the lens of personal self-image together with life choices. Modern social awareness has become linked to being eco-conscious for numerous people. People must adopt this new perspective because it enables them to ask for policy adjustments while transforming their lifestyle habits. People generally offer two categories of environmental solutions which include improved recycling practices as well as better waste management and enhanced public transit systems and stronger environmental regulations. People widely discuss these solutions across online forums and comment sections which indicates that practical change is gaining popularity among the general public. Some people lower their optimism about government change due to the lack of noticeable public action despite their online media engagement.

6. CONCLUSION

The study concludes that the significant influence of digital media in promoting environmental awareness in Karachi, a city facing numerous ecological challenges due to rapid urbanization and industrialization. It underscores that while digital platforms such as social media networks, online news outlets, and environmental blogs have become essential tools for disseminating information on environmental awareness, their true effectiveness is shaped by several key factors.

Firstly, content credibility matters significantly there is a significant amount of content all over the internet, but not everything you read is legitimate or even true. Getting the wrong information can mess up how people understand or care about what's happening with the environment. So, it is very important to make sure the content everyone scrolling through in digital world is backed up by data that's checked out.

Secondly, the skill to navigate digital landscapes is crucial in Karachi. Most people navigate online content but they are not too wary about judging the content they find. If we boost digital literacy in classrooms and locally, we can get more significant and positive results regarding the awareness messages on digital media.

Thirdly, getting the public involved is also important to make digital media drives

to make a difference. Understanding the content of environmental awareness can make a difference. It is also important for the people to involve in the campaigns on digital media on environmental awareness.

The proposed strategies to enhance digital media's influence. Strengthening fact-checking mechanisms can help filter out false or misleading information, ensuring that only credible content reaches the public. Localizing content by using regional languages, familiar references, and addressing city-specific issues can make environmental messages more relatable and effective for Karachi's diverse population. Finally, integrating online campaigns with offline initiatives such as clean-up drives, community workshops, and school programs—can reinforce digital messages with tangible action, creating a more holistic and impactful approach to fostering environmental responsibility.

6.1 Recommendations
A. Fact-Checking Initiatives
In an era where misinformation spreads rapidly online, it is essential to collaborate with credible fact-checking organizations to ensure the accuracy of environmental information shared on digital platforms. By forming alliances with established fact checkers, digital activists can debunk myths, correct false narratives, and build public trust in environmental messaging. These collaborations will not only strengthen the credibility of online campaigns but also safeguard communities from being misled by climate change denial or green washing efforts.

B. Localized Content Creation
To engage a wider and more diverse audience, it is important to produce content in multiple regional languages. Localized content makes digital environmental activism more accessible, relatable, and impactful across different cultural contexts. By incorporating local dialects, traditions, and community-specific concerns, campaigns can foster deeper understanding and participation among grassroots communities that may otherwise be left out of mainstream environmental discourse.

C. Hybrid Awareness Programs
Digital campaigns should be supplemented with offline initiatives to create a more holistic and inclusive approach. Hybrid awareness programs, which combine social media outreach, webinars, and influencer partnerships with on-ground events like workshops, clean-up drives, and school programs, can significantly broaden reach and engagement. This dual approach ensures that both tech-savvy and digitally excluded populations are informed and empowered to take action.

D. Government and NGO Support

To sustain and scale digital environmental activism, it is critical to have strong policy backing and institutional support. Governments and non-governmental organizations (NGOs) can play a vital role by providing funding, training resources, and platforms for collaboration. Additionally, policy frameworks that promote digital literacy, environmental education, and responsible online behavior will create an enabling environment for long-term activism and community-led environmental change.

This thematic analysis provides insight into how digital media contributes to environmental awareness in Karachi and suggests ways to enhance its effectiveness for greater societal impact.

Conflict of interest

The authors declare no conflict of interest.

References

Ali, R., & Khan, M. (2020). Urban pollution in Pakistan: Causes and consequences. Environmental Studies Journal, 45(3), 78-92.

Ali, S., & Rahman, F. (2020). Digital campaigns and environmental education in Pakistan. Journal of Environmental Communication, 5(2), 45-60.

Ahmed, S. (2017). Media coverage of environmental issues in South Asia: Trends and impact. Journal of Media Studies, 12(1), 56-70.

Anderson, J. (2017). Social media and environmental activism: A global perspective. International Journal of Digital Studies, 12(1), 22-37.

Bennett, W. L., & Segerberg, A. (2013). The logic of connective action: Digital media and the personalization of contentious politics. Cambridge University Press.

Castells, M. (2020). Networks of outrage and hope: Social movements in the internet age. John Wiley & Sons.

Cox, R. (2013). Environmental communication and the public sphere. Sage Publications.

Dobson, A. (2021). Environmental citizenship: The democratic challenge. MIT Press.

Hasan, M., & Patel, R. (2023). Digital media and climate activism: A comparative study. Global Communication Review, 18(3), 75-90.

Hansen, A. (2018). Environment, media, and communication. Routledge.

Jamil, A., & Ahmed, Z. (2022). Digital advocacy for environmental sustainability in Karachi. Pakistan Journal of Digital Studies, 10(4), 120-135.

Jenkins, H. (2006). Convergence culture: Where old and new media collide. NYU Press.

Khan, N., Rehman, F., & Ali, Z. (2021). Challenges of digital activism in Pakistan: A case study of environmental movements. Pakistan Journal of Digital Studies, 6(2), 33-47.

Khan, R. (2019). The impact of misinformation on environmental discourse in Pakistan. South Asian Media Journal, 6(1), 89-102.

López, M., & Rodriguez, A. (2022). Social media and environmental awareness: A global perspective. Environmental Communication Review, 15(4), 112-129.

Manzoor, T., & Raza, I. (2024). Digital media strategies for environmental activism in Pakistan. Journal of Environmental Policy & Communication, 9(1), 20-38.

McLuhan, M., & Powers, B. R. (2018). The global village: Transformations in world life and media in the 21st century. Oxford University Press.

Qureshi, S., & Rehman, K. (2021). Social media usage patterns in Pakistan: Implications for civic engagement and activism. Asian Journal of Media Studies, 18(2), 89-104.

Rehman, T., & Shah, L. (2020). Industrial emissions and environmental degradation in Karachi: A policy analysis. Pakistan Journal of Environmental Research, 7(3), 45-63.

Schultz, P. (2002). Environmental concern and information dissemination in the digital age. Journal of Applied Psychology, 87(4), 345-356.

Shirky, C. (2011). Here comes everybody: The power of organizing without organizations. Penguin Books.

Smith, J., Brown, P., & Taylor, M. (2019). Communicating climate change: Strategies for environmental messaging. Routledge.

Ullah, N., & Yousaf, M. (2021). Social media engagement and environmental awareness in Karachi. Pakistani Journal of Social Sciences, 9(2), 66-79.

Wahlström, M., et al. (2020). Youth activism and social media: The case of Fridays For Future. Environmental Politics, 29(6), 992-1012.

Yousaf, H., & Farooq, N. (2023). Hashtag activism and environmental awareness: A case study of #CleanKarachi. Digital Media Journal, 14(2), 123-137.

Zafar, I., & Siddiqui, L. (2021). Policy implications of digital media in environmental education. Karachi Policy Review, 15(3), 34-50.

Zubair, S. (2019). Misinformation and environmental discourse in digital spaces. South Asian Journal of Digital Communication, 11(3), 67-85.