



Original Article

Content Characteristics of the Trend of Infographics on Environment and Climate Change Adaptation in Vietnamese Online Newspapers

Phan Thuy Linh^{1,*}, Chu Duc Ha², Vu Thi Minh Tam³,
Tran Van Tien⁴, Nguyen Thi Tuyet Minh¹, Trinh Thuy Duong⁵

¹*Academy of Journalism and Communication, Xuan Thuy, Cau Giay, Hanoi, Vietnam*

²*VNU University of Engineering and Technology, Xuan Thuy, Cau Giay, Hanoi, Vietnam*

³*Ha Long University, Bach Dang, Nam Khe, Uong Bi, Quang Ninh, Vietnam*

⁴*National Academy of Public Administration, Nguyen Chi Thanh, Dong Da, Hanoi, Vietnam*

⁵*East Asia University of Technology, Xuan Phuong Industrial Area, Tu Liem, Hanoi, Vietnam*

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Abstract: In the context of the significant shift from traditional mass media to digital journalism, infographics have become an increasingly utilized type of journalistic work for online newspapers worldwide, including in Vietnam, to convey messages across various fields. Infographics play a crucial role in communication strategies aimed at raising awareness of environmental issues and climate change adaptation. They effectively present complex data patterns and help the public quickly interpret messages through images, charts, and maps. This study examines the evolving use of infographics on environmental and climate change adaptation topics in online newspapers over the years, highlighting variations in content across these trends. The findings provide a solid foundation for further solutions to enhance the role of infographic journalism in environmental communication and climate change adaptation.

Keywords: Infographics, Environment, Climate change, Online newspaper.

* Corresponding author.

E-mail address: chaulinh2010tp@gmail.com

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1. Introduction

Environmental issues, including climate change, provide serious difficulties for developing countries, with Vietnam especially vulnerable [1]. The country's diversified ecosystems and reliance on agriculture and natural resources make it highly susceptible to environmental deterioration, pollution, and the multiple effects of climate change. Rising temperatures, more frequent extreme weather events, and sea-level rise worsen existing vulnerabilities, posing severe concerns to food security, economic stability, and public health [2-4]. Thus, it is crucial to provide comprehensive information to the public about environmental issues, particularly climate change.

Effectively providing information on environmental issues and climate change to the public requires a multi-faceted approach [5]. Particularly, utilizing various communication channels, including online newspapers, social media platforms, educational programs, and community events, has been demonstrated to ensure inclusive outreach. Of our interest, online newspapers reportedly offered timely updates, engaging multimedia content, and interactive discussions, making information more accessible and relatable [6]. This approach raised awareness and empowered individuals and communities to contribute to environmental sustainability and climate resilience. Thus, the role of online newspapers was indispensable in driving collective efforts toward environmental sustainability and resilience. However, there has not been any comprehensive analysis of the characteristics and trends in environmental content and climate change adaptation through new communication technologies, specifically in the form of infographics on Vietnamese online newspapers in the past.

The aim of this current study was to comprehensively survey and understand the content characteristics of the trend of infographics related to environment and climate change adaptation in online newspapers. This study will address two research questions (RQs):

- RQ1: How has the trend of infographics about the environment and climate change adaptation in Vietnamese online newspapers changed over time?

- RQ2: What is the content differentiation of the infographics trend on the environment and climate change adaptation in Vietnamese online newspapers?

Answering the study topics above will provide researchers with a basic understanding of approaching content characteristics of the trend of infographics. Emerging themes and appropriate publications might help new scholars identify potential research directions.

2. Materials and Methods

2.1. Data Collection

The library was constructed by exploring all raw data from five Vietnamese online newspapers, including VnExpress Newspaper (<http://vnexpress.net/>), Nhan Dan Newspaper (<http://nhandan.com.vn/>), Vietnam News Agency (<https://vnanet.vn/>), Vietnam Plus Newspaper (<https://www.vietnamplus.vn/>) and Resources & Environment Newspaper (<https://baotainguyenmoitruong.vn/>), which included titles, abstracts and keywords (Table 1). Data was collected during 4 years, beginning on January 1, 2020, and ending on December 31, 2023.

2.2. Data Analysis and Reporting

The subjects of environmental issues and climate change adaptation have been forecasted and preliminarily coded utilizing a theoretical framework designed specifically for these topics. The arrangement of independent variables within each coded subject was methodically structured based on their observed positions, identified from an analysis of 352 infographics. More specifically, the online platforms of each news source were searched using the terms “text, policies of the Party and State on the environment” (E1), “current status of policy implementation” (E2) and

“environmental protection solutions” (E3), “average temperature increase and sea level rise” (CC1), “extreme weather” (CC2), “consequences, impacts on various fields” (CC3) and “adaptation warnings/guidelines” (CC4). Using SPSS software [7], these variables, relating to environmental content and climate

change adaptation, were meticulously examined to ascertain the frequency and distribution of these subjects within infographics on environment and climate change adaptation across five Vietnamese online newspapers that were part of the survey.

Table 1. A brief of five Vietnamese online newspapers

#	Vietnamese online newspapers	Homepage	Press-managerial agency	Mission
1	VnExpress Newspaper	http://vnexpress.net/	Vietnam Ministry of Science and Technology	Popular online news
2	Nhan Dan Newspaper	http://nhandan.com.vn/	Vietnam Ministry of Information and Communication	Official news
3	Vietnam News Agency	https://vnanet.vn/	The Vietnamese Government	Official news
4	Vietnam Plus Newspaper	https://www.vietnamplus.vn/	Vietnam News Agency	Official news
5	Resources & Environment Newspaper	https://baotainguyenmoitruong.vn/	Ministry of Natural Resources and Environment	Resources and Environment issues

(Source: Author group).

3. Results

3.1. Manifestation of the Changing Trend of Using Infographics on Environment and Climate Change Adaptation in Online Newspapers Over the Years

To study content characteristics, we first performed an analysis by exploring infographic works over 4 years. The period 2020 - 2023 marks the initial phase of implementing the National Adaptation Plan for Climate Change for 2021 - 2030, with a vision towards 2050, as stipulated in Decision No. 1422/QĐ-TTg by the Prime Minister. Within the tasks and solutions outlined in the National Plan under the section “Reducing disaster risks, mitigating damages caused by increasing extreme weather events, and minimizing losses from climate change” there is an emphasis on enhancing disaster communication capabilities, integrated with national information and communication infrastructure systems to ensure comprehensive,

accurate, and timely information dissemination for effective disaster prevention and control. Therefore, selecting the period 2020 - 2023 to analyze the characteristics and content trends of environmental and climate change adaptation infographics on Vietnamese online newspapers contributes to providing an overarching view of the state of environmental and climate change adaptation communication in mass media. This analysis can further offer insights and recommendations for improving environmental and climate change adaptation information dissemination in the subsequent phases of the National Plan.

As expected, an overview of the change of the infographic trends on the environment and climate change adaptation on surveyed online newspapers during the period was illustrated in Figure 1. Based on an examination of 352 samples, the Vietnam News Agency is the press agency with the highest frequency of presenting information on the environment and climate change adaptation through infographics,

accounting for 43.2% (n = 352). However, it has varied over the years. The substantial frequency growth of Vietnam News Agency in 2023 has created a significant gap compared to other online newspapers. This confirms that content about the environment and climate change adaptation is increasingly emphasized in the presentation of information to improve the ability to receive messages from the public. In

addition, the number of infographics produced by the Information and Graphics Documentation Center of the Vietnam News Agency increased to 300 graphic products in 2022, a 10% increase compared to the same period in 2021. This highlights a lack of human resources and infrastructure to specialize in this type of content [8].

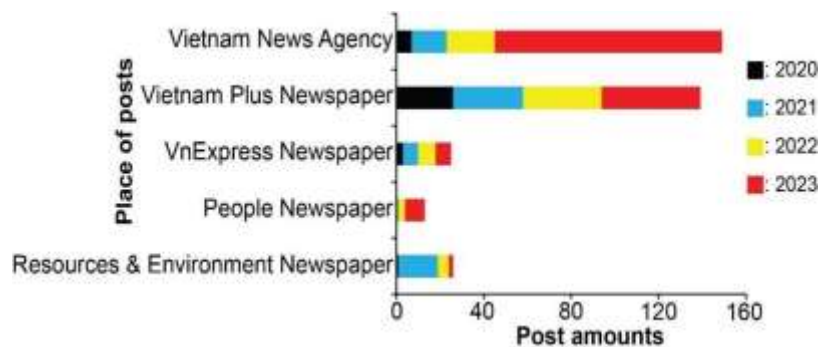


Figure 1. Overview of the changing trend in using infographics on the environment and climate change adaptation in online newspapers over the years. (Source: Author group).

On the other hand, promoting the strengths of new communication technologies is essential to influence and innovate the thought of levels and sectors in communication activities and raise awareness of environmental protection among businesses, communities, and citizens. This issue is raised to implement the “National Environmental Protection Strategy to 2030, Vision to 2050” approved by the Prime Minister (Decision No. 450/QĐ-TTg). Therefore, Vietnam News Agency, the main news agency of the Government of Vietnam, is the direct and pioneering unit in implementing and concretizing the task of using new communication technologies as infographics to enhance and convey environmental information. This basis explains the trend of a slight increase in the number of infographics worked on the environment and climate change adaptation in VietnamPlus Newspaper (0.6%) and Nhan Dan Newspaper (1.7%), compared to 2022.

Natural Resources and Environment Newspaper is the official spokesperson of the

Ministry of Natural Resources and Environment. This online newspaper is leading and pioneering in environmental communication activities. However, the resources of the Natural Resources and Environment Newspaper are limited. As a result, they cannot keep up with the digital transformation trend in journalism and access to new communication technologies. The current interface of Natural Resources and Environment Newspaper lacks an infographic section, which is specialized to distinguish journalistic works that use infographics. The research results indicate that the number of infographics on the environment and climate change adaptation in the Natural Resources and Environment Newspaper accounted for the lowest percentage at 7.4% (n = 352).

3.2. Manifestation of Content Differentiation in the Trend of Infographics on Environment and Climate Change Adaptation

A list of independent variables related to environmental content (including E1, E2 and E3)

and climate change adaptation (including CC1, CC2, CC3 and CC4) has been used to analyze the manifestation of content differentiation. As a result, a summary of the changing trend in the

use of infographics on climate change adaptation and environment in Vietnamese online newspapers has been illustrated in Figure 2 and Figure 3.

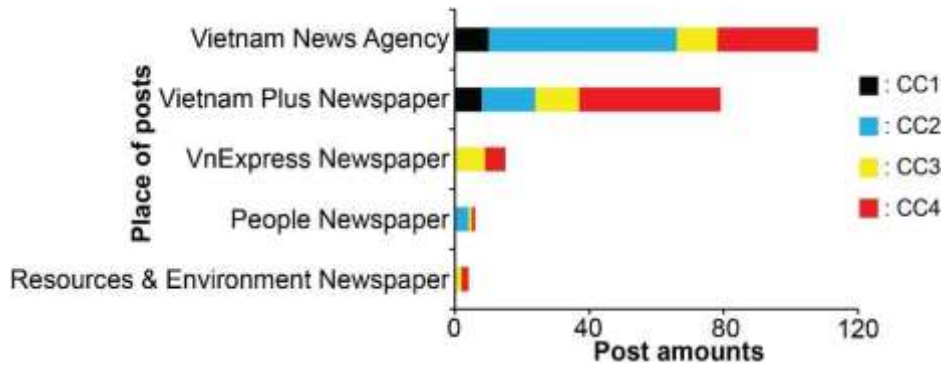


Figure 2. Overview of the changing trend in using infographics on climate change adaptation in Vietnamese online newspapers. (Source: Author group).

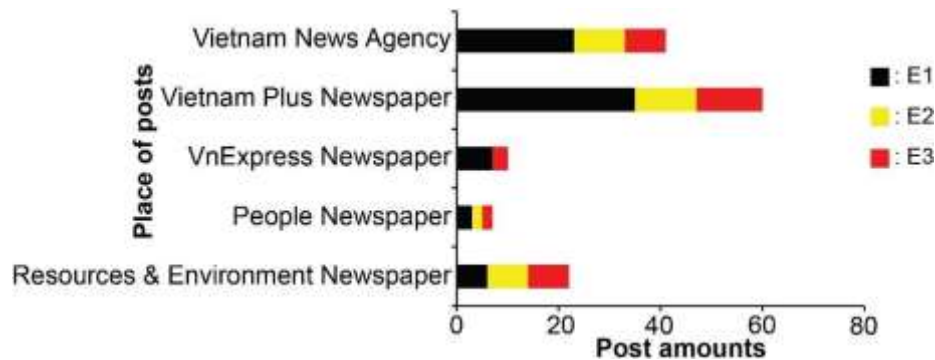


Figure 3. Overview of the changing trend in the use of infographics in the environment in Vietnamese online newspapers. (Source: Author group).

In general, Vietnam News Agency and VietnamPlus Newspaper both fully and comprehensively report content on the environment and climate change adaptation, accounting for the highest proportions of 42.3% and 39.5% (n = 352), respectively. The sample analysis results for each dependent variable show that CC4 accounts for the highest proportion, with 23% of the total infographics works, mainly concentrated in VietnamPlus Newspaper (11.9%) and Vietnam News Agency (8.5%). Following next is CC2, accounting for 21.6%, concentrated mainly in Vietnam News

Agency (15.9%); E1 also holds a significant proportion with 21%, appearing regularly on VietnamPlus Newspaper (9.9%) and Vietnam News Agency (6.5%).

During the survey period, the Law on Environmental Protection 2020, passed by the National Assembly at its 10th session and effective from January 1, 2022, has become an objective impetus for press agencies to enhance the volume of information regarding new points in environmental policies and laws to the public and relevant stakeholders. Specifically, the regulations on environmental permits and the

content of air environmental permits in Clause 2, Article 40 (including emission sources; maximum exhaust flow rate; exhaust stream; pollutants and the limit values of pollutants in the exhaust stream; location and method of exhaust discharge) have become more timely and groundbreaking compared to the corresponding content in the Law on Environmental Protection 2014, as presented through infographics in the surveyed online newspapers. The content on the current policy implementation and solutions status accounted for 9.1% and 9.7% ($n = 352$), respectively. Three environment-related dependent variables (E1, E2, E3) were primarily represented in the VietnamPlus Newspaper. Infographic works illustrated the law's content on management, reuse, recycling, treatment, and developing a circular economy model for plastics and enhanced information on global antiplastic waste initiatives through infographics.

The content reflects that the variables CC4 and CC2 lead the trend in infographic content in the surveyed online newspapers. According to the World Meteorological Organization's report, Asia faces numerous extreme weather events in 2023, such as tropical storms, heavy rains and floods, droughts, heatwaves, and wildfires [9, 10]. For instance, major floods in Yemen have affected over 165,000 people and caused significant damage to both lives and property. These events have accelerated the global demand for early warning information and adaptive scenarios to inform about "red alerts". Consequently, the public and stakeholders are guided and encouraged to take action in developing adaptive scenarios for extreme weather events and sea-level rise, which are clear manifestations of climate change in Vietnam. The research results also indicate that the data scope of CC4 primarily reflects lessons learned and strategic adaptation solutions to climate change worldwide (accounting for 15.1%, $n = 81$); the data scope of CC2 mainly reflects the increasing trend of extreme weather events in Vietnam (accounting for 18.5%, $n = 76$). The overall data scope of the content

reflected in the infographic works mainly focuses on the world (accounting for 54.5%, $n = 352$). However, infographic content on related issues within the national scope will have a higher impact on public awareness of behavior control compared to infographic content on issues with a global scope.

4. Conclusions

The content characteristics of the trend of infographics on the environment and climate change adaptation in Vietnamese online newspapers have shown positive effects in attracting public attention and updating information more quickly on relevant subjects. However, our results demonstrate that the level of infographic representation and content differentiation on the environment and climate change adaptation differs significantly. Press agencies are not evenly applying and promoting the potential of using infographics to represent material in online newspapers. Therefore, the research makes some suggestions to improve the quality of the content manifestations of infographic trends on the environment and climate change adaptation, including:

Firstly, shifting the mindset from traditional journalism products to multimedia and data journalism needs to start with a reform mechanism demonstrating the interaction relationship among elements and departments in the creative process of journalistic works within media organizations. Specifically, given the current trend of developing infographics journalistic works in various fields, especially its effectiveness in communicating about the environment and climate change adaptation, the authors propose several critical suggestions for reform mechanisms in media organizations as follows: Investing in tools and software that support data collection, processing, and analysis; Establishing an efficient data management and storage system; Integrating data into the workflow by setting up data collection processes right from the initial stages of journalistic production; and building a data culture within

the media organization, among departments, divisions, and journalists.

Secondly, press agencies need to enhance their reporting and promote messages about the environment and climate change adaptation in local regions within the country. This activity should identify the focal points and key issues of cities and provinces dealing with environmental phenomena and climate change adaptation. Consequently, this will enhance the effectiveness of propaganda efforts to raise awareness about environmental protection and proactive actions regarding climate change adaptation manifestations in each locality. Moreover, the coverage of information will directly or indirectly impact the extent of issues surrounding the environment and climate change adaptation, guiding the public to take action regarding the situations communicated by the press, especially in emergencies that require timely indicators from the press.

From some of the above suggestions, press agencies and journalists could develop the potential of the trend of infographics on the environment and climate change adaptation, orienting the public to be deeply aware of urgent issues, thereby promoting actions to protect the environment and reduce climate change adaptation in Vietnam in the future.

In conclusion, this research comprehensively assessed the content characteristics of trends in environmental infographics and climate change adaptation in Vietnamese online newspapers. The slight annual increase in environmental infographics and climate change adaptation across various news outlets highlights the potential growth of data journalism in Vietnam and the investment of media agencies in environmental and climate change communication. The variation in frequency and differentiation in content, based on seven dependent variables over four years (2020-2023), illustrates that the scope of environmental and climate change adaptation information in the press is comprehensive and detailed. This coverage reflects the urgency, current state, impacts, and consequences across multiple

sectors. Researchers, policymakers, and educators can utilize the findings of this study to explore further the potential development of content characteristics and new communication forms using environmental infographics and climate change adaptation in the future.

Disclosure of Interest

The authors have no competing interests to declare that are relevant to the content of this article.

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