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RECEIVED 14 August 2024

ACCEPTED 10 October 2024

PUBLISHED 04 November 2024

CITATION

Zhou Y (2024) Navigating constraints: news values and journalistic role performance in Chinese state media VR news. *Front. Commun.* 9:1480659. doi: 10.3389/fcomm.2024.1480659

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Navigating constraints: news values and journalistic role performance in Chinese state media VR news

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Introduction: This study explores the intersection of virtual reality (VR) technology and journalism, with a particular focus on the application of VR in news productions by China Central Television (CCTV). The research aims to assess how VR enhances immersive storytelling, the prevailing news values it supports, and how journalistic roles are performed within these productions in China.

Methods: A content analysis was conducted on 234 VR news productions by CCTV, examining the use of immersive elements, the representation of news values, and the roles of journalists in the context of VR news.

Results: The findings indicate that, while VR enhances audience engagement through immersive experiences, its application in CCTV's VR news remains limited in scope. The technology is primarily employed within traditional journalistic frameworks, often emphasizing the loyal-facilitator role.

Discussion: The study reveals that immersive journalism at CCTV tends to support state-aligned narratives, promoting positive news values and limiting the critical engagement typically associated with more interventionist journalistic models. By examining the news values and the nuanced performances of journalistic roles in the context of VR news, this research contributes to the broader understanding of how emerging technologies like VR are shaping journalistic practices in authoritarian media systems, offering insights into both the potential and limitations of VR in enhancing audience engagement while maintaining journalistic integrity.

KEYWORDS

immersive journalism, VR news, news values, journalistic role performance, Chinese journalism, journalism practice, content analysis

1 Introduction

The global news industry has experienced profound changes because of the rapid advancement of virtual reality (VR) technology. [Costa and Brasil \(2017\)](#) state that VR represents a pivotal moment in the evolution of media history. VR news, characterized by its immersive and interactive nature, offers audiences a completely new way of experiencing news ([Baía and Coelho, 2018](#); [Pavlik, 2019](#); [Wu et al., 2021](#); [Wu, 2022](#)). Unlike traditional news, VR news allows audiences to virtually enter the scene, providing a more engaging and comprehensive understanding of events ([De la Peña et al., 2010](#); [Kukkakorpi and Pantti, 2021](#); [Shin and Biocca, 2018](#); [Sirkkunen et al., 2016](#)).

Moreover, the application of VR technology in journalism has altered the traditional narrative methods ([Domínguez, 2017](#); [Hardee, 2016](#); [Harris and Taylor, 2021](#); [Jones, 2017](#); [Pérez-Seijo et al., 2022](#)). Traditional news reporting predominantly utilizes linear dissemination methods, including text, images, and short videos, which require audiences to follow a

predetermined sequence when consuming news content. However, the integration of VR technology has disrupted this linear narrative approach, enabling multidimensional presentations and offering new opportunities for immersive VR news experiences (Bujic and Hamari, 2020; Sundar et al., 2017; Yang and Zhang, 2022). These shifts bring new possibilities to the news industry. The novel news experience elicits stronger emotional engagement and a higher level of enjoyment from audience (Van Damme et al., 2019; Kukkakorpi and Pantti, 2021). Consequently, both academia and journalism practitioners have high expectations for the application of VR technology in the news industry (Aronson-Rath et al., 2015; De la Peña et al., 2010; Kickstarter, 2012; Watson, 2017).

Mainstream news media outlets are increasingly incorporating immersive technologies into their news productions. For example, in 2017, NBC News in the United States utilized the VR platform AltSpace to produce and broadcast a series of interview programs (Francesco and Nakagawa, 2017). This marked the first exploration of VR interview programs, allowing audiences to interact with people in the news office in real-time. The BBC has also been actively developed VR content, creating a variety of VR productions ranging from high-end documentaries to short 360-degree videos (Watson, 2017).

In China, VR news has been embraced by mainstream media outlets, including China Central Television (CCTV). The year 2016, recognized as the inaugural year for virtual reality technology, saw mainstream Chinese media widely integrating VR technology into their news reporting to enhance audience engagement and provide a more dynamic viewing experience. Examples include Caixin's VR documentary "Kindergarten in the Mountains" (*Shancunlidayoueryuan*), Xinhua News Agency's VR highlights "One Hour Before the Opening of the Chinese People's Political Consultative Conference (CPPCC)" (*Zhijizhengxiehuiyikaimuqianyixiaoshi*), and the VR news coverage of the 2018 National People's Congress and CPPCC in CCTV.

However, scholars have raised ethical concerns regarding the use of VR technology in journalism. These include discussions about objectivity and authenticity of news (Aitamurto, 2019; Jones, 2017; Kang et al., 2019; Kool, 2016; Mabrook, 2021), as the immersive nature of VR blurs the line between factual reporting and simulation. Other critical issues include audience trust (Nielsen and Sheets, 2021; Pavlik, 2019; Usher, 2019), news values of VR news (Pjesivac and Hudson, 2024; Wu, 2022; Zhang and Wu, 2017), and complexities to journalistic practices (Kool, 2016; Mabrook and Singer, 2019). For instance, users may doubt its credibility because VR manipulates what they see and experience, thereby creating skepticism around the impartiality of the content. Concerns about the news values of VR news focus on how traditional journalistic principles, such as accuracy and relevance, may be compromised in favor of creating more visually engaging or emotionally charged content. The complexities arise mainly because VR journalism often requires journalists to adopt new roles that go beyond traditional reporting, including ethical decision-making regarding the content and form of the virtual experiences. Moreover, the need to re-educate audiences on media literacy becomes necessary (Bunardi and Prestianta, 2023; Glas et al., 2023). In addition to these ethical issues, technological limitations such as causing sickness, dizziness, or distraction when watching VR news (Broeck et al., 2017; Lin et al., 2017) may limit audiences' experience.

Although it made a sensational effect with significant reactions and garnered widespread attention, immersive VR news remains a

new paradigm in the field of reporting. To date, there remains a lack of clear understanding regarding the significance that immersive VR news holds for journalism studies. To explore the practical application of immersive elements in VR news, this article provides evidence from China, by conducting a content analysis of 234 news productions of CCTV. Through content analysis, this article reveals the extent to which immersive elements are present in news productions, assesses the news values, and evaluates the performance of news roles. This study contributes to a broader understanding of how emerging technologies are reshaping journalism. Additionally, it offers practical insights for media practitioners interested in VR technology in their reporting, ensuring that they can effectively engage audiences while maintaining high journalistic standards.

2 Literature review

2.1 The immersive elements

Immersive journalism is a form of news reporting that applies VR technology to news production, offering viewers a first-person perspective and providing an immersive experience (De la Peña et al., 2010; Sundar et al., 2017). This reporting style merges illusions of presence, plausibility, and the appropriation of the virtual body, immersing audiences within a computer-simulated environment that obscures their awareness of the actual physical space around them. This approach elicits a profound sensation of being physically present in a "real place, reliving real stories, with real bodies" (Witt et al., 2016). Known as Response-As-If-Real (RAIR), this phenomenon ensures that participants react to virtual environments as if they were experiencing real-world situations. The effectiveness of RAIR hinges on the high level of immersion and realism in the virtual environment, making participants temporarily "forget" they are in a virtual world and react naturally. High-quality graphics, audio effects, and interactive design are crucial for achieving RAIR (Bowman and McMahan, 2007). Peng and Peng (2016) state that VR news differs significantly from traditional forms in terms of communication modalities and narrative modes. Further emphasizing the importance of technological fidelity, Slater and Wilbur (1997) argue that the richness of the display, robustness of content, clarity of resolution, and overall quality are pivotal in fostering a convincing immersive journalism experience. Additionally, modalities such as image, audio, and text impact the level of immersion (De Bruin et al., 2022).

Specific elements of VR news productions can influence the level of immersion experienced by audiences. The type of device used for VR news—whether a desktop computer, mobile phone, head-mounted display (HMD), or Cave Automatic Virtual Environment (CAVE) system—plays a crucial role (Grassi et al., 2008; Kang et al., 2019; Wu et al., 2021). The sense of immersion increases with advancements in technology. For example, VR headsets provide a more inclusive and immersive experience compared to desktops or mobile phones (Cummings and Bailenson, 2016).

In the specific journalistic practices, news productions that can be classified VR news are still limited. The actual focus is mainly on 360-degree panoramic news (Baía and Coelho, 2018; Zhou, 2022). VR news productions, particularly those using 360-degree videos, can be viewed through HMD, allowing audiences to experience full immersion. Alternatively, they can be viewed on mobile devices,

where smartphones are used as VR displays, providing users with a partial immersive experience (Sreedhar et al., 2016). In game studies, a high level of immersion means high fidelity, which increases presence and engagement of users (McMahan et al., 2012). Interestingly, Wang et al. (2018) found that 360-degree VR videos lead to lower audience engagement than non-VR videos.

In sum, immersive journalism varies according to the level of immersive technology employed in news production. Different immersive elements evoke varying levels of immersion and engagement, resulting in distinct news experiences.

2.2 VR news narratives

Traditional news reporting primarily relies on linear and single mode of communication (Harcup, 2014). In contrast, VR news disrupts this linear narrative model by introducing a deconstructed, non-linear approach that enhances the spatial dimension of media information (Jones, 2017). Jones employs content analysis and focus group interviews to explore the narrative strategies of immersive journalism. She categorizes the narrative strategies into three types: social 360, character-led, and reporter-led. These categories, respectively, represent spatial narrative within panoramic videos, first-person perspective storytelling, and the role of journalist.

Firstly, VR technology recreates the spatial narrative for audiences. It overlaps the space of the news with audiences' real environment, isolating them from the physical world, thereby increasing their attention to the news (Xie, 2020). By integrating sound, text, and images into a single immersive scene, VR technology enables audience to overcome the physical limitations of screen size, providing a panoramic view of the news scene (e.g., Steynberg, 2020). This approach allows users to break free from linear narratives and experience the news in a more comprehensive and engaging way (Domínguez, 2017; Kukkakorpi and Pantti, 2021). Spatial narrative in VR news leverage the arrangement and interaction of spaces to tell a story, making the news not just a story to be heard, but a space to be experienced (Sundar et al., 2017).

Secondly, VR technology allows audiences to explore news scenes through a first-person perspective, offering a more immersive and engaging experience. Traditional media typically employ a third-person narrative perspective, positioning viewer as a passive observer. However, in VR environments, audiences can embody a virtual persona or interact as recognized characters within the virtual world, taking on active roles (Cummings and Bailenson, 2016; Domínguez, 2017). The latter one represents a higher level of immersion (De Bruin et al., 2022; Sanchez-Vives and Slater, 2005). Immersive journalism is thus characterized by a first-person perspective and the diminished role of media (generally the journalist), creating a "self-narrative" form of information engagement.

Lastly, the shift from a third-person to a first-person perspective also signifies a change in the roles of the audience and the journalist. Audiences engage in the news story through role-playing, while the journalist's role gradually fades from the news production. In traditional news, the presence of journalists is usually evident through narration, framing, or direct interaction with the audience. However, in immersive journalism, the deliberate omission of the journalist and camera is a technique used to enhance the audience's sense of presence and immersion. This approach makes audiences feel as though they are witnessing events firsthand, rather than through a journalist's mediation

(Kool, 2016). It is important to note the ethical issues that accompany this shift. The journalist's role encompasses not only reporting but also creative decision-making, including choices about camera angles, movements, sound directions, and other sensory details to construct the narrative. The shift in roles brings about ethical considerations both for journalists and audiences (Hardee, 2016; Hardee and McMahan, 2017; Herrera Damas and Benítez de Gracia, 2022).

The narratives influence users' self-identification and recognition within the VR environment regarding "who I am" (Barbara and Haahr, 2021). The immersive narratives in VR news can either enhance or impede the active participation of users in journalistic productions, consequently affecting the level of immersion. Here the first research question is proposed:

RQ1. What immersive elements are embodied in VR news in China?

2.3 News value theory

News values are defined as the criteria used to assess whether an event qualifies as news (Eilders, 2006; Kristensen, 2023; Reese and Ballinger, 2001). Galtung and Ruge (1965) proposed the widely known criteria to guide the news selection process, providing a systematic way to understand why certain events become news while others do not. They categorized 12 news values into several characteristics such as meaningfulness, unexpectedness, and threshold. These characteristics are independent of each other and collectively define the principles that guide news production. The study of news values revolves around the question "What is news?" (e.g., Harcup and O'Neill, 2016). As society and culture evolve, news values change accordingly (Park and Kaye, 2023). Eilders (2006) revised traditional news values through her research on German news, proposing a new set of criteria, including relevance, conflict, and proximity. Similarly, O'Neill and Harcup (2009) offered a contemporary understanding of what constitutes news, introducing values such as power elite, bad news, magnitude, and media agenda. These standards, set against the backdrop of the mass communication era, rely on media such as the printing press, telegraph, telephone, and television. They focus on the audience as the target and concentrate on the news content production process, thereby defining the entities capable of making news value judgments.

In the new digital context, the original elements of news value theory, such as timeliness, significance, and proximity, have become less effective in explaining contemporary news practices (Yu et al., 2024). Beyond textual content, scholars have identified the importance of visual and audio information (Bednarek, 2016a; Caple and Bednarek, 2016; Dick, 2014). Additionally, Harcup and O'Neill (2016) updated news values to reflect changes in journalism practices, particularly under the influence of digital media. The revised news values include exclusivity, bad news, conflict, surprise, audio-visuals, shareability, entertainment, drama, follow-up, the power elite, relevance, magnitude, celebrity, good news, news organization's agenda. The role of social media in shaping news values is also becoming increasingly apparent (Bro and Wallberg, 2017). Relevant studies highlight the impact of various platforms, including Facebook (Al-Rawi, 2017a; Bednarek, 2016b; Park and Kaye, 2023), Instagram (Al-Rawi et al., 2021; Hendrickx, 2023), and Twitter (Al-Rawi, 2017b; Araujo and van der Meer, 2020).

The dilemma faced by news value theory reflects the mismatch between the norms and rules of news production, developed within

the context of the industrial society, and the current news dissemination ecology of the information society. Presently, both academia and the industry are attempting to address this dilemma in two main ways: firstly, by incorporating new elements into news value theory through empirical research that reflects the characteristics of the digital age; secondly, by developing new forms of journalism to rejuvenate the vitality of news production (Yu et al., 2024). Exploring how VR news demonstrates innovation and value enhancement in terms of information, knowledge, and understanding is, therefore, a meaningful discussion in the study of new media content value. Thus, the second research question is proposed:

RQ2: What news values are reflected in VR news?

VR's immersive elements, such as interactivity and the first-person perspective, challenge the way news values are applied in journalistic practice. To further investigate these integration of immersive elements within the VR news and their alignment with traditional news values, the following research question is posed:

RQ3: How do immersive elements (interactivity and first-person perspective) influence specific news values?

2.4 Journalistic role performance

Journalistic role performance refers to the actual behaviors and practices exhibited by journalists during the news production (Mellado, 2014; Mellado and Hellmueller, 2015, 2016). This concept emphasizes how journalists' roles are manifested in the content they create, reflecting their actions and decisions in real-world scenarios. As the value-laden characteristics of news productions, journalistic role performance is framed under six roles across three conceptual domains active-passive stance of journalists, relationship between journalists and the authorities, and roles to audiences, specifically, interventionist, service, watchdog, loyal-facilitator, infotainment and civic (Mellado and Hellmueller, 2015).

The emergence of journalistic role performance represents a shift in the focus of journalism theory research from the self-perception of journalists to examining what these roles accomplish within journalistic practices (Mellado and Van Dalen, 2014). This transition allows for a more precise understanding of journalistic practices across different media systems.

Digitalization has shaken traditional media and has driven a shift in the role of journalism. Mellado et al. (2024) found that the roles exhibited by online media platforms are more infotainment/service-oriented and there are little differences concerning roles tied to journalism's core function as a public service, especially the watchdog role compared to traditional media (newspapers, radio, television). Unlikely, based on news in Chilean, Mellado et al. (2021) stated that print news exhibited a stronger presence of loyal-facilitator, civic, service, and infotainment roles, whereas online news demonstrated a higher prevalence of disseminator and watchdog roles. Regarding social media, Tandoc et al. (2019) found journalists presented as detached watchdog and critical change agent roles on Twitter. Additionally, through a textual analysis of AI-generated news, Ji et al. (2024) discovered that Chinese journalists exhibit both critical and loyalty-promoting roles in their coverage of emerging technologies.

Journalistic role performance is also shaped by socio-political and economic backgrounds, leading to variations across different countries

(Mellado et al., 2024). Interestingly, news productions in general display the watchdog role in practice, including Spain (Humanes and Roses, 2018); Swiss (Raemy et al., 2019), and Chile and Mexico (Mellado et al., 2018). Currently, research on journalistic role performance as a framework for studying journalistic practices primarily focuses on Western democratic countries (e.g., Mellado et al., 2024). There is a significant gap in the research on journalistic role performance in China. Mellado et al. (2017) found that in China, journalism is neither distinctly critical nor loyalist. The low performance of both the watchdog and loyal-facilitator roles indicates that the state still exercises significant control over the press. Wang and Li (2024) discovered that under the triple pressures of technological disruption, economic downturn, and tightened political control, journalistic role performance in China has been repositioned. It now combines the roles of watchdog and facilitator, shifting from a focus on criticism to an emphasis on constructiveness.

A significant limitation of existing research on role performance in journalism is its predominant focus on the analysis of print media. This paper also aims to address the extent to which VR news, as a new journalistic practice, challenges traditional news values and the performance of journalistic roles. The introduction of VR in journalism challenges these roles, as the immersive and interactive elements of VR may lead to a shift in how journalistic roles are performed. This shift also raises questions about how journalists maintain their facilitator roles within the context of immersive news production. Given the gap in empirical research related to VR news in China, these results will contribute to the emerging field of journalism research. Therefore, ask the following:

RQ4: What journalistic role performance are demonstrated in VR news?

RQ5: How do immersive elements (interactivity and first-person perspective) impact journalistic roles of VR news?

3 Materials and methods

This paper utilizes a quantitative content analysis. For conducting a systematic demonstration of quantitative generalization of VR news based on reliable classification and observation. CCTV has started posting VR news in the VR Channel since 2020. The selected data are all published news productions in the CCTV-VR channel. Currently, only CCTV continues to sporadically update its VR news content. The channel originally had 238 videos, but during the data collection period (April 2024), 4 news links were inaccessible. Thus, as of May 2024, a total of 234 videos were collected.

Two coders are undergraduate students majoring in journalism and communication, and were trained before coding. 50 (21%) VR news productions were randomly selected and were coded by two coders to assess the inter-coder reliability. Each news production was first watched via computer and then watched once again for coding. There was 69 to 100% agreement across all variables (The Krippendorff's alpha value is from 0.69 to 1), indicating an adequate level of agreement between the coders' ratings. To answer RQ3 and RQ5, this study applied Chi-square (χ^2) statistics to examine the relationships between categorical variables.

The operationalizations of variables are noted as followed. De Bruin et al.'s (2022) codebook was originally designed to analyze immersive news productions across three aspects: modalities used in VR news

productions, such as visuals, audio, and text; narratives, including viewing perspective (first-person or third-person); and interactivity, which involves the ability to change perspectives and pace while viewing the news. However, given the unique features of the VR news content on CCTV, adjustments were made to the codebook to more precisely capture the specifics of the news productions analyzed in this study. For instance, the variable that assessed interactivity based on the audience's ability to "walk around in the virtual environment" was removed, as this function is not present in CCTV's VR news content.

News values were assessed using categories derived from literature and the definition provided by [Harcup and O'Neill \(2016\)](#). These values include: **exclusivity** – stories uniquely obtained by the news organization; **bad news** – stories with negative events; **conflict** – stories that cover disputes and confrontations; **surprise** – stories that highlight unexpected or unusual elements; **audio-visuals** – stories with engaging visuals, videos, or infographics; **shareability** – story likely to be widely shared and discussed on social media platforms; **entertainment** – soft stories designed to amuse or engage audiences; **drama** – stories involving unfolding events like accidents; **follow-up** – stories providing updates to previous reports; **the power elite** – stories about influential figures, organization, or institutions; **relevance** – stories concerning cultural, social, or historical connections of the stories to the audience; **magnitude** – stories reflecting the large scale or significant impact of an event; **celebrity** – stories involving well-known people; **good news** – stories emphasizing positive developments; and finally the **news organization's agenda** – stories that align with the news outlet's ideological, commercial, or strategic objectives. This framework was used to conduct a comprehensive evaluation of the CCTV news.

In evaluating CCTV's VR news productions, [Mellado's \(2014\)](#) framework of journalistic role performance was applied, namely six

distinct roles. These include: (1) **the interventionist model**, which involves the journalist's active participation in shaping public opinion, where news productions take a clear stance or promote particular viewpoints; (2) **the watchdog model**, characterized by monitoring those in power, often through investigative journalism that scrutinizes authority and holds institutions accountable; (3) **the loyal-facilitator model**, in which journalists support the government or other powerful institutions by promoting official policies, with a focus on fostering national development and social cohesion; (4) **the service journalism model**, which provides practical information and advice, offering content such as consumer tips or lifestyle guidance to help audiences navigate everyday life; (5) **the infotainment journalism model**, which blends entertainment with news, addressing the public as spectators by prioritizing sensational, emotionally charged, or visually stimulating content; and (6) **the civic-oriented model**, aimed at encouraging civic engagement by fostering public debate and informing citizens of their rights and responsibilities.

4 Results

The CCTV platform employs 360-degree panoramic mode and various audiovisual media to construct a VR virtual space, providing audiences with a VR news experience. The study identifies two types of VR news: 360-degree videos, which constitute 32.9% of the content, and hybrid VR news, which makes up 67.1%. 360-degree video means that the news content is presented in 360-degree panoramic video ([Figure 1](#)); hybrid VR news in this article means that the news content includes a variety of media forms, including 360-degree video and other interactive designs ([Figure 2](#)). In these VR news productions,



FIGURE 1

The 360-degree video VR news in CCTV. Reproduced from: <https://vrnews.v.cctv.com/player/index.html?spm=C94212.PUKAtiJ50h3v.S80830.696appid=kb7e5vi8&vuuid=wjmp2pz0>.



FIGURE 2

The hybrid VR news in CCTV. Reproduced from: <https://news.cctv.com/VR/jsvrgzhwc/index.html?spm=C94212.PUKAtiJ50h3v.S80830.1>.

there are four main sections: “VR Warm Stories,” “VR Major Events,” “VR Anywhere Door,” and “VR Breaking News.” “VR Warm Stories” focuses on reporting national policies, including series such as “Revisiting the General Secretary’s Poverty Alleviation Footprints” and “VR Roaming.” “VR Major Events” highlights the timely social events through the everyday lives of people, featuring series like “Epidemic’ Line VR Reporting” and “Frontline of the Fight Against the Epidemic.” “VR Anywhere Door” utilizes virtual reality technology to break the spatial limitations of news reporting, allowing audiences to experience the grandeur of the country from the comfort of their homes. “VR Breaking News” provides special reports on major sudden events, such as the flood rescue operations in Anqing, Anhui. Table 1 presents the themes of virtual reality news reporting in this study.

The VR news sample was analyzed to understand the utilization of various modalities, including visual, audio, and textual elements (see Table 2). The findings indicate a comprehensive use of these modalities in news productions.

The most frequently employed textual function is the explanation of news content, used in 84.6% of the samples. Subtitles usually appear within the video content included in VR news, making up 22.6% background music is universally used in the sample, appearing in 100% of the VR news productions on the CCTV-VR channel. In contrast, audio cues (the sound signal that draws audiences’ attention, such as alarms) are the least utilized audio element, appearing in only 0.9% of the samples. Visual elements are crucial in enhancing the authenticity and engagement of VR news. Actual footage is predominant, used in 98.7% of the news productions, reinforcing the credibility of the news. In contrast, computer-generated video is rarely used, appearing in only 1.3% of the samples. Additionally, static illustrations and infographics are employed, with usage rates of 71.8

and 74.4% respectively, further supporting and explaining the news content.

The findings of how interactive features are utilized in VR news are summarized in Table 3. The changing of viewpoint is the most prevalent, present in 97.9% of news productions. Changing narrative perspectives within the same story, used in 45.7% of samples, and shifting between modalities, found in 66.7% of samples, enhance storytelling by offering richer, dynamic angles and versatile content presentation. Additionally, controlling the location of the story, present in 72.6% of samples, deepens user engagement by providing control over the narrative’s setting.

Although these interactive features somewhat enhance the interaction between the audience and the news content, thereby increasing immersion, they remain limited and do not meet the expectations set by early scholars and practitioners (see Table 3). These findings are consistent with De Bruin et al.’s (2022) results based on European VR news productions.

In terms of narratives, audiences of VR news still present as observers (the third person) rather than the experiencer (the first person), 71.8 and 30.3%, respectively. Additionally, only 21 productions (9%) utilize a first-person perspective, where the user experiences the VR environment through their own eyes (i.e., an avatar). In contrast, all 234 productions (100%) employ a third-person perspective, where the user observes the VR environment as an external viewer. The extensive use of third-person perspectives and narratives suggests that VR news is still largely designed to keep the user in an observer role, rather than fully immersing them in the story as an active participant.

The second research question aims to evaluate the presence of traditional news values in VR news content. Every VR news story (100%) incorporated audio-visual elements, emphasizing the

TABLE 1 Overview of VR news in CCTV.

CCTV news	<i>N</i>	%
News type		
360-degree video	77	32.9
Hybrid VR news	157	67.1
Topics		
Economy/finance	34	14.5
Social issues	156	66.7
Legal and judicial matters	0	0
Culture/entertainment	29	12.4
Technology	6	2.6
Lifestyle	1	0.4
War/defense	0	0
Figure	1	0.4
Education	1	0.4
Health	0	0
Others	6	2.6
News section		
VR warm stories	76	32.5
VR major events	53	22.6
VR anywhere door	98	41.9
VR breaking news	7	3.0

TABLE 2 Overview of modalities of VR news.

Modality	<i>N</i>	%
Text		
Instruction text	165	70.5
Explained text	198	84.6
Subtitle	53	22.6
Audio		
Background music	234	100
Non-diegetic narration	88	37.6
Diegetic narration	74	31.6
Ambient sound	68	29.1
Audio cue	2	0.9
Visual		
static illustrations	168	71.8
Computer-generated video	3	1.3
Actual footage	231	98.7
Infographics	174	74.4

medium's reliance on immersive and rich multimedia content. Shareability and relevance were also found in all news productions (100%). A significant portion of the content (63.2%) was categorized as good news, totaling 148 stories, indicating a positive bias in VR news reporting. Magnitude and exclusivity accounted for 12.4 and 6.8%, respectively. Except for the news organization's agenda (100%),

other traditional news values were notably absent in VR news productions.

These findings illustrate the distinctive characteristics of VR news. The emphasis on audio-visuals, shareability, relevance, and positive news reflects a strategic approach to engage audiences through immersive and interactive content. The absence of traditional

TABLE 3 Overview of interactive features in VR news.

Interactivity	N	%
Changing of viewpoint	229	97.9
Changing in narrative perspective in the same story	107	45.7
Shifting between modalities	156	66.7
Controlling the location of the story	170	72.6

TABLE 4 Parts of models of journalistic role performance.

Models of journalistic role performance		N	%
Interventionist model	Taking sides	57	24.4
	Interpretation	134	57.3
	Use of adjectives	97	41.5
Loyal-facilitator model	Defense/support activities	228	97.4
	Defense/support policies	55	23.5
	Positive image of political elite	15	6.4
	Progress/success	49	20.9
Infotainment journalism model	Sensationalism	25	10.7
Civic oriented model	Local impact	55	23.5

TABLE 5 Chi-square tests of immersive elements and news values.

Immersive elements	News value	χ^2 (df, N)	p-value	Cramer's V
Changing of viewpoint	Exclusivity	0.375 (1, 234)	0.54	0.04
	Magnitude	0.723 (1, 234)	0.395	0.056
	Good news	4.111 (1, 234)	0.043	0.133
Changing in narrative perspective	Exclusivity	12.08 (1, 234)	0.001	0.227
	Magnitude	25.74 (1, 234)	< 0.001	0.332
	Good news	5.134 (1, 234)	0.023	0.148
Shift between modalities	Exclusivity	8.587 (1, 234)	0.003	0.192
	Magnitude	16.551 (1, 234)	< 0.001	0.266
	Good news	4.863 (1, 234)	0.027	0.144
Controlling the location of the story	Exclusivity	6.466 (1, 234)	0.011	0.166
	Magnitude	12.462 (1, 234)	< 0.001	0.231
	Good news	3.884 (1, 234)	0.049	0.129
First-person perspective	Exclusivity	2.009 (1, 234)	0.156	0.093
	Magnitude	86.485 (1, 234)	< 0.001	0.608
	Good news	13.406 (1, 234)	< 0.001	0.239

news values such as bad news, conflict, and drama highlights a shift in focus toward more constructive and engaging storytelling in VR news.

Different elements within various journalistic role performance models are represented in Table 4. The loyal-facilitator model shows a high occurrence of defense/support activities (97.4%), indicating a strong tendency toward supporting certain activities within the content. The interventionist model is notable for its high use of interpretation (57.3%) and adjectives (41.5%), suggesting a focus on providing context and analysis. The infotainment journalism model and civic oriented model are less prominent, with lower percentages of sensationalism (10.7%) and local impact (23.5%), respectively.

Other journalistic role performances were absent through the VR news in CCTV.

To examine RQ3 and RQ5, several chi-square analyses were conducted. The first set of analyses was to investigate the interactive elements related to specific news values presented by VR news of CCTV.

The results demonstrate that specific immersive elements in VR news are significantly associated with various news values, especially with the magnitude and good news values (see Table 5). Notably, the first-person perspective shows a strong relationship with the magnitude of news value, suggesting a large effect size. Conversely, as a traditional news value, exclusivity does not show a significant

correlation with VR technology, indicating that certain conventional values may not translate effectively into the immersive VR context.

Table 6 presents the results of Chi-square tests analyzing the relationship between immersive elements in VR news and different aspects of journalistic role performance. Changing in narrative perspective and first-person perspective, in particular, show strong associations with multiple performance aspects, indicating that these immersive elements can significantly influence the way journalistic roles are perceived and performed.

5 Discussion and conclusion

With the widespread adoption of VR technology, the news industry has expressed great interest in VR news (Aronson-Rath et al., 2015). This article investigates the application of immersion elements in VR news, aiming to illustrate how news organizations or journalists can enhance the sense of immersion and whether VR news, as a new journalistic practice, adheres to news values and journalistic roles. Particularly during the COVID-19 lockdowns, VR news has challenged traditional news models by offering an immersive news experience from home. Through a content analysis of 234 news productions, this study reveals the application of immersive elements in news stories, discussing the news values and journalistic role performances presented, as well as their interrelationships. This provides empirical evidence for this emerging media practice within the context of China.

First, it is important to note that although scholars and industry professionals have high expectations for VR news, believing it enhances audience immersion and thereby deepens the connection between the news story and the audience, leading to higher engagement and deeper emotional connections, the level of immersion in practical applications is limited. In most news productions, users adopt a third-person perspective (observer) rather than a first-person perspective (participant). All news content can be viewed in 360-degree panoramas. Despite the inclusion of other interactive media forms, audiences still experience the news according to the journalist's planned content rather than through self-exploration. Similar results were found in the study by De Bruin et al. (2022), where a content analysis of 189 news productions in Western countries. While VR news positions audiences as active and engaged participants, it is essential to acknowledge the challenges posed by the application of new technologies concerning user agency and journalists' control. The news practice reveals that journalists or news organizations tend to rely on established conventions, thereby minimizing the influence of users on news narratives. The limited use of immersive elements result in audiences lacking a strong sense of presence and emotional engagement. The passive viewing experience, where audiences still follow the journalists' planned narrative path, as well as the limited utilized interactive elements further emphasizes the gap between the expected immersive experience and the actual implementation.

Secondly, the analysis of the news values in VR news highlights the importance of audio-visual elements, shareability, relevance, and the news organization's agenda. The emphasis on these elements reflects a strategic approach to attract audiences through immersive and interactive content. Additionally, the significant positive bias in VR news, where many stories are categorized as good news, can

be attributed to the characteristics of VR technology. Immersive experiences often evoke emotional resonance and positive engagement from audiences, encouraging news producers to favor positive, uplifting stories to capitalize on this feature. This approach not only aligns with the inherent traits of VR technology but also with the positive reporting trend typical of Chinese state media, such as CCTV. In this context, VR news focuses on uplifting content to promote national achievements, bolster state image, and ensure societal stability (Feng and Li, 2024; Liu and Chang, 2021). However, it is worth noting that the prioritization of audience appeal in VR news may sometimes take precedence over journalistic impartiality, posing a challenge to traditional press freedom standards, particularly in media environments subject to strict governmental oversight.

Although VR technology introduces new narrative methods, news organizations still maintain tight control over what is deemed newsworthy and how it is reported. The absence of traditional news values such as bad news, conflict, and drama highlights a shift in the focus of VR news narratives toward more constructive and positive storytelling. This deliberate avoidance of negative news may be attributed to the amplifying effect of VR's immersive nature on emotions. The immersive experiences provided by VR have the potential to intensify negative emotions, leading to adverse reactions from audiences, which aligns with previous research indicating that VR can have negative emotional impacts on viewers (Lavoie et al., 2021). Consequently, news producers tend to avoid topics that may evoke negative emotional responses, opting instead for stories that have a more positive impact on the audience.

The prominent performance of the loyal-facilitator model in VR news shows the news organization's tendency to support specific activities and policies. This is particularly significant in the context of the Chinese media system, where media outlets, especially state-run organizations like CCTV, function under strict government directives that emphasize the promotion of state ideology and positive societal narratives (Kuang and Wang, 2020). This controlled use of immersive technology reflects broader issues around press freedom, where media content is shaped by political directives rather than editorial independence. The high frequency of the loyal-facilitator model in supporting activities suggests a strong alignment with governmental and public policy support, closely related to the overall orientation and policy environment of Chinese media, where the press often acts as a mouthpiece for state propaganda (Jirik, 2016). The interventionist model excels in providing context and analysis, indicating a need for Chinese media to explain complex social issues and policies in a manner that aligns with government priorities. This also echoes the news organization's agenda in news values, which is strategically designed to maintain social stability and promote national achievements.

Despite VR's potential to revolutionize journalistic practices, the findings suggest that Chinese state media utilize VR primarily to endorse supportive roles rather than critique or challenge authority. For instance, while the infotainment role often ranks high in immersive journalism globally, indicating a focus on entertaining and engaging content, in Chinese VR news, the low presence of infotainment journalism implies a deliberate focus on education and information dissemination over mere entertainment, reinforcing the role of media as an educational tool under state guidance. The results differ somewhat from the findings of Wu (2022), highlighting variations in the application of immersive journalism between different media environments. Additionally, like the

TABLE 6 Chi-square tests of immersive elements and journalistic role performance.

Immersive element	Journalistic role performance	χ^2 (df, N)	p-value	Cramer's V
Changing of viewpoint	Taking sides	1.645 (1, 234)	0.2	0.084
	Interpretation	2.899 (1, 234)	0.089	0.111
	Use of adjectives	3.617 (1, 234)	0.057	0.124
	Defense/support activities	0.134 (1, 234)	0.714	0.024
	Defense/support policies	1.570 (1, 234)	0.21	0.082
	Positive image of political elite	0.350 (1, 234)	0.554	0.039
	Progress/success	1.353 (1, 234)	0.245	0.076
	Sensationalism	0.611 (1, 234)	0.434	0.051
	Local impact	1.570 (1, 234)	0.21	0.082
Changing in narrative perspective	Taking sides	23.734 (1, 234)	< 0.001	0.318
	Interpretation	5.358 (1, 234)	0.021	0.151
	Use of adjectives	19.659 (1, 234)	< 0.001	0.29
	Defense/support activities	5.188 (1, 234)	0.023	0.149
	Defense/support policies	13.450 (1, 234)	< 0.001	0.24
	Positive image of political elite	10.824 (1, 234)	0.001	0.215
	Progress/success	19.222 (1, 234)	< 0.001	0.287
	Sensationalism	24.150 (1, 234)	< 0.001	0.321
	Local impact	11.276 (1, 234)	0.001	0.22
Changing modalities	Taking sides	0 (1, 234)	1	0
	Interpretation	8.941 (1, 234)	0.003	0.195
	Use of adjectives	0.009 (1, 234)	0.925	0.006
	Defense/support activities	12.316 (1, 234)	< 0.001	0.229
	Defense/support policies	0.012 (1, 234)	0.913	0.007
	Positive image of political elite	8.014 (1, 234)	0.005	0.185
	Progress/success	4.659 (1, 234)	0.031	0.141
	Sensationalism	13.995 (1, 234)	< 0.001	0.245
	Local impact	1.188 (1, 234)	0.276	0.071
Controlling location	Taking sides	15.679 (1, 234)	< 0.001	0.259
	Interpretation	1.900 (1, 234)	0.168	0.09
	Use of adjectives	0.541 (1, 234)	0.462	0.048
	Defense/support activities	16.357 (1, 234)	< 0.001	0.264
	Defense/support policies	12.064 (1, 234)	0.001	0.227
	Positive image of political elite	6.034 (1, 234)	0.014	0.161
	Progress/success	11.483 (1, 234)	0.001	0.222
	Sensationalism	10.538 (1, 234)	0.001	0.212
	Local impact	9.781 (1, 234)	0.002	0.204
First-person perspective	Taking sides	62.904 (1, 234)	< 0.001	0.518
	Interpretation	17.217 (1, 234)	< 0.001	0.271
	Use of adjectives	32.584 (1, 234)	< 0.001	0.373
	Defense/support activities	0.607 (1, 234)	0.436	0.051
	Defense/support policies	75.084 (1, 234)	< 0.001	0.566
	Positive image of political elite	38.606 (1, 234)	< 0.001	0.406
	Progress/success	76.926 (1, 234)	< 0.001	0.573
	Sensationalism	75.773 (1, 234)	< 0.001	0.569
	Local impact	75.084 (1, 234)	< 0.001	0.566

findings in Mellado and Hellmueller (2015), where the least common roles in traditional journalism included service and interventionist roles, the results in the Chinese context similarly show a minimal representation of these roles, reinforcing the alignment with established journalistic norms and the objectivity standard that tends to avoid opinion or advocacy by journalists.

The civic-oriented model's performance in local impact indicates a degree of regional reporting, likely reflecting China's vast regional differences and local news needs, yet still operating within the boundaries set by the central government. The Chinese media system, characterized by its dual pressures of political control and market forces, shapes the journalistic landscape where media content must be both appealing to audiences and compliant with government regulations (Huan, 2016). As a result, media forms, including VR, are required to operate within these constraints, significantly influencing both the content and practice of journalism. The findings suggest that, despite VR technology's potential to revolutionize the field of journalism, its application within Chinese state media is primarily aimed at reinforcing state-driven narratives, maintaining control over information, and ensuring alignment with state interests.

Finally, the results of the chi-square test analysis indicate that specific immersive elements in VR news are closely related to different news values, particularly in emphasizing magnitude and positive reporting. The first-person perspective demonstrates a strong advantage in enhancing the significance of news and fostering emotional connections with the audience. This immersive experience amplifies the importance of events, creating a stronger sense of presence and emotional resonance among viewers. VR news, through its interactive and immersive reporting methods, is particularly suited to highlighting news values that can be visualized and emotionally conveyed. This also suggests that there may be a need to establish new standards for evaluating news values in VR technology to better accommodate the characteristics of immersive media.

In terms of journalistic role performance, immersive elements similarly exhibit significant influence. The first-person perspective is closely associated with the performance of various journalistic roles, transforming the narrative dynamics of traditional journalism from objective and neutral reporting to more participatory and personalized forms. This shift not only affects the positioning of journalists within their reports but also provides audiences with a more direct and interactive news experience. However, it is important to note that,

despite the significant potential of these immersive elements, the use of the first-person perspective in practice remains limited, potentially constrained by technical challenges, production costs, and editorial caution regarding narrative control. As immersive journalism continues to evolve, understanding the impact of these immersive elements on news values and journalistic role performance will become increasingly essential.

Data availability statement

Publicly available datasets were analyzed in this study. This data can be found at: the VR news link: <https://news.cctv.com/yuanchuang/VR/index.shtml>.

Author contributions

YZ: Writing – review & editing, Writing – original draft.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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