The Development of Digital Technology Efficiency in the Communication of Large-Scale Events

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Abstract: Under the wave of digital technology revolution, smart sports events are leading the development of Chinese and international sports events in a new direction. However, there is still a gap in the theoretical and practical research achievements on the improvement of digital technology in the communication of large-scale competitions in China. Article uses stack poly-spoke model to analyze the application effect of AR in symbol, emotion and situation in the event communication. And Starting from the operation mechanism of the model, it provides a strategy for improving the application efficiency of digital technology in the event communication.

Keywords: Large-Scale Events, Digital Technology, AR, Event Communication.

1   INTRODUCTION

Under the context of digital economy as the main economic form, digital technology has been applied in large-scale events more and more widely, and has become one of the necessary means to ensure the normal operation and efficient dissemination of events. The Hangzhou Asian Games has also included "intelligence" in the concept of the Asian Games. In October 2021, the General Administration of Sport of China issued the 14th Five-Year Plan for Sports Development, which proposed to "support the innovative application of new technologies such as big data, blockchain, Internet of Things, cloud computing and artificial intelligence in the field of sports". In order to meet the new demands proposed by the transformation of large-scale events, digital technology needs to transform scientific and technological tools into scientific and technological efficiency and become a new engine for the high-quality development of large-scale events. On the basis of improving the management efficiency of large-scale events, it can be transferred and applied to the sports industry and energy development in cities. Efficiency is different from efficiency, which is not only reflected in the size and level of effect and benefit, but also more importantly reflects the size and strength of the effect and benefit ability, improves efficiency to grab the optimization of elements, and the mobility and self-growth of efficiency put more emphasis on people's subjective initiative. Large event digital technology application has the development difficulty, high cost, long

recovery cycle, and large event preparation cycle is long, short duration, the fault tolerance rate is low, subject to the digital technology and large events basic features, the external advantage of digital technology limited, and digital technology and large events between professional information permeability is low, only rely on technological innovation for large events of digital technology efficiency is not significant. Therefore, how to improve the efficiency of digital technology in large-scale events is an important task for the high-quality development of large-scale events, and also the need for the high-quality development of sports industry and competition cities, which has become a topic of significance and value at the practical and academic level.

2 LITERATURE REVIEW

At present, there are few research documents on the improvement of digital technology efficiency for large-scale events in China, but there are many documents on the digitalization of sports industry, sports service industry and sports communication with large-scale events as the carrier, which can be connected with them. Overview of related literature, for efficiency promotion, cut into the perspective of focus on the sports industry development and events, based on the existing product case analysis put forward targeted improvement strategy research way, improve efficiency strategy is mostly optimized application environment or combined with technological innovation, to expand the application scenario of digital technology.

Shen Keyin proposed that the digital development of sports service industry should strengthen the top-level design and improve the development environment in the government dimension, gather factor resources in the industrial dimension, and promote the supply-side structural reform [1]. Chai Wangjun sorted out the function mechanism of specific digital technology to enable the high-quality development of sports industry, and analyzed the application dimensions [4] of various digital technologies in different sports service segmentation industries from the characteristics of digital technology perspective. Wang Xiangfei, combed the specific application of VR in large sports communication, analysis and put forward in the transmission of image production, social transmission, equipment compatibility problems, and based on this, from the communication technology, industry standards, talent training, virtual reality technology in large sports events communication application of optimization strategy [5]. In addition, some studies also explore the application of digital technology in large-scale events from the technical dimension, such as the application of AI intelligent technology [6] and multi-dimensional perception system [7] in the security link of large-scale events.

## 3 HOW DIGITAL TECHNOLOGY PLAYS THE EFFECTIVENESS OF TECHNOLOGY

Beijing New Olympic Group, which takes video product development and production and system integration as its core business and takes commercial real estate operation as the value-added mode, and provides live broadcast technical services for China's 2022 Beijing Winter Olympic Games. New Otter AR system —— Graphite Ultra HD online virtual packaging system provides the text broadcast for the whole HD of the event through uHD virtual

implantation technology and uHD large screen. In terms of uHD virtual implantation technology, it mainly uses three core technologies: sensing and positioning, virtual layered rendering and synthesis, and GPU color keys. Sensing positioning uses image recognition technology to locate the position and posture of the camera in a virtual environment, Ensuring the accurate positioning of the camera in the environment while also ensuring the accurate capture of real-time images of the field, To meet the audience's demand to watch the wonderful moments of the athletes in the event; Virtual layered rendering synthesis technology through the combination of virtual broadcast, virtual implantation scene and packaging layer to achieve rich broadcast effects, It is conducive to the audience's pursuit of real-time broadcast and camera review of the game score; The GPU color key technique involves the processing of scene brightness and shadows, Make the real people in the virtual scene more "sense of landing", Enrich the audience's visual experience of the saturation picture of the game. In the audience survey the influencing factors of the experience, the audience to the platform quality definition has high requirements, new otart, ultra-high definition screen not only provide 5G + 4K / 8K images, also in data input processing, it docking internal and external data sources for project control, make the event forecast, the game table, athletes real-time situation, the team formation data visualization, visualization.

3.1 The Aggregation-Convergence Model to Analyze the Communication Effect of AR Optimization

3.1.1 The Analysis Framework of the Stacked Poly-Convergence Model was Established

The stack poly-convergence model is a model of analyzes traditional media information by using the way of information transmission and the evolution rules from a decentralized perspective. The stack-convergence model distributes the multimodal aggregated information [7] to radiate the media triggers to the audience through three dimensions of symbol, emotion and situation, and the audience produces different information behaviors at different acceptance nodes. The superposition-divergence model is divided into two processes: aggregation and divergence. The operation mode of the two processes is shown in the figure below. Introduce the model of AR, VR technology watching products to explain, fold poly more focused on AR technology interaction, can through intelligent products based on the reality environment of virtual objects, information display to pass to the change of the audience, and spoke more focused on AR and VR technology to the audience virtual information interactive entertainment and panoramic view of the virtual world.
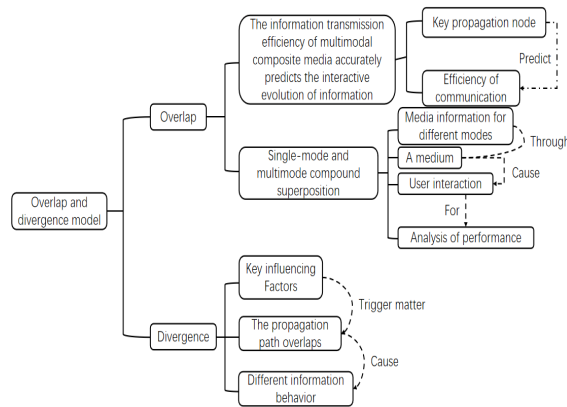
Figure 1. Framework diagram of the stacked poly-divergence model

Through the manifestation principle of various colors in the traditional optical mode, especially through the difference of red, green and blue, the signal composition of the new media transmission is examined from the perspective of overlapping and radiation, so as to study the fusion law and transmission effect between the signal components of the three dimensions such as symbol, emotion and situation.

3.1.2 AR and VR Technology Operation Principle and the Two

AR ——Augmented Reality, AR generally refers to augmented reality technology. AR information trigger is AR products in information to enhance the trigger mechanism, namely in the visual information conveyed by the real object increased cannot touch the virtual information, through AR product stack poly reality and virtual fusion information, radiation out a more complete useful information. Under the stack-convergence model, the information trigger of AR is the trigger mechanism of AR products when the information is enhanced, that is, the untouchable virtual information is added to the visual information conveyed by real objects, and through the overlapping reality and virtual fusion of AR products, more complete and useful information is distributed.

VR ——Virtual Reality, VR generally refers to virtual reality technology. VR technology is the use of computer simulation technology to create a virtual three-dimensional world, to provide users with visual, auditory and tactile sensory simulation, through a variety of paths to text, pictures, sound contained in the information conveyed out.

The difference between the two is that AR technology emphasizes the interaction of information, on the basis of the real world, add or remove virtual objects generated by computer or information that can interact in real time; VR technology emphasizes panoramic interaction, a complete virtual three-dimensional world created by computer simulation technology similar to the real world but isolated from the real world, and three-dimensional immersion brought by the virtual environment by mobilizing human senses.

3.2 A Superposition and Divergence Model Analysis of Event Communication Efficiencys

This paper analyzes the overall efficiency, operation mode and information dissemination mode of virtual intelligent competition watching products based on innovative technology from the three levels of symbol, emotion and situation.

3.2.1 Symbolic Level

Currently, people are already stuck in the symbolic landscape created by social media. The meaning of medium existence is reality, namely symbolic life. Since the advent of smartphones, the world has changed. The symbolic world built by social media on mobile terminals completely binds people together. In the foreseeable future, the emergence of wearable devices, virtual reality, and augmented reality will make people more deeply involved in the media survival.

At the symbolic level, AR enriches the media of event communication. During the watching process, the spectators, as the recipient, can combine the indirect media of AR and VR terminals to approach the real perception of the human body, that is, the direct media. Indirect media is that the audience is not on the competition scene. At this time, the media is more inclined to watch the event broadcast products, such as mobile phones, tablets, computers and large-screen TV tools. For a series of watching products, whether broadcast tools or live watching wear can enter the virtual world and athletes interactive VR glasses, can let the crowd access to the event process, athletes, and focus, cause communication between domestic and international discussion, bring language speech and thinking together color.

AR / VR also provides an effective path to grasp the transmission effect. In the dimension of symbolic information, the amount of information propagation is calculated by the similarity of the subject vector between the information, and the evolution of media information propagation is viewed from the principle of light overlapping, so the amount of comments is the symbolic dimension in the propagation of media information. The audience forms multiple communication sub-groups on different media platforms. For the behavior data of their comments, the communicators of the event can screen the data and screen out the comments with virtual technology products such as "AR and VR", and screen the audience's product evaluation or suggestions again, and make improvements according to the relevant useful information.

3.2.2 Emotional Level

The effective application of AR / VR intelligent game-watching products takes social diversity and enhances people's emotional experience.

AR / VR promotes personal emotional expression and group emotional transmission among spectators. The psychological elements of the users of digital technology viewing products predominantly include individual psychological and social psychological elements such as cognition, emotion, personality and interpersonal communication. In the social media environment, emotion is the fundamental power of sports topic event heat, sports events for the audience emotional transfer is to form the root cause of large-scale sports mobilization, the

audience emotional reaction to the events of social cultural connotation, in the form of emotional resonance and discourse together to participate in public opinion. From the perspective of the prototype theory, emotional transmission and prototype contains the group sharing the emotion and meaning of mutual overlap, driving the generation and development of public opinion, and all kinds of AR individual virtual image and expression helps to make more intuitive reveal watching emotion.

The AR + social scene has been widely used in sports events. The application of AR + social interaction introduces people's emotion of watching games into the research of virtual space. The psychological elements of users of digital technology watching games mainly include individual psychological and social psychological elements such as cognition, emotion, personality and interpersonal communication. In the social media environment of events, emotion is the fundamental driving force of sports topic events, and the mobilization of sports events to audiences 'emotions is the fundamental reason for the formation of large-scale sports mobilization. The audiences' emotional reactions to events receive the marketing of social culture, and participates in public opinion in the form of emotional resonance and discourse coordination. From the perspective of the prototype theory, emotional communication and prototype contains the group sharing the emotion and meaning of each overlap, driving the generation and development of public opinion, and AR + social scene application to share the emotion and meaning deepening amplification, all kinds of AR personal virtual image and expression made more intuitive show watching emotion.

3.2.3 The Situation Level

The intelligent XR viewing products provide the audience with an interactive time and airspace based on emotion. The "boundary" of the situation has not only the wuli definition domain such as "boundary and boundary", but also the time and airspace in the wuli sense of "local and regional". The intelligent game-viewing products break through the boundary in terms of the situation and provide the network virtual space, so as to create a platform for the audience to communicate emotionally through the virtual world provided by XR tools. In terms of e-sports and social interaction, VR video games provide users with virtual real scene dialogue, shooting, fighting, decryption, installation art and other scenes to create sensory stimulation. In terms of film and live broadcasting, AR special effects are the exclusive experience of non-site users. Virtual reality / enhanced expression forms portray the scene according to AR / MR special effects application to present the visual aesthetic arena for the audience.
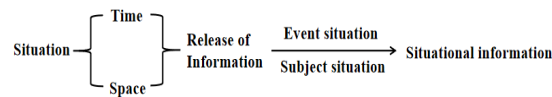

Figure 2. Context and situational information diagram

3.2.4 Symbol, Emotion, Situation Level Progressive Analysis

This paper holds that the symbol, emotion and situation form a progressive relationship in the communication and interaction of the event. Through the design and development for watching the event and the audience, the emotion transmits the symbol, and arouses the audience emotion

to embed the emotional color for the interaction between people and the environment; the situation increases the symbol and emotional additive effect, thus providing a communication platform for the interaction between people and the environment. The progressive combination of the three provides the fundamental ideas for the application of digital technology in large-scale competitions.

4   MECHANISM REFINING

Based on the analysis of the above, it can be found that in the practical application, the core requirements of the event management link and the principle of digital technology are not easy to change, but the management process and the application form of digital technology generated to meet the core requirements are not fixed. The two are the relationship of mutual promotion and coordination. Therefore, it is necessary to combine the principle of digital technology with the fundamental goal of specific business and the underlying logic, and redesign the business process, which is more conducive to realizing the overall maximization of management efficiency and science and technology efficiency, so as to improve the efficiency of science and technology at the application level. In view of the complex process of the interaction between the two, on the basis of sorting out the matching process of supply and demand, a new mechanism for improving the efficiency of the efficiency of digital technology in large-scale events from the perspective of supply and demand matching is explored and proposed.

4.1 Two Main Contents of Supply and Demand Matching

4.1.1   Static Matching

First of all, combining the characteristics of a certain link of the event management, mining its most fundamental needs, and matching digital technology that can play the most efficient role in principle. For instance, the prominent feature of the event communication link is the variety of communication media, and its fundamental demand is to alleviate the information asymmetry between the subjects, while the technical advantages of AR augmented reality and VR virtual reality can improve the rate of information restoration and the richness of communication media, and highly match the needs of the event communication link.

4.1.2   Dynamic Matching

Digital technology enriched the event management link the realization of the fundamental goal path, should be event management link business process and digital technology as dynamic change supply factors, in order to meet the fundamental demand of event management link as the guidance, and at the same time adjust the event management link specific execution process and the application of digital technology, improve the matching degree of supply and demand, in the dynamic adjustment, find management efficiency and technology efficiency of overall maximization.
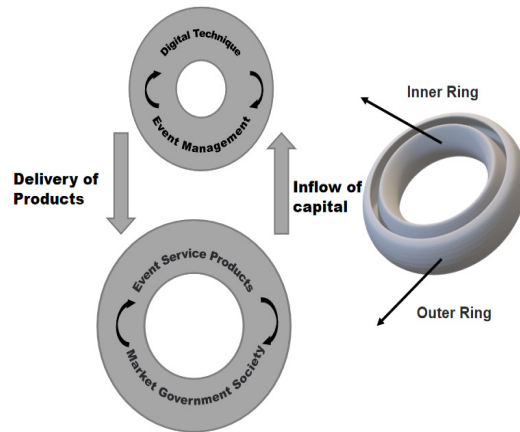
Figure 3. Structure diagram of the double-ring elements

4.2 The Structure of the Supply and Demand Dynamic Matching Mechanism

Elements: digital technology and event management links (such as event communication), specific implementation process of digital technology products and event management links, large-scale event service products, funds, markets (including digital technology products market and large-scale event service products market), government and society.

Element structure: The relationship between the elements can be described as the double-ring structure presented in the figure below. In the interior ring, event management link and digital technology on the basis of static matching, through innovative digital technology products and redesign or optimize event management link specific execution process, common iteration to mutual assignment, in the process of sustainable dynamic matching, high quality large event service products as output, meet the market, government and society proposed different demands for large events, to achieve value or even value-added. As feedback, the market, government and society in the outer ring inject capital into the interior ring, accelerate the capital flow of the inner ring, and promote the upgrading and iteration of the inner ring elements. In this way to stimulate the vitality of the interior ring and the internal elements of the inner ring, promote the circulation of the inner and outer ring, and form a sustainable operation mechanism.
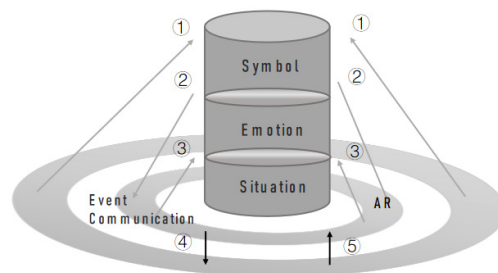

Figure 4. Structure diagram of the double-ring elements

For digital technology, multi-level demand expands the space for technology play, etc. Accurate demand and timely application feedback provide direction guidance for continuous innovation, which is conducive to the improvement of scientific and technological efficiency at the application level. Continuous funding sources and rich application scenarios can promote the technical efficiency of its technology.

5 AR + VR STRATEGY OF IMPROVING TECHNOLOGY EFFICIENCY IN LARGE-SCALE EVENT COMMUNICATION

5.1 Symbol Level

With the continuous progress of digital technology, people's requirements for competition commentary are getting higher and higher. As the bridge and link of sports events, commentary has the functions of connecting the preceding and the next, explanation and technical analysis in the dissemination of sports events, so that people can understand sports while popularizing sports knowledge, improve people's interest in watching, guide the masses to participate, so that the masses can fully feel the unique charm of sports events. In the studio, AR technology can not only change the environment, but also utilize the virtual screen to provide the competition field, athletes, action analysis and other information on the commentary of the commentator, so that the audience can understand more comprehensive information about the event on the spot in real time under professional commentary.

5.2 Scenario Level

The research report on the users of the 2021 Tokyo Olympic Games has divided them into four categories, namely, the national team iron fans, the vertical fans, the competition spectators, and the family companions. National iron fans attach great importance to the competition, Positive or negative mood differences generated by the title or defeat of the favorite national players, From the analysis of the stacked-radiation model, These differences give an emotional color to the event; Vertical lovers value the process of the event and the highlights of the athletes, belongs to the situational level of the model, This group has high spatial and temporal requirements for the situation, The process of AR augmented reality technology and VR virtual space technology, To meet people's demand for camera-capture moments; The crowd are more inclined to the results of the event and off-site news, beginning from the symbolic dimension in the model, Using AR recognition technology applied in the event to provide better information on the latest trends of the event. Let the audience receive more comprehensive information; Family companions attach importance to children's patriotic education, VR glasses can be used to guide their children to the virtual environment that simulates China's early participation in the World Games to experience the difficulties of people at that time. And to conduct sports knowledge and popular science for their children.

5.3 Emotional Level

New Zealand Internet software Dropit has developed a 60-second auction on the stadium score card to enhance the interaction between the brand and fans. During the game, AR + purchase app can be set up to buy interactive items. Viewers can bid for the individual sports time of the winners, or buy the signature photos and commemorative T-shirts of their favorite players.3 d scanning technology is applied to 3D data the surrounding athletes, the same clothes, wristbands, hair accessories and other items, and set the small purchase logo at the time of the event for the audience to click and purchase. Interaction is an important part of immersive game watching. We have to mention the virtual technology here. According to the survey results, more than half of the Internet users are willing to try the technology, while 30% of the netizens will wait and see to become potential users of the technology. For people who can't be there, virtual worlds provide an excellent interactive platform.

With the in-depth development and extensive application of VR technology, it is estimated that by 2025, the total market volume of VR content in China will exceed 83.2.7 billion. In the next five years, the world VR content field investment growth rate is the fastest enterprise training, and then the game industry, but the sports industry is not on the list, by 2020, the world of VR / AR project investment and financing amount is about two hundred million yuan, 2019 rose 14 percent: each link from the world of VRIAR industry project investment and financing, hardware and application link is the hot link of investment and financing, this shows that the application of VR in the event has a great development space.

In order to further improve the application of digital technology in the event and enhance the interactivity of people watching the game, applicable digital research departments can use virtual technology to provide each participant and the audience logged on the official platform with DIY own image platform, the audience can use VR glasses to watch the game in the virtual world stream interaction.

VR technology has also brought benefits to people with disabilities. VR helmets developed by an innovative company in London can help people with visual impairment to get their eyes back to regular levels, and enable people with visual impairment to watch wonderful sports games. Virtual images can also create different experiences to people with mobility difficulties. Deaf and mute people can also connect the Asian Games site through AR glasses and use double screen and one screen to present high-definition scene and subtitle accurate translation screen for game interaction, enriching the game watching experience of impaired people in an all-round way. As a platform, these functions can be collected according to the needs of the audience to facilitate people's use and switch of various functions.

6   RESEARCH CONCLUSION

As for the improvement of the efficiency of digital technology in large-scale events, this paper believes that from the perspective of supply and demand matching, the demand to guide the supply of large-scale events, and expand the breadth and depth of digital technology efficiency in the application of different levels with hierarchical demand. Specifically, through with large event management link execution process mutual adjustment, respectively meet the demand of event management link at all levels, improve the supply and demand of matching degree and on

the whole application level to improve the efficiency of digital technology of digital technology, to a certain extent, promote technological innovation, improve the technical level of science and technology efficiency.

Today's large sports events more interactive expanding, melting media era has come, watching the crowd before the event, in the late interactive entertainment experience requirement is becoming higher and higher, according to the results of the survey, 83.24% of the audience will share each other watching feelings, video platform and social platform to become the masses, sharing, evaluate the main channel of empathy. The main forms of mass game watching are live broadcast, short video, replay, full audience viewing, round broadcast, etc. The linkage of large screen and large TV screen on the mobile terminal have become the mainstream of game watching tools. At the same time, the mobile terminal also provides a social platform for the audience to interact and discuss the event. During the discussion, the audience tends to discuss the performance of the national team, opening and closing ceremonies and performances, the referee's decisions and disputes, and the prediction of competition results, etc. In the preference of these discussions, the public believe that the main factors affecting the interactive experience on the platform are: content richness, picture quality clarity, professional interpretation, viewing fluency, function richness, etc. Therefore, to enrich the platform content, invite more professional commentators, make the platform picture quality clearer, and improve the relevant functions of the platform to improve the user experience.

In the process of watching the game, the functions they most want to add are real-time broadcast, VR panoramic viewing, intelligent portrait recognition, screen recording function and interactive entertainment, which shows the increasing demand for independent operation and freedom. As the platform side, these functions can be concentrated on one platform to facilitate the use and switching of various functions.

Therefore, from the following three points for digital technology in the dissemination of large-scale events recommendations.

- Text, pictures, sound and video are integrated, professional commentary to deliver the wonderful information of the event.

- Subdivide the watching groups to provide personalized customized services for groups with different needs.

- Interaction promotes the game watching experience, and uses the virtual technology to create a diversified digital interactive platform.

In general, this paper has the following three innovative points: the first is the new perspective, explore the large event digital technology technology efficiency improvement strategy from the perspective of supply and demand matching; the second is the new mechanism: deconstruct and reconstruction of the digital technology and event management supply and demand matching mechanism; the third is the new suggestion: using the innovative supply and demand matching mechanism to with the specific suggestions of AR technology efficiency improvement.

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