

Realistic Dilemmas and Relief Strategies for the High-Quality Development of Sports Consumption in China from the Perspective of Digital Economy

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ABSTRACT

At the historical node where the "Digital China" strategy and the construction of a "Leading Sports Nation" intersect deeply, the digital economy, with its high innovation, strong permeability, and broad coverage, is becoming the core engine driving the high-quality development of sports consumption in China. The high-quality development of sports consumption is not only an important pivot for expanding domestic demand and building a new development pattern of dual circulation but also an inevitable requirement for meeting the people's growing needs for a better life. Abandoning the traditional quantitative empirical paradigm, this paper, based on the dual perspectives of Marxist political economy and New Institutional Economics, constructs a theoretical analytical framework of "Power Change - Efficiency Change - Quality Change" to systematically explain the internal mechanism of the digital economy empowering sports consumption. The study posits that the digital economy provides new growth momentum for sports consumption by reshaping production functions, reducing institutional transaction costs, and innovating consumption scenarios. However, examining current practices, China's sports consumption still faces multiple deep-seated dilemmas in the process of digital transformation: digital infrastructure construction has "soft and hard" shortcomings, and key technologies lack autonomy; the circulation of data factors faces dual blockages of "islands" and "barriers," and privacy security risks are prominent; the supply of high-quality digital sports products has a structural gap, and the virtual-real integration experience is fragmented; the inequality of consumption caused by the digital divide remains severe. Aiming at these bottlenecks, this paper, combining the successful experiences of developed countries, proposes relief strategies such as consolidating new digital infrastructure to build a solid development base, deepening supply-side structural reform to enrich the product system, improving the digital governance system to optimize the consumption environment, building a multi-level talent cultivation mechanism, and adhering to the inclusive orientation, aiming to provide solid theoretical support and practical directions for promoting the modernization and consumption upgrading of China's sports industry.

KEYWORDS

Digital Economy; Sports Consumption; High-Quality Development; Realistic Dilemmas; Relief Strategies; Data Factors

1. INTRODUCTION

1.1. Research Background and Problem Statement

Currently, the global economy is in a critical period of a new round of technological revolution and industrial transformation, and human society is accelerating towards the era of digital civilization. The rapid development of new-generation digital technologies represented by big data, cloud computing, artificial intelligence (AI), blockchain, and the Internet of Things (IoT) is reconstructing the global innovation landscape and reshaping the global economic structure. This transformation is known as the "Fourth Industrial Revolution," the core of which lies in the comprehensive, multi-angular, and full-chain transformation of traditional industries through digitization, networking, and intelligence. In China, the digital economy is not only a new momentum for economic growth but also a core component of national strategy. The report to the 20th National Congress of the Communist Party of China explicitly pointed out to "accelerate the development of the digital economy, promote the deep integration of the digital economy and the real economy, and build internationally competitive digital industry clusters." This macro-strategic deployment points out the direction for the digital transformation of all walks of life and provides fundamental compliance for the high-quality development of the sports industry.

As a new growth point of the national economy and a core component of the "happiness industry," the development level of the sports industry is an important indicator of a country's soft power and social civilization. The "14th Five-Year Plan for Sports Development" clearly states that by 2035, China will be built into a leading sports nation, and the sports industry will become a pillar industry of the national economy. However, to achieve this grand goal, the core lies in activating sports consumption, especially promoting the optimization and upgrading of the sports consumption structure. For a long time, China's sports consumption market has faced a series of deep-seated structural contradictions: on the supply side, effective supply is insufficient, mid-to-high-end sports services are scarce, and a large number of sports resources are idle or inefficiently utilized; on the demand side, consumption experience is single, interactivity is poor, making it difficult to meet the increasingly personalized and diversified needs of consumers; on the spatial side, the utilization rate of traditional sports venues is low, scenarios are solidified, and it is difficult to form an efficient consumption loop. Traditional sports consumption models are often limited to "presence" in physical space, with short value chains and consumers in a passive recipient position.

With the widespread application of digital technologies, the boundaries of sports consumption are broken, content is reshaped, and relationships are redefined. From "cloud fitness" to "metaverse spectating," from smart wearable devices to sports big data platforms, digital technology is triggering a profound "scene revolution" and "value revolution." As Jiang Xiaojuan (2021) pointed out, digital technology can greatly improve the efficiency of the service industry and change the traditional perception of the low efficiency of the service industry, which has revolutionary significance for the service-oriented sports industry [1]. However, we must clearly recognize that the digital transformation of China's sports consumption cannot be achieved overnight and is still in a critical period of overcoming obstacles. In the process of empowering sports consumption, digital technology faces not only hard constraints such as infrastructure and technical standards but also soft constraints such as institutional mechanisms, conceptual awareness, and talent reserves. From the perspective of the digital economy, what deep-seated realistic dilemmas does the high-quality development of China's sports consumption face? What is the formation mechanism behind it? How to effectively relieve these dilemmas and build a long-term development mechanism? This is not only a theoretical issue that needs to be deeply discussed in academia but also a practical issue that needs to be urgently solved by government decision-making departments and the industry. This paper aims to abandon the traditional quantitative empirical analysis paradigm, adopt normative theoretical analysis methods, systematically sort out the logical mechanism of the digital economy empowering sports consumption, deeply analyze the current realistic pain points, and propose targeted relief strategies.

1.2. Definition of Core Concepts

1.2.1. Digital Economy

The digital economy referred to in this paper refers to a series of economic activities that use digitized knowledge and information as key production factors, modern information networks as important carriers, and the effective use of information and communication technologies as an important driving force for efficiency improvement and economic structure optimization. In the field of sports, the digital economy refers not only to sports e-commerce or e-sports but also to the deep integration of digital technology with the entire process of sports production, circulation, consumption, and distribution, which is the digital reshaping of the entire chain of the sports industry. It includes two dimensions: digital industrialization (such as e-sports, sports big data services) and industrial digitization (such as smart venues, smart wearable devices).

1.2.2. High-Quality Development of Sports Consumption

High-quality development of sports consumption refers to the realization of the optimization and upgrading of the consumption structure, the significant improvement of consumption quality, the improvement and optimization of the consumption environment, and the effective guarantee of consumption fairness on the basis of the continuous expansion of consumption scale. It emphasizes the transformation from traditional "physical, survival-oriented, single-type" consumption to "service-oriented, development-and-enjoyment-oriented, composite-type" consumption. Its core features include:

- (1) Precise matching of supply and demand: Reducing supply and demand mismatch and improving market clearing rate through big data analysis.
- (2) Deep integration of online and offline: Breaking physical space limitations to achieve full-time and space consumption experience.
- (3) Unification of economic and social benefits: Not only driving economic growth but also promoting national fitness and the construction of a Healthy China.

2. THEORETICAL LOGIC OF DIGITAL ECONOMY EMPOWERING HIGH-QUALITY DEVELOPMENT OF SPORTS CONSUMPTION

The digital economy empowering the high-quality development of sports consumption is not a simple superposition of technologies but follows profound economic logic. This paper constructs a theoretical framework for the digital economy to empower sports consumption from three dimensions: power change, efficiency change, and quality change.

2.1. Power Change: Total Factor Productivity Improvement Driven by Digital Technology

According to neoclassical growth theory, economic growth mainly comes from the increase in factor input and the improvement of total factor productivity (TFP). By introducing data as a new type of production factor, the digital economy has changed the production function of the sports industry and realized the transformation from factor-driven to innovation-driven.

2.1.1. The Multiplier Effect of Data Factors

Data has become the fifth major factor of production after land, labor, capital, and technology. Unlike other factors, data has the characteristics of non-rivalry, non-exclusivity, and zero marginal cost. In sports consumption, consumer behavior data (such as movement trajectory, heart rate, consumption preferences) are recorded, cleaned, and analyzed, and can be fed back to the production end to achieve precise R&D and production. As analyzed by Ren Bo (2022), the driving mechanism of the digital

economy promoting the high-quality development of the sports industry lies in optimizing resource allocation, reducing transaction costs, and promoting industrial integration [2].

(1) **Optimizing Labor Factors:** Artificial intelligence-assisted coaching systems can replace some repetitive labor (such as motion counting, basic guidance), allowing sports practitioners to focus on higher-value creative services (such as emotional companionship, personalized plan formulation).

(2) **Activating Capital Factors:** Digital finance and blockchain technology have lowered the financing threshold of the sports industry, enabling capital to flow more accurately to high-quality sports projects and improving capital allocation efficiency.

(3) **Multiplying Technology Factors:** The combination of data and algorithms makes the iterative speed of technological innovation exponentially faster, for example, the R&D cycle of new materials for sports equipment is greatly shortened.

2.1.2. The Permeation Effect of Technological Innovation

As a General Purpose Technology (GPT), digital technology has strong permeability. It can be embedded in various links such as sports goods manufacturing, sports event operation, and sports training services.

(1) **Intelligent Manufacturing:** Through the industrial internet, sports manufacturing enterprises have achieved flexible production and can meet consumers' personalized customization needs at low cost (C2M model). For example, digital factories established by enterprises like Anta can quickly produce customized running shoes based on consumers' foot shape data.

(2) **Format Innovation:** VR/AR technology has spawned new formats such as virtual sports and e-sports, opening up new consumption growth points. These new formats are not limited by natural conditions such as weather and venues and have strong scalability. Shen Keyin et al. (2020) also emphasized the key role of data factors in industrial chain reconstruction in their theoretical model [3].

2.2. Efficiency Change: Precise Matching Mechanism of Supply and Demand Constructed by Digital Platforms

New Institutional Economics believes that transaction costs are a key factor hindering the expansion of market scope. Digital platforms greatly improve the operational efficiency of the sports consumption market by reducing information asymmetry.

2.2.1. Reducing Information Search and Matching Costs

In the traditional model, consumers need to pay huge time costs and search costs to find suitable sports venues, coaches, or events, and often face the dilemma of a "lemon market" (bad money drives out good money). Digital platforms (such as Dianping, Keep, Joyrun) gather massive supply information and use algorithmic recommendation technology to realize the transformation from "people looking for goods" to "goods looking for people."

(1) **Algorithmic Matching:** Recommendation algorithms based on big data can accurately push the most matching sports services based on users' geographical location, interest preferences, and historical behavior, solving the problem of supply and demand mismatch.

(2) **Trust Mechanism:** The user evaluation system, credit scoring system established by the platform, and the traceability mechanism based on blockchain reduce the moral hazard and adverse selection problems faced by consumers and promote the conclusion of transactions.

2.2.2. Breaking Spatiotemporal Constraints and Market Segmentation

The digital economy has natural cross-spatiotemporal attributes, which can break traditional administrative divisions and geographical barriers and promote the formation of a unified large market.

(1) Spatial Extension: Through live webcasting and virtual reality technology, sports events originally confined to specific venues can reach global audiences, greatly expanding market boundaries. The NBA has expanded its market to every corner of the world through the distribution of digital media copyrights.

(2) Fragmented Utilization of Time: Online fitness courses allow users to use fragmented time for consumption, breaking the fixed time limit of traditional gyms and improving the utilization rate of sports resources. The Long Tail Theory has been perfectly verified here, and even niche sports projects (such as extreme sports teaching) can find a sufficient scale of consumer groups on the Internet.

2.3. Quality Change: Escalation of Consumption Experience Induced by Digital Content

Experience economy theory points out that experience is a new economic offering after service. By creating immersive and interactive experiences, the digital economy promotes the quality change of sports consumption.

2.3.1. Leap from Functional Consumption to Experiential Consumption

Traditional sports consumption often focuses on obtaining a certain function (such as physical fitness, mastering skills). Digital technology endows sports consumption with more entertainment, social, and cultural attributes. Wang Xianliang et al. (2021) pointed out that one of the realistic dilemmas faced by the digital transformation of China's sports industry is the fragmentation of experience [4], and digital technology is the key to bridging this fragmentation.

(1) Immersive Experience: Metaverse technology allows consumers to participate in virtual events immersively, obtaining sensory stimulation beyond physical reality. For example, the cycling software Zwift allows users to experience the track gradient and scenery of the Tour de France on a riding platform at home.

(2) Social Interaction: Social media and sports apps construct online "interest-based communities," meeting consumers' social and emotional belonging needs. Social mechanisms such as sports check-ins and leaderboard PKs make sports consumption not just a personal physical activity but a process of social capital accumulation.

2.3.2. Acceleration of Servitization Transformation

Digital technology promotes the transformation of sports manufacturing to "product + service," that is, service-oriented manufacturing. For example, a smart bracelet is not just a hardware product but an entrance connecting health management services. This model of "hardware drainage, service profit" extends the value chain and enhances the added value of consumption. Consumers no longer buy a single product but a whole set of data-based health solutions.

3. CURRENT CHARACTERISTICS OF DIGITAL TRANSFORMATION OF SPORTS CONSUMPTION IN CHINA

Driven by theoretical logic, the digital transformation of China's sports consumption presents distinct characteristics of the times and is undergoing a comprehensive reshaping from form to relationship.

3.1. Consumption Form: Leap from Physical Consumption to Digital Service Consumption

For a long time, China's sports consumption structure has shown the characteristic of "physical dominance" (such as a high proportion of purchases of sports shoes and clothing). With the development of the digital economy, the proportion of digital service consumption has significantly increased, and the structure is increasingly optimized.

3.1.1. Formation of Content Payment Habits

Consumers are increasingly willing to pay for high-quality digital sports content, such as purchasing event live streaming memberships, subscribing to online fitness courses, and purchasing virtual items for e-sports.

(1) Event Viewing: Platforms such as Tencent Sports, Migu Video, and iQIYI Sports have cultivated users' paid viewing habits by providing value-added services such as ultra-high-definition, multi-angle, and VR live streaming. The maturity of this payment model has injected huge vitality into the sports copyright market.

(2) Knowledge Payment: Knowledge-based products such as professional sports rehabilitation guidance, scientific training plans, and master classes have become new consumption hotspots. A large number of professional sports bloggers have emerged on platforms such as Zhihu and Bilibili, promoting the knowledge-based nature of sports consumption through knowledge monetization.

3.1.2. Rise of Virtual Sports Assets

Virtual assets such as sports digital collectibles (NFTs), digital star cards, and virtual tickets based on blockchain technology have begun to enter the public eye. This marks the expansion of sports consumption objects from physical items to virtual digital warrants, enhancing the financial and collection attributes of consumption. For example, the popularity of NBA Top Shot has triggered a wave of exploration of digital collectibles by domestic sports IPs. Although it is still in its infancy, it shows huge market potential.

3.2. Consumption Scene: Expansion from Physical Space to Virtual-Real Integration Space

Scene is the carrier where sports consumption occurs. Digital technology reconstructs the traditional "people-goods-scene" relationship, making consumption scenes ubiquitous.

3.2.1. Intelligence of Home Fitness Scenes

Catalyzed by public health events, the home has become an important sports scene second only to sports venues. Devices such as smart treadmills, Fitness Mirrors, and somatic game consoles (such as Switch Ring Fit Adventure) have moved professional fitness experiences into the living room, forming a new scene of "cloud private coach + home terminal." This scene has extremely high convenience and privacy, effectively solving the problems of fragmented time and high cost of going to the gym for modern people.

3.2.2. Wisdom of Public Sports Spaces

Urban parks and community fitness paths are undergoing digital transformation. Smart trails record residents' exercise data in real-time through face recognition and sensors and provide voice guidance; smart venues achieve unattended operation, self-service booking, face-scanning entry, and automatic lighting control, greatly improving the convenience and operational efficiency of public sports services. For example, "People's Gyms" built in Shanghai, Hangzhou, and other places have achieved low-cost, all-weather operation through IoT technology.

3.3. Consumption Relationship: Transformation from One-way Purchase to Value Co-creation

In the digital ecosystem, consumers are no longer isolated individuals or passive recipients but "Prosumers" deeply involved in the value creation process.

3.3.1. Prosperity of UGC (User Generated Content)

Consumers share sports videos, equipment reviews, and event commentaries on platforms such as TikTok (Douyin), Bilibili, and Xiaohongshu (Red). These contents constitute an important part of the platform ecology, attracting more traffic and consumption.

(1) Seeding Economy: The real sharing of KOCs (Key Opinion Consumers) has become a key factor influencing others' consumption decisions. This trust-based "seeding" (recommendation) has a higher conversion rate than traditional advertising.

(2) Community Interaction: Running groups and ball friend groups established based on common interests enhance user stickiness through online check-ins and offline gatherings. Apps like Keep stimulate users' participation enthusiasm and sense of achievement through gamification mechanisms such as challenges and badge rewards.

4. REALISTIC DILEMMAS OF HIGH-QUALITY DEVELOPMENT OF SPORTS CONSUMPTION IN CHINA FROM THE PERSPECTIVE OF DIGITAL ECONOMY

Despite significant achievements, compared with the requirements of high-quality development, the digital transformation of China's sports consumption still faces a complex situation where "hard constraints" and "soft weaknesses" coexist. These dilemmas not only restrict the release of consumption potential but also affect the improvement of industrial competitiveness.

4.1. Insufficient "Hard" Support: Constraints of Digital Infrastructure and Key Technologies

4.1.1. Regional and Urban-Rural Divides in Digital Infrastructure Construction

Digital infrastructure is the base of digital sports development. Currently, the construction of new infrastructure such as 5G base stations and gigabit optical networks in China is mainly concentrated in eastern coastal cities and first- and second-tier cities.

(1) Regional Imbalance: The network bandwidth in the central and western regions and vast rural areas is insufficient, and the latency is high, making it difficult to support digital sports applications with high bandwidth requirements such as VR live streaming, cloud fitness, and holographic interaction. This "digital infrastructure divide" directly leads to inequality in sports consumption opportunities and restricts the inclusive release of digital dividends to underdeveloped areas.

(2) Lagging Venue Transformation: The digital transformation cost of a large number of existing sports venues is high, and there is a lack of financial support. Many venues remain at the primary stage of installing access control gates and surveillance cameras, lacking deep IoT connection and data collection capabilities, resulting in a low level of intelligence and inability to achieve data interoperability with online platforms.

4.1.2. Key Core Technologies and High-End Equipment Rely on Imports

In core hardware fields such as high-end sports chips, high-precision sensors, professional-grade VR/AR equipment, motion capture systems, and high-tech sports fabrics, the independent R&D

capabilities of Chinese sports enterprises are relatively weak, with a high degree of dependence on foreign countries.

(1) **High Costs:** Dependence on imports for core components pushes up the cost of digital sports products, limiting their popularization in the mass consumer market. For example, the price of professional smart riding platforms and ski simulators is tens of thousands of yuan, which is difficult for ordinary consumers to afford.

(2) **Risk of Technology Blockade:** Against the background of international trade friction, the security and stability of the industrial chain and supply chain face challenges. In addition, some so-called "smart sports products" have problems such as technology stacking, useless functions, and poor interaction experience, leading consumers to have a negative perception of "pseudo-intelligence," affecting the repurchase rate.

4.2. Lagging "Soft" Environment: Lack of Data Governance System and Standards

4.2.1. Serious Data Island Phenomenon and Poor Circulation of Factors

The release of data value depends on circulation and sharing. However, currently, China's sports data resources are divided among different internet giants, sports administrative departments, and vertical application platforms, forming serious "data chimneys."

(1) **Platform Barriers:** Data standards between different fitness apps are inconsistent, interfaces are incompatible, and user data cannot be migrated and integrated across platforms. Running data recorded by a user on Platform A cannot be synchronized to the health file on Platform B, resulting in fragmented data value.

(2) **Government-Enterprise Disconnection:** There is a lack of integration mechanism between public sports data (such as national physical fitness monitoring data, public venue flow data) and commercial sports data. The large amount of data held by the government is in a "sleeping" state, failing to effectively empower enterprise R&D and market decision-making, making it difficult to form a complete big data portrait.

4.2.2. Prominent Risks of Privacy Leakage and Algorithmic Ethics

The digitization process of sports consumption involves a large amount of personal sensitive information, such as biometric features (face, fingerprint), location trajectory, health status (heart rate, blood pressure), and consumption habits.

(1) **Privacy Security:** Driven by commercial interests, some enterprises engage in excessive request for permission, illegal collection, and illegal trading of user data. Once data leakage occurs, it will bring huge hidden dangers to consumers' personal and property safety, triggering a crisis of social trust.

(2) **Algorithmic Discrimination:** Algorithmic discrimination phenomena such as "big data backstabbing" (price discrimination based on big data) occur from time to time in fields such as sports ticket booking and membership services. To maximize commercial interests, algorithms may use information advantages to set high prices for old users, seriously damaging consumption fairness and eroding consumers' trust in digital sports platforms.

4.3. Supply and Demand Mismatch: Structural Shortage of High-Quality Digital Sports Products

4.3.1. Scarcity of High-Quality Content Supply

Although the market is flooded with massive sports news and fitness videos, truly high-quality, professional, and systematic digital sports content is still scarce.

(1) **Serious Homogeneity:** A large number of online fitness courses have identical content, lacking scientificity and pertinence, mostly simple movement follow-alongs, lacking in-depth explanation of sports principles and personalized guidance.

(2) **Insufficient Age-Appropriateness:** Professional digital sports prescriptions for special groups such as teenagers, the elderly, patients with chronic diseases, and pregnant women are severely lacking. Existing digital sports products are mostly designed for young groups, failing to effectively cover the health needs of the entire life cycle, resulting in a huge market gap.

4.3.2. Insufficient Depth of Virtual-Real Integration

Currently, many "Internet + Sports" models still stay on superficial connections, lacking deep physical integration and chemical reactions. As Zhong Bingshu (2022) pointed out, the new trend of sports industry development under the background of the digital economy requires fundamental changes in talent training models, and the current supply-demand mismatch largely stems from this [5].

(1) **Fragmented Experience:** There is often a conflict of interest between online platforms and offline venues, failing to form an efficient O2O closed loop. Users who purchase courses online often cannot get supporting hardware support or coach guidance in offline venues, resulting in a broken service experience.

(2) **Poor Interactivity:** The interactive experience of virtual events mostly stays at the visual level, lacking real tactile feedback and motion load simulation, making it difficult to replace the pleasure of offline sports. Metaverse sports is currently more of a concept hype, with limited practical landing scenarios, and user experience has not yet reached an ideal state.

4.4. Divide Effect: Consumption Inequality Triggered by Insufficient Digital Inclusiveness

4.4.1. "Digital Outcast" Risk for the Elderly Group

With the arrival of an aging society, the elderly should be the main force of sports health consumption. However, complex smart device operation interfaces, cumbersome registration processes, and dazzling app functions constitute a huge obstacle for the elderly to cross the digital divide. Many smart venues have canceled manual windows and only support scan-code reservations, causing difficulties for the elderly to enter and make reservations, preventing them from enjoying digital dividends and even excluding them from the public sports service system.

4.4.2. Consumption Threshold for Low-Income Groups

Digital sports consumption is often accompanied by high hardware investment (such as purchasing smart watches, VR glasses, smart bikes) and continuous software subscription fees (such as membership fees, course fees). This is a considerable burden for low-income groups. While improving consumption quality, digital technology also invisibly raises the threshold for sports consumption, which may lead to the solidification of sports consumption classes and violate the principle of equalization of public sports services.

5. EXPERIENCE REFERENCE FOR THE DEVELOPMENT OF DIGITAL SPORTS CONSUMPTION IN DEVELOPED COUNTRIES

Stones from other hills may serve to polish the jade of this one. Analyzing the successful experiences of developed countries in Europe and America in the field of digital sports consumption has important reference value for solving China's realistic dilemmas.

5.1. United States: Deep Integration of Technology and Sports Under Market Dominance

As a dual power in the digital economy and sports industry, the core experience of the United States lies in a highly market-oriented technological innovation mechanism and a complete industrial chain ecology.

5.1.1. Deep Binding of Tech Giants and Sports Leagues

Tech giants such as Amazon, Google, and Microsoft have established close strategic cooperative relationships with top professional sports leagues such as the NBA, NFL, and MLB.

(1) **Data Analysis and Tactical Empowerment:** Utilizing AWS cloud services and AI technology to digitally package events in all aspects. For example, the "NBA CourtOptix" system launched by the NBA uses AI to track player movements, calculate shooting probabilities, defensive intensity, and other advanced data, providing tactical support not only for teams but also providing in-depth tactical analysis data for viewers, greatly improving viewing experience and willingness to pay.

(2) **Copyright Operation and Streaming:** The broadcasting of US sports events has fully transitioned to streaming media. Platforms such as ESPN+ and Amazon Prime Video maximize copyright value through technologies such as personalized recommendation and multi-screen interaction.

5.1.2. Perfect Data Trading and Copyright Protection Mechanism

The United States has a mature sports data trading market and a strict copyright protection legal system.

(1) **Data Commercialization:** The legalized trading of sports betting data has created huge value-added space for the industrial chain and also fed back the digital construction of events. Sports data companies like Sportradar have formed standardized processes in data collection, cleaning, and distribution.

(2) **Copyright Protection:** Strict copyright laws protect the intellectual property rights of digital sports content, crackdown on piracy, safeguard the interests of content creators and copyright owners, and incentivize continuous innovation investment.

5.2. Europe: Public Service Digitization and Community Economy Model

European countries perform outstandingly in the digitization of public sports services and the community economy based on football clubs, emphasizing the balance between social benefits and economic benefits.

5.2.1. Intelligent Networking of Public Sports Facilities

The EU vigorously promotes the construction of "Smart Cities," incorporating community sports facilities into a unified digital management platform.

(1) **Resource Sharing:** Taking the UK and Germany as examples, residents can find and book surrounding public football fields and tennis courts with one click through a unified app, and can even view the real-time crowding degree of the venues, greatly improving the utilization rate of public resources.

(2) **Open Data:** The government mandates that public sports facilities open data interfaces, encouraging third-party enterprises to use these data to develop applications such as fitness maps and event organizations, forming a prosperous digital sports ecology.

5.2.2. Value Co-creation Based on Fan Token

European football clubs actively explore the application of blockchain technology in fan operations.

(1) **Socios Model:** Many giant clubs (such as Barcelona, Juventus) cooperate with Socios.com to issue Fan Tokens. Fans holding tokens can participate in club decisions (such as jersey design, entrance music selection, friendly match opponent selection), enhancing fans' sense of belonging and consumption stickiness.

(2) **Business Model Innovation:** This model realizes "exchanging warrants for funds, exchanging community for loyalty," transforming fans' emotional capital into tangible economic value, creating a new paradigm for sports consumption in the Web 3.0 era.

6. RELIEF STRATEGIES FOR DIGITAL ECONOMY DRIVING HIGH-QUALITY DEVELOPMENT OF SPORTS CONSUMPTION IN CHINA

Facing the above dilemmas, combining international experience and China's national conditions, we must adhere to problem orientation and systematic thinking, and implement comprehensive policies from dimensions such as infrastructure, supply reform, governance system, talent cultivation, and inclusive orientation to build a long-term mechanism for the digital economy to empower sports consumption upgrading.

6.1. Consolidating the Digital Base and Building the Technical Foundation for Sports Consumption Upgrade

6.1.1. Promoting Balanced Layout of New Infrastructure

The government should increase financial investment and policy guidance to include sports digital facilities in the overall plan of national "New Infrastructure" and implement the "Digital Sports New Infrastructure Project."

(1) **Filling Weaknesses:** Focus on strengthening network infrastructure construction in central and western regions and rural areas, support the digital transformation of sports venues in underdeveloped areas through financial transfer payments and special bonds, and ensure that network coverage and bandwidth meet the needs of digital sports applications.

(2) **Standard Guidance:** Formulate unified smart sports venue construction standards (such as "Guidelines for Smart Sports Venue Construction") and data interface specifications, clarify intelligence level requirements, avoid redundant construction and waste of resources, and promote interconnection between venues.

6.1.2. Strengthening Key Core Technology Breakthroughs

Build a technological innovation system with enterprises as the main body, market-oriented, and deep integration of industry, academia, and research.

(1) **Unveiling the List and Taking Command:** Encourage leading sports enterprises to unite with universities and research institutes to form innovation consortia and concentrate on overcoming "chokepoint" technologies such as sports chips, high-performance sensors, motion capture algorithms, and holographic displays.

(2) **Special Support:** Establish special funds for sports science and technology innovation, support the R&D of smart sports products with independent intellectual property rights. Subsidize the application of the first set of smart sports equipment, reduce hardware costs through technological innovation and large-scale application, and let high-quality digital sports products "fly into the homes of ordinary people."

6.2. Deepening Supply Reform and Enriching the Supply of High-Quality Digital Sports Products

6.2.1. Cultivating New Formats and Models of Digital Sports

Adhere to innovation-driven, promote the deep integration of digital technology and the sports industry, and increase mid-to-high-end supply.

(1) Developing E-sports and Virtual Sports: Vigorously develop emerging formats such as e-sports, cloud events, and virtual sports, promote their professionalization and standardization development, and strive to include them in the international sports event system. Support holding high-level virtual sports events and cultivate relevant consumer markets. As suggested by Zhang Yexia et al. (2023), the assetization of sports data requires the construction of laws and systems for protection, which also provides a system foundation for the development of new business forms [6].

(2) Hybrid Service Model: Encourage traditional sports training institutions to use live streaming and AI technology to carry out online teaching, forming a "online + offline" complementary hybrid service model. Use AI coaches to provide personalized, low-cost sports guidance to improve service efficiency.

6.2.2. Creating Immersive Consumption Scenes with Virtual-Real Integration

(1) Metaverse Layout: Promote the application of technologies such as Virtual Reality (VR), Augmented Reality (AR), and holographic projection in sports consumption scenes. Build a "Metaverse Sports Community" allowing users to socialize, compete, and consume in virtual space, creating a brand-new consumption experience.

(2) Offline Upgrade: Promote the intelligent upgrade of offline physical venues, use IoT technology to realize "senseless payment," "smart guidance," "environmental monitoring," and "smart storage," improving user convenience and comfort. Improve venue operational efficiency and floor efficiency through digital means.

6.3. Improving Governance System and Building a Safe and Standardized Digital Consumption Environment

6.3.1. Establishing and Improving Data Laws and Regulations

(1) Confirmation Mechanism: Accelerate the formulation of hierarchical and classified management measures for sports industry data security, clarify the ownership, use rights, and usufruct rights of sports data. Explore the mechanism of data assets entering the balance sheet and promote the trading and financing of sports data as assets.

(2) Privacy Protection: Strictly implement the "Personal Information Protection Law" and "Data Security Law," regulate the collection and use of user biometric information by sports enterprises, and establish the "principle of least necessity." Establish a negative list for data collection and strictly prohibit the illegal collection of sensitive information such as faces.

6.3.2. Strengthening Algorithmic Supervision and Platform Anti-monopoly

(1) Algorithmic Audit: Establish an algorithm filing and audit system to improve algorithm transparency. Regulatory authorities should regularly inspect platform recommendation algorithms and pricing algorithms to curb "big data backstabbing" and algorithmic discrimination, ensuring consumers' right to know and right to choose.

(2) Anti-monopoly Law Enforcement: Regulatory authorities should strengthen anti-monopoly supervision of sports internet platforms, prevent disorderly expansion of capital, and protect the innovation vitality of small and medium-sized enterprises. Smooth consumer complaint and reporting channels and establish a rapid response mechanism for consumer rights protection.

6.4. Strengthening Talent Support and Building a Composite Digital Sports Talent Team

6.4.1. Reforming Talent Cultivation Models in Universities

(1) **Interdisciplinary Construction:** Encourage sports colleges and science and engineering colleges to carry out cross-school joint training and add interdisciplinary majors such as "Sports Big Data," "Sports Artificial Intelligence," and "Digital Media Operation."

(2) **Curriculum System Optimization:** Add computer science, data analysis, digital economy, and other content to the curriculum setting of sports majors to improve the digital literacy and technical application capabilities of sports majors.

6.4.2. Building Industry-Education Integration Training Platforms

(1) **School-Enterprise Cooperation:** Support sports enterprises and universities to jointly build digital sports laboratories, training bases, and industrial colleges. Implement the "dual tutor" system to allow students to exercise their problem-solving abilities in real project practices.

(2) **Vocational Skill Certification:** Establish a digital sports vocational skill level recognition system, carry out on-the-job training and continuing education for practitioners, and create a composite talent team that understands technology, sports, and management.

6.5. Adhering to Inclusive Orientation, Bridging the Digital Divide to Promote Consumption Fairness

6.5.1. Promoting Age-Appropriate Transformation and Barrier-Free Construction

(1) **Age-Appropriate Design:** Encourage enterprises to develop smart sports products suitable for the elderly, simplify operation interfaces, increase voice interaction functions, and launch "Senior Mode" or "Care Version" apps. Research by Yang Shuangyan et al. (2023) shows that the digital divide has a significant negative impact on residents' sports consumption, so age-appropriate transformation is urgent [7].

(2) **Retaining Manual Services:** Retain necessary manual service windows and cash payment methods in public sports venues to ensure the basic sports rights of the elderly and groups unaccustomed to using smart devices. Establish a volunteer service mechanism to help the elderly cross the "digital wall."

6.5.2. Implementing Digital Sports Projects in Rural Areas

Use digital technology to promote the flow of high-quality sports resources to rural areas and assist rural revitalization.

(1) **Sinking Cloud Resources:** Transport courses of high-level coaches to rural areas through internet platforms to solve the shortage of rural sports teachers. Build rural digital sports activity centers equipped with basic smart fitness equipment.

(2) **Precise Assistance:** Use big data to identify the sports needs of low-income groups and conduct precise subsidies by issuing targeted digital sports consumption coupons to lower their threshold for participating in digital sports consumption.

7. CONCLUSION

The deep integration of the digital economy and sports consumption is an inevitable trend of the times and the only way to achieve high-quality development of the sports industry. Research in this paper shows that the digital economy has profoundly changed the internal logic of sports consumption through power change, efficiency change, and quality change, injecting strong impetus into the sports

industry. However, China currently still faces many realistic dilemmas in infrastructure, data governance, product supply, talent reserves, and digital inclusion. The production and reconstruction of digital sports consumption space from the perspective of scene theory emphasized by Liu Gang et al. (2022) provide us with a spatial dimension of thinking to solve these problems [8].

Solving these problems cannot rely solely on the spontaneous adjustment of the market but requires the organic combination of a "proactive government" and an "effective market." By implementing systematic strategies such as consolidating the digital base, deepening supply reform, improving the governance system, strengthening talent support, and adhering to the inclusive orientation, we have reason to believe that China's sports consumption will usher in a new stage of high-quality development characterized by digitization, intelligence, and greening, contributing to the construction of a sports power and a digital China. As Chen Yuanxin et al. (2023) stated, digital technology empowering supply-side reform of public sports services is an inevitable path [9]. Future research can further focus on the disruptive impact of Generative AI (AIGC) on sports content production and the ethical regulation of metaverse sports to provide continuous intellectual support for the sustainable development of digital sports. Finally, the classic discussion on the digital economy by Goldfarb and Tucker (2019) also reminds us to always focus on the economic nature of digital technology in reducing various costs [10].

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