

Digital Empowerment of Outdoor Sports Resource Development and Integration Path of Sports and Tourism: A Systematic Review

Yihan Shi

*Nanjing Institute of Physical Education, School of Sports Industry and Leisure, Nanjing, China
2022598352@qqmail.com*

Abstract. The digital China initiative, leading sports nation initiative and healthy China initiative together with the cultural and tourism integration has set up a basis for the development of outdoor sports and tourism in terms of policies. With the digital economy driving more change, people's need for outdoor entertainment is not just about seeing things around them; it is becoming more individualized, immersive, secure and interactive. But there also are short-comings: Information is not symmetrical, supervision of safety is insufficient, products all look the same, and it's hard to match supply and demand. And it is also important tool which could deal with the supply problem. Research about existing digital sports, smart tourism, and outdoor sports industry is still very scattered and no one has carried out in-depth study of the connections between digital empowerment, resource development, sports tourism integration. The paper carries out an organized literature review to gather releas: In this paper we try to create a theoretical frame covering the areas of technologic supply, resources' attribute and integrative ways in industries. Theoretically can help us understand how value is created for sport tourism destination in the digital economy. Practically, it is beneficial to help local governments, scenic areas, outdoor sports enterprises and other units in carrying out resource allocation, product creation, smart management etc., so as to build an efficient high-quality outdoor sports industry system.

Keywords: digital empowerment, outdoor sport, resource development, sports-tourism integrate, systemic review

1. Introduction

In recent years there has been continuous progress on high level national policies like Digital China, Leading Sports Nation and Healthy China. Combined with further coupling of culture and tourism, they also provide a certain policy basis for the overall development of outdoor sports and tourism. With the digital economy and the real economy interwoven to move beyond a merely technological application layer, it is starting to become an intrinsic driver for industrial transformation and upgrade [1]. Under such a macro background, it is just when the outdoor sports and tourism industry is at its consumption upgrade time. People's demands for outdoor leisure are no longer met by ordinary sightseeing, instead it moves quickly towards individualism, immersivity, safety and high level of

interaction. However, contrary to this trend of development is a lag in the development and utilization of traditional resources. There are widespread problems such as resource information asymmetry, difficult and timely safety supervision, the same kind of product supply, unsmooth supply-demand correspondence. On the supply side, how to use digital means to cope with such practical problems is now an inevitable problem that cannot be avoided in today's industry.

Conceptually speaking, it includes a large amount of things from nature such as mountains, waters, woods and cultural heritages like ancient buildings and villages and also all kinds of sports venue and supporting facilities. Past use of such resource tends to be on the more extensive side. Nowadays with the aid of digital technologies like geographic information system(GIS) , remote sensing , internet of things(IOT), big data analysis we are seeing huge changes in our exploration, assessment, planning, conservation process and moving towards more precise operation. Sports and tourism have been seen together as "use sport to boost tourism; use tourism to stress sport", but under a digital environment, that's not all there is to it. Today, we can take some advantages of different technology in order to help create these new products; also reshaped the form of how you will deliver services to your customer; created completely different consumption situation involving both reality as well virtually; and finally built brand new system to co-create value [2].

Looking back at what others have written, there are lots of things that people know about stuff like "digital sports," "smart tourism," and the "outdoor sports industry." But ideas that put together "digital empowerment" and "outdoor sports resource development" and "sports –tourism integration" into one big thing don't happen too much. Specifically speaking, the present literature mostly pays attention to the application effect of only one kind of technology, like the role of virtual reality in creating an experience, there is not much attention on the fact that when combining different technologies together, how does this affect the whole life cycle process of managing resources and restructure the industrial ecosystem altogether? At the same time, as for research methods there is also some difference: Some part focuses more on large scale policy interpretation and other part is about concrete case description in a certain place without good theoretical connection between them. Therefore, even though there are more such related discussion, but no such systematic integration framework yet exist and also the tension between being abstract in theory or how to implement it. According to these above points, this article tries by carrying out a systematic literature review to collect and combine all researches about the digital empowerment of outdoor sports resource development as well as the sports-tourism integration in order to create an analysis path including technology supply, resources attributes and industrial integrated path. From theory's point of view, it wishes for the contribution made to the knowledge about how value is created in sports tourism destinations during digital economy. In reality, it is given reference to local governments and scenic spots managers, as well as related outdoor sports enterprises and other companies regarding resource configuration, product updating, intelligent operation, and so on, accumulating a certain amount of basic data for building an excellent first-level outdoor sports industrial system.

2. Methodology

2.1. Literature search strategy

Search was done on the following database:(1) China National Knowledge infrastructure (CNKI) (2) Web of science. Search Period: Literature dated Jan.1, 2015-Dec.31, 2025 were included in the search. I searched in the Chinese database for "digitized" or "digital empowering" and outdoor. I

used the English database and searched for it with the two terms of "Digitalization" or "digital empowerment" AND "outdoor sports".

2.2. Literature inclusion and exclusion criteria

Table 1. literature inclusion and exclusion criteria is presented

Inclusion Criteria	Exclusion Criteria
Studies directly related to "digital empowerment of outdoor sports resource development" and "sports-tourism integration"	Studies indirectly related to the topic, with weak relevance
Studies containing theoretical, methodological, case study, or empirical analysis	Purely descriptive studies lacking empirical analysis or digital elements
Studies involving aspects such as policy, platforms, technology application, operational models, and governance	Dissertations and theses

2.3. Literature screening

The researchers selected literature through the search strategy and criteria first with the titles of the articles, followed by the abstracts, and then the full text. The first author asked another individual who was not also one of the authors on this paper to help screen the literature to ensure that it met the criteria. When there is disagreement between the two screeners, it will be decided with another person.

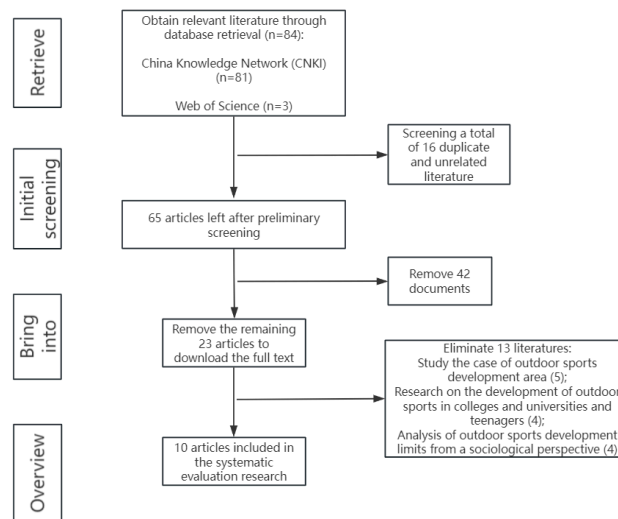


Figure 1. Literature search process flow chart

3. Results

3.1. Overview of included literature

The list of literature for the study can be seen in table 2.

Table 2. Literature inclusion checklist

order number	title	author	research topic
1	International Experience and China's Solutions for High-Quality Development of Outdoor Sports Industry under an Innovative Ecosystem	Cui Qianru et al [3].	Innovative ecosystem theory (macro, meso, micro)
2	Research on High-quality Development of Outdoor Sports Industry Empowered by New Quality Productivity in Hexi Corridor	Kang Linshan [4]	new quality productive forces
3	Research on Digital Technology Empowering High-quality Outdoor Sports Destination Construction	Yu Zhe, Zhang Xiaolin [5]	Dual-wheel drive (natural resources + digital economy)
4	Implementation Mechanism for High-quality Development of Outdoor Sports Industry in the Process of Chinese-style Modernization	Zhou Lijun et al [6].	Five Characteristics of Chinese Modernization
5	Research on Digital Economy Empowering High-quality Development of Outdoor Sports Industry	Zhang Yawen et al [7].	Digital economy empowerment
6	Research on Intelligent Development of Leisure Sports Industry from the Perspective of Sports and Tourism Integration	Hu Lulu [8]	Integration of Sports and Tourism, Intelligent Development
7	Research on Realistic Dilemmas and Practical Pathways of Digital Economy Empowering Outdoor Sports Consumption Upgrade	Qiang Hao, Guo Dongdong [9]	Digital Economy and Consumption Upgrading
8	Digital Technology Empowers High-Quality Development of Outdoor Sports Destinations: Mechanisms of Action, Practical Challenges, and Implementation Paths	Wang Xiaorui et al [10].	Empowering through Digital Technology
9	Practical Challenges and Approaches for High-Quality Development of Mountain Outdoor Sports in Guizhou Province under the Dual Drive of "Natural Resources + Digital Economy"	Xiao Junyi [11]	Dual-wheel drive (natural resources + digital economy)
10	New Quality Productivity Drives High-quality Development of Outdoor Sports Industry: Supply and Demand Logic, Effect Mechanism and Implementation Path	Zhang Xu [12]	New Quality Productivity and Supply-Demand Logic

In total, there are 10 such studies that will be included: Read them in detail to find out what is the same and different between those papers.

3.1.1. Commonalities

After making a comprehensive analysis and review of relevant literature materials, we find the following similarities among them: First, all the literature revolve round the central purpose that "the high-quality development of the outdoor sports industry," which also shows its significant position within the sport industry, national economy and ecological civilization construction. Secondly, most of these literature have formed a consensus view point, that is to say, they all agree that digital technology such as big data, ai, vr/ar, 5g, iot etc., will become main driver for industrial update and consumption upgrading as well as destination development and branding. Thirdly, it can be observed through most literature that there exist common problems like imperfect policy system, inadequate digital infrastructure, talent shortage, late data governance, insufficient industrial collaboration. Fourthly, various stakeholders including government, enterprise, university, social organization played different roles in different aspects, such as policy-making, talent training, platform building and security safeguarding. Fifthly, most literatures hold the view that green development, low carbon transition, ecological protection are necessary parts of high quality development and transformation of green mountains and clear waters into valuable assets

3.1.2. Differences

Theoretical frameworks and focal points are different: Literature 1 uses the 'Innovation Ecosystem' theory, Literature 2, 10 use the 'New Quality Productive Forces' theory, Literature 3, 5, 7, 8 use "Digital Economy Empowerment", Literature 4 use "Chinese Style Modernization", Literature 9 put forward a dual drive model. Research scope is different: the literature 2, 9 emphasize on some region and its endowment of resources, characteristic feature etc., other literatures are more national or macro. Research emphases differ: Literature 1, literature focuses on 'international experience', literature 3, 8 are focused on 'outdoor sports destinations', literature 7 is about 'consumption upgrades', literature 6 is regarding 'sports tourism integration and smart development', literature 5, 10 are centered around 'industrial mechanism and supply-demand structure'.

3.2. Main research trends

Table 3. Main research trends

Dimension	Core Conclusions
Clear trend of theoretical integration	Theories such as the digital economy, new quality productive forces, innovation ecosystems, and Chinese-style modernization are cross-integrating, forming multidimensional explanatory frameworks.
Complementarity of regional and national studies	National studies provide macro-policy direction, while regional studies (e.g., Hexi Corridor, Guizhou) emphasize resource endowments and local practices, complementing each other.
Evolution of development logic	A shift from "technology empowerment" to "systemic restructuring": Research is gradually moving from single-technology application towards institutional innovation, industrial synergy, ecological governance, and brand building.
Key core variables	Composite talent and data element governance have become consensus shortcomings, representing key focal points for future policy and research breakthroughs.

4. Discussion

4.1. Mechanism of digital empowerment: from "resource development" to "resource full-lifecycle governance"

The key part of this digital force, is transforming our outdoors sport industry's usual ways of creating static resources into actively managing everything from start to finish with regards to each kind type and amount of resource that exists. There is a lot of study which points out the significance of digital technology to outdoor sport industry however what does digital actually transform into "process structure" in term resource development. Based on the general theme of existing literature, Digital empowerment is a kind of improvement of Governance capability, this improvement can cover all aspects over entire resource life-cycle starting from identifying and evaluating resources till operations services & experiences creation and then moving towards supervision, monitoring and brand communication. Data gets it, becomes what's to rule over, growing better day by day and constantly, on a cycle. And specifically, there is the change of three key points:

Firstly resource recognition and evaluation changes its way from "judge according to feelings" into "utilize data for measurement", there are lots of spaces features within this outside sports field, as it's quite sensitive. In traditional development its based on experience or some rough data descriptions so there will be an info imbalance and a risky estimate. As well as like gis, remoting sensing, data analysis all of them would help you find things to do for your plan like what place you can built by, what place is safe with the nature limit Yu Zhe, Zhang Xiaolin state that at its heart it is about combining nature's resources with the digital economy. It actually creates a type of "computable resource" foundation through measuring data. Wang Xiaorui et al. also believe that the practical difficulty of developing a place with digital technology is due to the lack of foundation in data and late information changes, this means the identification of resources stage is very important as an entry point towards succeeding at digitizing your business. To integrate a centralized column called Matrix of digital technology. That would be GIS, RS and IoT (big data analysis & AI),VR/AR AND 5G functions which are divided broadly into these three parts: First one will involve using gis+ remote sensing in exploring Natural Resource and give us an idea what quality they have secondly we use it with the help big Data + ai+5g for supply- demand match on various types of sports – tourism packages as well regulating visitors' traffic flow and monitor their safety . third part would be vr /ar +digital Twins where new way comes out for tourist to experience Outdoor sports and provides platform to any kinds of sporting--tourist products. So, Digitalizing this stage is the first step of the whole governance chain and will affect the data quality and decision making accuracy in following steps.

And secondly, we go from "a single supply" to "user driven dynamic restructure." Outdoor sports products are very much about experience and also about the demands of users. Traditional supplies are more like a resource supply model and have hard time catering different market needs. Like big data, AI etc, technologies could make dynamic readjustments on the supply side according to users' preferences and capabilities, seasonal changes, and the fitness with certain routes so as to raise the degree of supply-demand equilibrium. Zhang Yawen et al. pointed out the significance of the value of digital economy empowerment is more about efficiency and structure optimization; while from Zhang Xu's point of view, he focuses on new quality productive forces, and it's about the coupling of supply and demand logic, which means digital empowerment itself should not just be about adding information but forming an organic supply system with learning ability and adaptation. Like how like when it came to rockclimbing being the one that took on those special ones, firstly there was

upstream resources like a cloud - network edge becoming an online base for all of cliffs' own advantages concerning natural resources and equipment use and training ground in a smart manner which groundwork is laid upon so AII coaching & Operations could be used in the field of Rock climbing. In terms of mid-stream R&D, digital technology has integrated into it such that the process itself is already becoming smarter; it changes some old gears as well, like climbing holds, shoes, harnesses, quickdraws, etc. Downstream in terms of operations and consumption, digital infrastructure and large-scale processing technology give sufficient computing capacity and algorithms for creating values from data such as resources, equipment, users, etc., so that the supply and demand can match with climbing gym, training center, brand of sports shoes and other enterprises. This change is about changing how the supply system works, instead of selling what we have now, it will become configuring what customers want which means making a big step up from holding onto stocks for long periods.

The third thing is about making improvements on serving people from giving them only the option to get it served off-line or having both ways where we can have some scenery available there along with virtual and combining things like VR /AR technology, smart guiding tours also along with online /off-line services so that everyone gets a mix between this immersion without putting themselves into too much risk. Hu Lulu focuses on sports and tourism integration under smart development, which means that the core of integration is about changing service process, scene mechanism: user is no longer just "arrived", instead they have been presented an experience route where they can understand it, choose it, plan it and participate in it by digital content and interactive system. Specifically speaking, AI systems can also integrate multi-dimensional information such as user side's fitness data, historical tracks and their own likes and dislikes on the environment side like current weather, terrain, ecological indicators and industry side visitors' flow, pricing, event calendar and other related content. Create dynamic picture of any place and use algorithm to do prediction in the form for risk, delay some travel time to space up the trip, save money to have better matching between many types of resources and individual needs. On the contrary, We will use digital to remove those geographical blocks on things like being able to get outside sports at Kailas: They use large amount of data for targeted marketing to the core outdoor fans, utilize social media such as Douyin & Xiaohongshu to produce themed content, use high definition and real scene short videos and influencers review to give a full tour of the niche outdoor destination sceneries and routes. At the same time using digital advertising system with very accurate targeting, so what were previously niche outdoor places can easily become mainstream overnight. And also using info gotten from the people in order to enhance their destination and routes too, doing that by means of both on-line & off line involvement with those online groups, consumers go on moving between becoming aware then buying once more before ending up having quite an emotional bond with the brand and place. Also similar is that Columbia focuses more around a scenario digital marketing with things such as thermal imagery camera being put in the online live stream so people can see the real environment and how a product works outdoors. And then we create this digital outdoors platform with all these kinds of digital outdoor experiences like we'll put in our paths and check our clothing for rain. So that people can completely know about the destination at home without leaving home, it lowers the cost of outdoor trip decisions and fundamentally solves the information gap problem of traditional outdoor sport destinations.

In short, the mechanism of digital empowering is: Through the use of data as a chain so that resources can be changed from "assets" into "governance" objects, then go through all this loop process to accomplish recognition, design and implementation processes that transforms us thinking mode from developing natural resources to governing the whole life-cycle. So, it is also the

mechanism that most of the research has concluded that "digital technologies are forces" but then also noted that institutional and foundational deficits prevented these forces from becoming systemic: because tech could only have its system empowering power released by being placed inside an entire governance process with a feedback loop.

4.2. Evolutionary mechanism of sports-tourism integration path: from "technology empowerment" to "systemic restructuring"

From the study we can find out that developmental logics in terms of sports – tourism integration is shifting step by step from single-technological utilization toward comprehensive institutional creation, industrial cohesiveness, ecological administration and brand establishment. To discuss the evolution here is to answer one key question: why do we go from "overlay" integration to "restructuring"?

First is about the basic conflict within sports tourism integration which comes from this: Sports experience requires more safety, professionalism and risk prevention; But for tourism consumption itself, it is to pursue simplicity and enjoyment. The digitalization is introduced to reduce "Matching Cost" for them, but low cost does not mean that more synergy can be achieved. The main cause lies in some important factors being scattered around, so there are all kinds of problems like data siloing, unmatching interfaces, blurry benefits, and hazy responsibility. Therefore, if we confine ourselves to being just "a platform that can connect" or simply display content, it won't take long for us to get results, but they will be hard to form into a loop. The crux of this issue is to build a channel for blending professionalism with recreation under the notion of "event= tourism; scenario = experience," on one hand, we can do tiered design, high intensity professional competition exists together with low barrier experience activities. For instance, a same climbing place may contain both the competition route as well as some interesting line which will create tourism experience for visitors, this is how we combine the "Sports Core" with "Tourism Extension"; On the other hand, digital tools can also realize targeted matching of supply and demand: By using users' profile information, it's easier to distinguish between those professional athlete and normal travelers. Pushing different kinds of training resource or guided tours according to them respectively, thus allowing the "depth" in Sports can have a better relationship with the "range" in Tourism. Moreover, it is necessary to pay attention to the integration of functions, making sure that places comply with the professional training's technical requirement at the same time providing convenient and comfortable tourism service for visitors. It can also be used to solve the natural contradiction in terms of resources, customers, and values from the perspective of sports and tourism at the same time.

Secondly it was due to the fact that digitalizing also reshaped structure of governance: Data that goes through the development of resources and then moves to service operations requires new cooperation among various departments and stakeholders. It is about data standards, interface standards, compliance with privacy and security, cross-regional cooperation procedures, differences in dividing between providing public services and running a business. Zhou Lijun et al talk about the governance mechanism in the process of Chinese style modernization, which can be regarded as theoretical support for "systemic reconstruction is always accompanied by governance upgradation" [3]; Cui Qianru et al stress that ecosystems should have synergies among macro, meso and micro levels; it shows that when systems tend to reconstruct, they should have ecological governance capacity. Organizational synergy + Market Synergy+ Institutional synergy together make up the main structure for collaboration on the outdoor sports business. Organizational synergy is the root, it needs cooperation between organizations, so as to achieve optimal allocation of resources, lower

transaction costs, make various links work effectively, and promote the mobility of factors. Market Synergy is important; we should utilize the power from industries and make our industrial driving effect better, integrate various products and factors which can help us handle fierce competition and diversified demand by continuously seeking cooperation and benefits opportunity through forward and backward linkage. Institutional synergy is the guard. And there will be benefits and risks sharing: It can make more industrial overall benefits for everyone, it's better that we stand together to win. Participating in risks as a share is required, therefore increasing the capacity of industry resume. They're organically made, so naturally they turn into an industry's help out from Tech to Systematic.

Three is that there are different resources, so we have to change the system. In regional studies, it is found that there is no uniformity in coupling of nature's resources with the digital economy. Resource type differences, development restriction differences, transportation condition differences, user market difference all influence digital empowerment transformation ways. Xiao Junyi took Guizhou's mountains as an example to say it's about "resources and data" based, different kind of configuration. Therefore, it is reasonable to deduce that the main obstacle to changing integration from being overlaid to restructuring does not lie in the number of technology, but whether or not there exist governance system and operation system that can accommodate for all kind of resources endowments. At the same time in order to solve "monetize your traffic" problem, Sports and Tourism Integration should extend the industrial chain: Firstly create professional equipment leasing center(e.g. ski, bike, diving), then reduce cost for people who want to participate. Secondly, create more training and study products such as outdoor survival skills, explore nature, sail/ ski summer camps etc., take full advantage of the benefits of outdoor sports in nature education so that we can attract customers to buy repeatedly. Third is combining with local wellness resource like hot spring, traditional chinese medicine to provide post activity recovery and sports injury cure service for enthusiasts, fill out post sport market. With the help of industrial chain, through sports-tourism, it could move from single transaction to continually create values.

Concerning on how we view about the output values when we come to Upper-most Layer called - Integration Layer, it gets its influence from a technological layer as well get a support via resource layer: In order for us to break through something like "Sports & Tourism" which was industrialised way above us or simply occupying space with them all. Instead going forth towards the higher ground for total digitization restructuring in term of the product, services, scene, government-building up advance integration pathway such includes: "Sports Powers Tourism," "Touembrace Sports." Advance digital enable value creation along with synergizing issues creates due to the lack collaborative Sports& Tourisms industry under an industrial sense When selecting a place, if one chooses prospective outdoor sports places to bring together with tourism instead of just informing people on them like simple information, it wants more than these individual "places". It aims for a larger field that provides all sorts of different experiences. AIs would intelligently tie up trails, history spots, nearby eatery options along with other fun things going around town based on what those individuals might find really interesting - be it exploring culture or being challenged by nature or perhaps something shared as challenges among friends according to this preference and create connected narrative "minivacations": In that period, we have AI as our center of service coordinations and it also flexibly suggests nearby supplies/rest stops and transportation linkages based on how users are at present state in time. This is achieved by merging sport into the tourism services. Moreover, AI can make someone feel more included by the likes community matching and light-compeion recomendations making it not on outir once but something that is always a part o your

social circle and even your story This way can satisfy our own fitness needs and also explore more about culture, society and other places.

Therefore, the author argues that evolution of Sports -tourism Integration is no more about Technology but as more Technology comes in, More Institutionalized Synergy is required. We won't get to a place where we can really have cooperation with our system if it's digitally present in all parts of the resource lifecycle management: only then will we make that jump from working together on something to actually having collaborative production, which shows us that both tech empowerment and systemic change mean changing what happens but also altering structures – an overall organization isn't just about putting places for things inside; there's more to their positioning among greater networks as well. It is the internal logic to realize the high-quality development of sport + tourism.

5. Conclusion

By reviewing thoroughly on "digital empowerment of development & integration of outdoor sports resources with tourism", in our opinion, its sequence progress order is: Technology empowerment – system reform. In which point out that at root level speaking, it can make the Digital Tech be an important driving force for developing industry due to digital tech turning the data, then making Outdoor Sports Resource into governable and living objects during the entire development process. It includes the entire process of resource prospecting, evaluation and planning, provision of products, services provided to customers, risk supervision, etc., all the way to co-creating brands. It is fundamental to solve the existing problems in model such as imbalanced informations, do not fit with demand and supply goods and lacking time for risk management

But it's not the end of digitalization but instead a start of even more industrial change. Today's sport-tourism integration is at such an important juncture where it shifts from doing a simple "overlay" with the industrial sector on its surface and now does real "creation of co-value". And what's most crucial here to make this kind of change happen is when we must have rising governance structures & collaborative innovation systems that will naturally accompany more digitalization being implemented. When the data flow begins to connect and run from planing stage, operation stage, service stage and supervise stage, then departments barriers, data is isolated, fragmented cooperation model becomes a choke point. Therefore, in order to achieve successful sports-tourism integration it is not enough just to introduce certain technology; it has to go hand-in-hand with systemic restructuring of organizational synergy, market synergy, and institutional synergy. It must construct governance and operations systems able to support effective interaction between many parties, various kinds of information sources, and different circumstances.

In short, in the coming days, we will see "digital empowerment" and "systemic reconstruction" as one side of the same coin. On the other hand we should deepen the application of digital technology in all life cycle resource management to provide detailed, intelligent and personalized outdoor sports and tourism service. On the contrary, we also need to actively design and emphasize corresponding institutions, innovation, talents, benefits sharing, etc., so that it can create institutional and ecological soil to make full use of digital power. Only in such a manner can we fully achieve deep integration of "promoting tourism through sports, and elevating sports with tourism" and create a brand new ecological environment for an outdoor sporting industry that is high quality and sustainable.

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