

## ORIGINAL RESEARCH ARTICLE

# On the high-quality development of “blockchain +” enabled smart tourism

Qingzhong Ming<sup>1\*</sup>, Junfeng Wei<sup>2,3</sup>

<sup>1</sup>*Institute of Tourism and Culture Industry, Yunnan University of Finance and Economics, Kunming 650221, Yunnan, China. E-mail: mingqingzhong01@163.com*

<sup>2</sup>*School of Tourism and Landscape Architecture, Guilin University of Technology, Guilin 541006, Guangxi, China.*

<sup>3</sup>*Faculty of Geography, Yunnan Normal University, Kunming 650221, Yunnan, China*

### ABSTRACT

Promoting the integrated application of blockchain technology and smart tourism is conducive to improving the efficiency of smart tourism public service platform and guiding the innovation of tourism public service mode; It is conducive to cultivating the new connotation of smart tourism development and activating the new driving force of tourism development; It is conducive to cultivating new forms of tourism and providing new opportunities for the development and transformation of tourism. Many regions have laid out tourism and smart tourism as demonstration application fields for the deep integration of blockchain and real economy. Its basic orientation is to build blockchain tourism platform, establish multi-party consensus mechanism, build blockchain tourism credit management system, expand application fields and enrich application scenarios. In order to accelerate the high-quality development of tourism enabled by “blockchain + smart tourism”: Firstly, accelerate the research, formulation and introduction of relevant policy implementation plans; secondly, build a smart tourism ecological engineering system supported by blockchain technology; thirdly, try to build a blockchain tourism credit management system to solve the market pain points; fourthly, focus on promoting tourism consumption blockchain points to build a global tourism chain.

**Keywords:** blockchain; smart tourism; internet plus tourism; high quality development

## 1. Introduction

As an innovative application mode of distributed data storage, point-to-point transmission, consensus mechanism, encryption algorithm and other computer technologies in the Internet era<sup>[1]</sup>, blockchain technology is regarded as the next-generation subversive core technology after steam engine, power and Internet, and its status is similar to HTTP (Hypertext Transfer Protocol) of the current Internet. It is considered to be conducive to promoting the transformation of the Internet from information

transmission as the core to value transmission as the core, and helping the high-quality development of economy and society. It will be the cornerstone of digital economy and smart society. Therefore, it has been highly concerned and recognized in all fields of global economy, industry and academia<sup>[2]</sup>. China attaches great importance to the development of blockchain technology. Blockchain technology is included in the 13<sup>th</sup> Five-Year Plan for National Informatization for the first time and is laid out in advance as a strategic cutting-edge technology. In 2020, the ten departments jointly issued the “deep-

### ARTICLE INFO

Received: May 8, 2021 | Accepted: June 20, 2021 | Available online: July 4, 2021

### CITATION

Ming Q, Wei J. On the high-quality development of “blockchain +” enabled smart tourism. Smart Tourism 2021; 2(2): 11 pages.

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ening the Internet plus tourism” to promote the development of high-quality tourism. At the macro level, it released a strong signal that the Internet as the representative of modern information technology has become a high quality and important starting point for tourism. The 14<sup>th</sup> Five-Year Plan for Cultural and Tourism Development just released takes “actively developing smart tourism” as one of the seven measures to “improve the modern tourism system”, it is proposed to strengthen the construction of tourism information infrastructure, deepen the “Internet plus tourism”, and accelerate the development of intelligent tourism characterized by digitalization, networking and intelligence. In order to enhance the convenience and improve service experience, we will promote the innovation of the mode of intelligent travel public service.

Blockchain, as an underlying technology architecture, its fundamental value is to integrate with society and economy. Tourism is a potential idealized application field of blockchain technology<sup>[3]</sup>. First of all, any industry with high requirements for information is applicable to blockchain technology, and tourism is also an information-based industry<sup>[4]</sup>. Secondly, tourism is a comprehensive industry, which has the characteristics of high industrial relevance, long industrial chain, many industrial elements and many intermediate links of transactions. This means that only the management of the whole industry elements can make the tourism industry develop healthily and sustainably, which is exactly in line with the technical characteristics of blockchain applicable to multi-party participation scenarios and the idea of distributed ledger management. Compared with other industries, blockchain technology can better meet the management and service needs of tourism. In addition, blockchain technology has the advantages of consensus trust, certificate traceability, tamper proof, privacy protection and other characteristics, which are different from the traditional information transformation. In the combination with tourism, it will bring new business models and tourism supervision ideas. In short, blockchain is expected to provide compre-

hensive and three-dimensional support for tourism and transform the whole industrial chain.

The application of blockchain in tourism is still in the exploratory stage and has great potential. Its potential application fields include digital payment, business process reengineering, the improvement of non-intermediary level, tourism supply chain management and tourism credit system construction, covering the core factors of tourism enterprises, tourism transportation, accommodation, catering, scenic spots and tourism shopping. At present, many well-known tourism enterprises in the world have begun to explore the application of blockchain technology in marketing, reservation, payment, settlement and so on. For example, TUI Group, a European travel agency giant, took the lead in announcing the investment and layout of blockchain in the tourism industry in July 2017, dumping all the company’s data onto the Ethereum blockchain network in an attempt to eliminate the control and influence of intermediaries such as Expedia and bookings.

Like any other information technology, the application of blockchain in tourism can also be attributed to the construction of smart tourism. In the final analysis, it is to provide people with more intelligent, convenient and high-quality cultural and tourism service<sup>[5]</sup>. However, the core technical basis for realizing smart tourism is different at different stages of technological development and under the conditions of economic and social feasibility. This paper regards blockchain as the technical foundation and underlying architecture of smart tourism in the future, focuses on analyzing the potential and prospect of “blockchain +” enabling the high-quality development of smart tourism, combs the main orientation and main task areas of current government departments to promote the combination of blockchain and tourism, and finally puts forward some strategies and countermeasures to promote the integration of blockchain technology and smart tourism, so as to provide reference for the tourism industry to re-examine the construction of smart tourism, provide new solutions for providing more intelligent,

accurate, convenient, efficient, safe, reliable, high-quality and orderly tourism services through “blockchain + smart tourism”.

## 2. The technology foundation and application of blockchain

In a narrow sense, blockchain is a chained data structure that combines data blocks in chronological order, and ensures global shared distributed ledgers that cannot be tampered with or forged in a cryptographic way. The account book is shared in different sites, different geographical locations or networks composed of multiple institutions. Broadly speaking, blockchain technology is a new distributed infrastructure and computing paradigm that uses the chained block data structure to verify and store data, the distributed node consensus algorithm to generate and update data, the cryptography to ensure the security of data transmission and access, and the smart contract composed of automated script code to program and manipulate data. Blockchain has the characteristics of decentralization, hard tampering, traceability, autonomy and distrust<sup>[6,7]</sup> which is conducive to the tourism industry to promote data sharing, optimize business processes, reduce costs and increase efficiency, improve synergy efficiency, build a trusted system and realize value transmission. Among them, the block chain data structure ensures the verifiability and traceability of data; decentralized means decentralization (disintermediation) and multi-point joint accounting. The distributed node consensus algorithm greatly improves the difficulty and cost of data tampering, and effectively ensures the establishment of trust relationship between different nodes (including unfamiliar nodes) and the clarification of the distribution relationship of rights and contributions; smart contract is a piece of program code that can automatically verify and execute preset terms running on blockchain nodes. Its combination with consensus mechanism and other technologies solves the problem of information asymmetry, ensures the establishment of cooperative relations among multiple agents in a trustless environment, and has a high degree of autonomy. Ac-

ording to the application scenarios and the existence and difference of relevant system access mechanisms, blockchains are generally divided into public chains (decentralized blockchains), alliance chains (partially decentralized blockchains) and private chains (centralized blockchains). At present, the alliance chain is the hot spot of industry implementation practice.

Blockchain is an important part of the new generation of information technology (NGIT) industry, but it is not a single information technology. From the perspective of system architecture, blockchain technology originates from the development of P2P (peer-to-peer) network technology, asymmetric encryption algorithm, database technology, digital currency and other technologies. The maturity and application development of blockchain technology in the future also requires its deep integration and integration with new infrastructure (new infrastructure) such as next generation communication network (5G), big data, cloud computing, Internet of things, artificial intelligence and quantum information. If 5G is similar to the information transmission of nerve conduction, the Internet of things is similar to the perception of nerve endings, big data is similar to people’s knowledge and experience accumulation, artificial intelligence is similar to people’s behavior judgment, and cloud computing is similar to the infrastructure of brain organization, then blockchain, as the core tool of rules and coordination, is similar to people’s rule consciousness and legal consciousness.

At present, blockchain is generally considered to have experienced three development stages (**Table 1**) “digital currency (blockchain 1.0)—digital assets and smart contracts (blockchain 2.0)—multi industry and multi-domain applications (blockchain 3.0)”. However, these three stages are not succeeded one by one, but develop in parallel and exist at the same time. China’s blockchain development is guided by the application of the chain circle and aims to promote the integrated development of the blockchain and various economic and social fields. From the current decision-making deploy-

ment and policy measures on accelerating the application of blockchain technology and industrial development, the application scenarios of blockchain include the optimization of modern financial services (supply chain finance, asset management, digital RMB, etc.), the enabling the real economy (smart agriculture, smart energy, tracing of important mineral resources, smart manufacturing, tourism services, supply chain, etc.), the improvement of public services (education, health care, em-

ployment, pension, precision poverty alleviation, commodity anti-counterfeiting, food safety, public welfare, intellectual property protection, social security, radio and television and network audio-visual, etc.), and the promotion of construction and governance modernization of digital government (government services, comprehensive supervision, public resource trading services, judicial certificates, electronic licenses, electronic invoices, ecological environment monitoring, etc.).

**Table 1.** Development stages of blockchain technology and application

	<b>Blockchain 1.0</b>	<b>Blockchain 2.0</b>	<b>Blockchain 3.0</b>
Development stage	Programmable digital currency	Programmable finance (smart contract)	Programmable society (multi-industry and multi-field application)
Typical characteristics	Distributed ledger, block linked data structure, asymmetric encryption, open source code	Smart contract, virtual machine, distributed application	Super ledger and slicing technology
Typical application fields	Coin circle applications, such as bitcoin	Digital finance and digital asset trading, represented by “Ethereum”	“Blockchain + real economy”, “blockchain + digital economy”, “blockchain + livelihood services”, “blockchain + smart city”, “blockchain + government governance”, etc.

### 3. Potential analysis of “blockchain +” enabling high-quality development of smart tourism

#### 3.1. “Internet Plus” promotes the development of smart tourism

Smart tourism is a systematic and intensive management reform based on the new generation of information technology to meet the personalized needs of tourists, provide high-quality and high satisfaction services, and realize the sharing and effective utilization of tourism resources and social resources<sup>[8]</sup>. It is generally believed that smart tourism is characterized by digitization, networking and intellectualization, including three systems: smart tourism management, smart tourism service and smart tourism marketing, covering the intelligent construction of tourism elements (smart scenic spots, smart hotels, smart transportation, smart meals, smart entertainment and smart shopping), intelligent construction of infrastructure (smart tourism infrastructure and tourism big data center), etc. Starting from the original National Tourism Administration’s inclusion of “smart tourism” into “*the 12<sup>th</sup> Five-Year*

*Plan for Tourism Development*” in 2011 and the deployment of smart tourism pilot cities, the construction of smart tourism in many places has achieved positive results. It has basically formed a smart tourism frame supported by 5G, big data, cloud computing, Internet of things, artificial intelligence, virtual reality, augmented reality and other information technologies, based on tourism big data center, tourism comprehensive service platform and comprehensive tourism management platform, focusing on the intelligent construction of tourism elements, and supplemented by cultural tourism digital content dissemination and online virtual immersive tourism.

The emergence and development of smart tourism follow the pace of the development of the internet. Since the State Council actively promoted the Internet plus action in 2015, the smart tourism construction of all levels of government and tourism authorities has been the focus of Internet plus tourism. Internet plus has become a new scene of mass tourism and new energy tourism. Internet and digitalization have become the infrastructure of smart tourism and the life content and consumption scene of mass tourism. However, smart tourism has not

reached the pre-assumption in many aspects. Combined with the empowerment of blockchain technology, it still has a lot of room for development: (1) from the policy of “Internet plus tourism” promulgated by the state and local governments, there is still a certain degree of insufficient attention to the block chain which is a more advanced Internet technology and its application, and the tendency of “emphasizing the government and ignoring the market; emphasizing the system and lighting industry; emphasizing technology and reducing the use of resources; emphasizing the platform and paying less attention to content”(From April 7, 2021, Dai Bin, Dean of China Tourism Research Institute (National Tourism data center), delivered a speech at the National Development Forum for Internet plus tourism and the 2021 Henan Intelligent Tourism Conference (Zhengzhou)); (2) the public infrastructure of “one center and two platforms” of smart tourism is still centralized in essence, for example: the integration of the big data center system is still not high, and the physical data islands and logical data islands have not been completely opened up. It is necessary to further integrate across departments, fields and industries to fully release the information value of the data. Compared with the design objectives and investment, the “two platforms” are still inefficient and inefficient, and it is necessary to further clarify the boundary between government public services and market tourism information services; (3) the existing tourism information system and tourism information ecology are also the system and ecological environment with OTA as the core and non-blockchain technology architecture, the exploration of improving the traditional information ecology based on blockchain technology transformation, building a more efficient, low-cost and strong trust industry environment, and expanding the application of industrial blockchain is not proactive enough. In this context, the potential and prospect of blockchain enabled high-quality development of smart tourism have been increasingly discussed in various fields of politics, industry, University and research.

### 3.2. Potential prospect of integrating “blockchain +” into smart tourism development

Smart tourism is one of the core application fields of blockchain technology in tourism<sup>[7]</sup>, promoting the integration of blockchain technology and smart tourism is conducive to promoting the deep development of smart tourism from Version 1.0 (Internet plus) to Version 2.0 (“blockchain +” promotion stage) and improve the scientific and technological content, digitization and modernization level of smart tourism.

First of all, “blockchain + smart tourism” is conducive to improving the new efficiency of smart tourism public service platform and guiding the innovation of tourism public service model. In April 7, 2021, Du Jiang, Vice Minister of Culture and Tourism, pointed out at the national Internet plus Tourism Development Forum and the 2021 Henan Intelligent Tourism Conference: “In recent years, all localities have actively explored the public service platform model of smart tourism, ‘one machine tour’, ‘one yard tour’ and so on, blooming all over the country. While providing tourists with diversified experience and services, they have made beneficial attempts and explorations for the development of smart tourism and accumulated rich experience. But at the same time, we should also see that at present, there are still some problems in various places, such as “emphasizing construction and neglecting operation”, “emphasizing face and neglecting effectiveness”, which fail to give full play to the due role of public service platform. In the future, if blockchain technology is used as one of the infrastructures of tourism public service platform, it can significantly improve the service efficiency of the platform and realize sustainable operation and development. On the one hand, using the characteristics of blockchain decentralization, multi-node participation in maintenance, intelligent data identification and chain reaction, and intelligent reward distribution according to contribution, it can effectively attract large-scale merchants and users to the chain and settle in the platform, and truly realize the functions

of “intensive integration, vertical and horizontal interconnection, information sharing and service coordination” of the smart tourism platform; On the other hand, using the characteristics of blockchain contract transaction and data sharing, an open and reliable comprehensive tourism service platform for food, housing, transportation, tourism, shopping and entertainment can be established. After all, the trust mechanism of blockchain technology decentralization and technology endorsement makes the greatest contribution to tourism public services by improving a set of tourism service credit system that is trustworthy, traceable and auditable, covering the whole range, recording the whole process and supervising the whole data.

Secondly, “blockchain + smart tourism” is conducive to giving new connotation to the development of smart tourism and activating new momentum of tourism development. Firstly, technologies such as distributed data storage of blockchain can provide an important technical basis for promoting multi-source and multi-element data collection, mining and fusion applications, and promoting the modernization of modern tourism governance system and governance capacity. Governance emphasizes the connotation of multi-center, transparency, trust and justice, and blockchain is very close to the conditions for realizing these connotations technically. For example, Yunnan Administration for Market Regulation introduced blockchain technology to comprehensively renovate the tourism market, and conducted cluster analysis on tourism shopping, travel agencies, scenic spots, airlines and other websites through the online transaction supervision platform, so as to effectively standardize the order of the tourism market. This mainly involves distributed storage to ensure the safe transmission and access of data between local regulatory authorities, so as to realize the consistent storage of data without tampering<sup>[9]</sup>; secondly, blockchain helps to weaken or even eliminate the market power of intermediaries such as online travel agency (OTA) and global distribution system (GDS)<sup>[10]</sup>, promote the decentralization of tourism industry, reduce intermediate links,

reduce transaction costs and improve industrial operation efficiency. However, decentralization can be divided into full decentralization, semi-decentralization and centralization of several important nodes. When blockchain is applied to tourism, what kind of decentralization scheme should be adopted in different fields and how to deal with the relationship between blockchain technology and existing systems, especially the relatively stable midstream channel providers in tourism, need to be further studied and tested in practice. It is generally believed that slow substitution partial substitution and long-term coexistence will be the mainstream of tourism information ecology in the future.

Finally, “blockchain + smart tourism” is conducive to cultivating a new direction of tourism development and providing new opportunities for the development and transformation of tourism. First, the decentralization of blockchain tends to place tourism suppliers and tourists on the same application layer, which is conducive to suppliers’ direct sensing of the market, responding to the needs of tourists, encouraging and stimulating entrepreneurship and innovation, and promoting the generation of new tourism formats and new products; second, we can take advantage of the non-tamperable, traceable, open and transparent attributes of blockchain information and the support of smart contracts to establish a new integrity mechanism, realize the trusted circulation of value, lay a new credit foundation for the tourism industry, and solve the problems of falsification of tourism comment data, oversold products (air tickets, accommodation products, etc.), unreasonable low-cost tourism, opaque and asymmetric information, breach of trust and contract, fake and shoddy tourism commodities (cultural and creative products, handicrafts, local specialties, etc.) tourist information leakage and other problems in the construction of tourism integrity system; third, blockchain helps to create a new ecosystem of global tourism and realize the “one chain Tour” of global tourism demonstration area. For example, Hainan Province is promoting the construction of destination tourism consumption

points based on blockchain technology to solve the problems of low service integration level and high cost of obtaining customers in various industries of tourism destinations.

#### **4. “Blockchain +” enables the direction and task field of high-quality development of smart tourism**

In November 2020, the Ministry of Culture and Tourism, together with ten departments like National Development and Reform Commission, Ministry of Education, and Ministry of Industry and Information Technology, jointly issued *Opinions on deepening the “Internet plus tourism” to promote the development of high quality tourism* (issued by Ministry Of Culture and Tourism [2020] NO.81). The opinions, in addition to the continued emphasis on the Internet as an important platform for sharing tourism elements, also proposed that the application of information technology revolution such as block chains should be promoted. We should further promote digitalization, networking and intelligent transformation and upgrading of tourism, foster new modes of development and promote the transformation of quality, efficiency and power of tourism development. This marks the vision of development smart tourism empowered by technology starting to surpass “Internet plus” and moving towards integrated application of block chain technology. At the local level, Guangxi, Guizhou and Yunnan have successively written “blockchain + smart tourism” into the “guidance”, “planning”, “action plan” and other policy documents on accelerating the application of blockchain technology and industrial development, so as to promote the integration of blockchain technology with government management, enterprise operation, tourist demand and other tourism links, improve cultural and tourism services, and finally create a transparent global tourism ecology

with fair and convenient honest and transparent environment. For example, Guangxi regards “improving cultural and tourism services” as one of the four main tasks of “promoting the deep integration of blockchain and real economy”; Guizhou lists “blockchain + smart tourism” as one of the eight projects for the integration and application of blockchain and real economy; Yunnan proposes to promote the integration of blockchain technology and smart tourism, and take smart tourism as an important part of helping to build a world-class healthy life destination; Shanxi Province lists the field of culture and tourism as one of the four industry demonstration application fields of blockchain; Hunan Province included “building a blockchain cultural tourism platform” in the blockchain enabled digital culture innovation and development project; Ji’an City proposes to focus on building blockchain pilot application scenarios in five fields, including smart culture and tourism.

Through the analysis of the relevant contents of smart tourism in the special policy documents of blockchain issued by seven regions in China, the research summarizes the current policy orientation and main task areas to promote the in-depth integration of blockchain technology and smart tourism (**Table 2**), which actually points out the direction for the development of smart tourism in the “14<sup>th</sup> five-year plan” and even in the future, that is, to effectively integrate global resources based on blockchain technology, optimize the whole process service and management, build a new consumption model and credit ecology, and open up the “last mile” of smart tourism. Provide tourists with authentic and credible information resources and personalized and accurate cultural tourism services. Realize cross regional, cross departmental and cross industry data collection. Improve the blacklist and punishment mechanism for dishonesty of tourists and enterprises.

**Table 2.** Main task areas of the high-quality development of smart tourism enabled by “blockchain +”

<b>Guide</b>	<b>Task</b>	<b>Target</b>
Building a blockchain tourism platform	(1) Build a domestic and cross-border tourism big data platform supported by blockchain technology. (2) Use blockchain to optimize smart tourism one-stop service platform and comprehensive tourism management platform.	Realize cross regional, cross departmental and cross industry data collection, mining, sharing and fusion applications; build tourism chain
Consensus building mechanism	(1) Establish a consensus mechanism including government, enterprises, tourists and other nodes. (2) Users, platforms and service providers participate and govern together.	
Build a blockchain credit management system	(1) Build a credible credit scoring system, form a unified tourist and enterprise credit score management system for destinations, and promote tourism consumption blockchain scores. (2) Improve the blacklist and punishment mechanism for dishonesty of tourists and enterprises.	Provide tourists with authentic and credible information resources and personalized and accurate cultural tourism services
Application field expansion	(1) Inns, hotels, home stay, scenic spots, museums, transportation, culture and entertainment, shopping and consumption, etc. (2) Food, housing, transportation, travel, shopping and entertainment.  Distribution channel management, hotel inventory management, settlement, fraud supervision, misconduct warning, service tracking and evaluation, “blockchain + tourism finance: (including consumer finance and supply chain finance), tourism insurance, product traceability, copyright deposit, tourist identity credit card, luggage tracking, mortgage free car rental, trace back the process of tourism consumption, blockchain electronic invoice, etc.	Integration of blockchain technology with enterprise operation, tourist demand and other tourism links
Enrich application scenarios		Form an open, transparent, safe and reliable integrated application and build a new consumption model

## 5. Main measures of the high-quality development of smart tourism enabled by “blockchain +”

### 5.1. Top level design: Accelerate the research, formulation and introduction of relevant policy implementation plans

Digitalization and intellectualization are one of the most distinctive features of contemporary tourism and the key to the evolution and high-quality development of tourism industry. Seizing the opportunities of blockchain technology integration, function expansion and industrial segmentation, guided by promoting the deep integration of blockchain and smart tourism and improving tourism services, aiming at building tourism into a demonstration industry of blockchain application, combined with high-quality development requirements, tourism “pain points” and local reality, deeply study the application scenarios of blockchain with methodological significance in the tourism industry (such as traceability, certificate storage, electronic title invoice, directory chain, etc.) and development basis, technical and economic constraints, potential risks, and scientifically evaluate the needs of the chain, and timely formulate and issue *the opinions on*

*deepening “blockchain + smart tourism” to promote the high-quality development of tourism, the implementation plan for the development of blockchain enabled smart tourism, the action plan for “blockchain + smart tourism” and the master plan for “blockchain + smart tourism”.*

### 5.2. Infrastructure: Build a smart tourism ecological engineering system enabled by blockchain technology

In the era of mass tourism, the operation mode of tourism industry depends on suppliers (tourism resource operators and travel agencies), channels (mainly composed of B2B platform and B2C platform), media and marketing platform (tourism UGC, tourism social platform, tourism media, etc.), support platform (payment platform, operation and maintenance management platform, tourism tools (Tourism tools include weather forecast, map, route query, vehicle service, navigation, etc.), financial services, etc.), which is a network of multi-middlemen and multi-link transaction process, and each node is centralized. Blockchain can decentralize data and resources based on distributed ledger, decentralize management based on consensus mechanism, and solve problems such as trust, authenticity verification and incentive allocation in the



process of data transmission and transaction based on point-to-point transmission and smart contract<sup>[11]</sup>. Therefore, facing the future, it is very necessary to build a smart tourism ecological engineering system supported by blockchain technology. It is reported that Yunnan Province plans to implement the “1+4+n” blockchain innovation project and build a credible digital ecosystem for global tourism based on the application scenario formed by the construction of “one mobile phone to visit Yunnan” and the growing big data of Yunnan tourism. The so-called “1+4+n” refers to the construction of a tourism public service blockchain main chain (including blockchain basic computing platform, unified blockchain digital identity and blockchain cloud service platform), the construction of four sub-chains: tourist integral blockchain, merchant integrity blockchain, industrial ecological blockchain and financial service blockchain, and the deployment and implementation of N blockchain innovation scene applications in stages. Among them, the tourist service blockchain includes applications such as tourist consumption points platform and tourist credit file, the merchant integrity blockchain includes applications such as integrity code, return platform and complaint platform, and the industrial ecological blockchain includes applications such as tourism data directory chain, intangible cultural heritage art trading platform, tourism commodity traceability, e-ticket and e-contract, financial services blockchain includes tourism supply chain financial services and tourism consumption financial services.

### **5.3. First try: Build a blockchain tourism credit management system to solve the market pain points**

To promote the blockchain, we should first try to improve the order of the tourism market, build the integrity system of destination tourism, and supervise the comprehensive tourism service market based on big data, so as to promote the innovation of business model and form demonstration applications by solving the market pain points. Firstly, apply the decentralized technology

of blockchain (de-intermediary and de-intermediary agents) to solve the “pain points” of tourism information asymmetry, high transaction costs, shrinking content of tourism products and services, over-booking of air tickets and hotel products, shopping tourism and other industries. Secondly, apply the tamper ability of blockchain and retroactive deposit technology to solve the “pain points” of bad currency expelling good currency and tourism commodity counterfeiting and shoddy caused by false comments on online tourism platforms, so as to create a good industrial competition ecology and self-discipline mechanism. Thirdly, based on the high transparency of blockchain technology and the elimination of trust dependence, innovate the governance mode of tourism market, realize the fairness and efficiency of comprehensive tourism law enforcement process through the blockchain platform, and solve the “pain points” of industries such as false orders, yin-yang contracts, implicit consumption, cheating and ripping off customers, and big data discriminatory pricing. In addition, we can also evaluate the credit rating of tourism enterprises based on real comments and big data, and optimize the record system of tourism uncivilized behavior.

### **5.4. Key applications: Promote tourism consumption points and build a global tourism chain**

It is suggested to steadily promote the construction of destination tourism consumption points based on blockchain technology, realize the exchange and mutual exchange of consumption points of different merchants in the fields of transportation, hotel accommodation, catering, shopping, scenic spots, tourist resorts, culture and entertainment, medical health, research and learning, and help enterprises in all links of the tourism industry realize user sharing, marketing promotion and service interaction, so as to improve user stickiness, reduce the cost of getting customers, and improve the level of service integration broaden the consumer market, promote tourism consumption, and finally build a global tourism chain to realize “a chain

tour of destination”. In addition, according to the long tail theory, as long as the storage and circulation channels of products are large enough, the market share shared by products with low demand or poor sales can be equal to or even greater than that occupied by a few hot selling products, that is, niche markets can gather energy to produce energy comparable to mainstream markets<sup>[12]</sup>. Blockchain technology has the characteristics of distributed architecture, point-to-point transmission and tamper free. Therefore, it has great potential to promote the innovation of tourism products and formats by tapping market segments and responding to the needs of the long tail, so as to promote the formation of new consumption hotspots and the development of sharing economy. Finally, in addition to global co-creation, the promotion of tourism consumption blockchain points also helps to realize national sharing. The self-consistency of blockchain is reflected in the tourism industry, that is, tourists may not only have one identity, but also be tour guides or managers. Each block in the blockchain records the tourism information of each region. By connecting each region through the blockchain, local characteristic tourism and service information can be exchanged with each other. Interested residents everywhere can participate in tourist reception and management. Tourists can most directly enjoy the local characteristic experience, and local residents can benefit from the service<sup>[13]</sup>. However, by actively promoting the tourism consumption points plan and expanding the new scenes and experiences of integrated service consumption with smart tourism as the core, it should still be carried out on the premise of scientifically evaluating the necessity, safety and efficiency of relevant industries, fields, data, projects, products and personnel.

In summary, the tremendous forces for change implied in the block chain technology and its continuous fermentation in the application fields are constantly promoting the development of intelligent tourism from Version 1.0 driven by Internet plus to Version 2 driven by “blockchain +”. “Blockchain + smart tourism” is conducive to improving the new

efficiency of smart tourism public service platform, guiding the innovation of tourism public service mode, giving new connotation to the development of smart tourism, activating new driving force of tourism development, cultivating new direction of tourism development and providing new opportunities for the development and transformation of tourism. It will eventually become one of the important fields, key driving forces and main means to promote the high-quality development of tourism. To this end, all localities responded positively by formulating policies and action plans on accelerating the application of blockchain technology and the development of smart tourism, planning to establish a multi-party consensus mechanism, build a blockchain tourism platform and build a blockchain tourism credit management system, so as to effectively integrate global resources, optimize the whole process service and management and build a new consumption model. Facing this new field and new task, we must take deepening the application of blockchain in tourism as the main line, improve the contribution rate of high-tech enabling the construction of modern tourism culture industry system and promote the high-quality development of tourism by strengthening top-level design, building “blockchain + smart tourism” ecological engineering system, building tourism credit management system and building intelligent global tourism chain.

## Conflict of interest

The authors declare no conflict of interest.

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