

Strategies for Promoting the Digital Transformation of the Cultural and Tourism Industry through Industry-Academia Integration

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Abstract: Industry-Academia Integration closely aligns academic research with industrial demands, leveraging deep collaboration between industry and universities to drive economic development and social progress. This paper takes Industry-University-Research collaboration as its starting point. It begins by analyzing the historical context of the digital transformation in the cultural and tourism industry. Subsequently, based on the current development status of Industry-Academia Integration, it examines the challenges faced in applying this model to the cultural and tourism sector. Building on the opportunities presented by the current wave of industrial digital transformation, the paper proposes countermeasures. These strategies include: establishing communication platforms to enhance the alignment of supply and demand between industry and academia; deepening strategic cooperation models to intensify collaboration; and improving personnel exchange mechanisms to optimize talent cultivation models. By increasing the promotion of new digital infrastructure in cultural tourism, these measures aim to foster the integration of production, education, and research, thereby accelerating the digital transformation of the cultural and tourism industry.

1. Introduction

In the process of digitization of the cultural tourism industry, the integration of industry and university has gradually become a new transformation growth point, which plays an important role in promoting the creative transformation and innovative development of the cultural tourism industry. On July 16, 2021, the General Office of the National Development and Reform Commission and the General Office of the Ministry of Education jointly issued the Notice on Printing and Distributing the List of Pilot Cities for Industry-Education Integration of Enterprises^[1], announcing the list of 21 national Industry-education integration pilot cities and 63 national Industry-education integration enterprises. The introduction of high-quality talents, access to high-level resources of universities and other forms of industry-university integration have created opportunities for the digital transformation of the cultural and tourism industry, and expanded the possibility of the digital transformation of the tourism industry under the cooperation mechanism between the cultural and tourism industry and universities. However, it can not be ignored that the integration of industry and university to promote the digital transformation of cultural and tourism industry still faces challenges such as single form of industry-university-research cooperation and insufficient integration of cultural and tourism industry and universities. Therefore, to analyze the high-quality development of cultural tourism, it is urgent to explore the practical strategy of industry-university integration to promote the digital transformation of cultural tourism industry.

2. Analysis of the Current State of Digitalization and Industry-Academia Integration in the Cultural and Tourism Industry

With the continuous development of digitization of the cultural and tourism industry, the industry-

university-research model has penetrated into the development of the industry. The increasingly close interaction between the industry and academia provides a realistic basis for exploring the strategy of promoting the digital transformation of the cultural and tourism industry through the integration of industry and academia.

2.1. The Development Status of Digital Management in Cultural and Tourism Attractions Driven by Industry-Academia Integration

In recent years, with the rapid development of digital technology and the transformation and upgrading of cultural tourism industry, cultural tourism scenic spots have gradually promoted digital management. The integration of industry and study has penetrated scientific research technology into the core of cultural tourism organization and spread to external scenic spots, playing an important role in promoting digital management of cultural tourism scenic spots. The integration of production and study accelerates technological innovation, and technological empowerment improves the management efficiency of scenic spots. Many university research institutions have cooperated with scenic spots to apply cutting-edge technologies such as artificial intelligence, big data and cloud technology to scenic spot management, and improve the internal management efficiency and service quality of the cultural and tourism industry by developing systems such as intelligent ticketing, passenger flow information monitoring and intelligent navigation. For example, Peking University and the Palace Museum in-depth cooperation, through the sharing of resources, the use of big data to analyze tourist behavior, and constantly optimize tourist routes and exhibition hall design. The integration of industry and university has continuously deepened the form of cooperation, and the innovation of management mode has promoted the renewal and upgrading of scenic spots. Universities and scenic spots cooperate to develop new cultural and creative products and immersive experience projects, enrich the formats of scenic spots, and optimize cultural and tourism industry services. Guangdong Vocational College of Arts and Arts has established a non-genetic Chenghe Cultural tourism practice base, and has enriched the supply of cultural tourism products in the Greater Bay Area by relying on intangible cultural heritage projects such as Lingnan Guqin. The integration of production and education trains high-quality management talents who are more suitable for the needs of the tourism industry, and the talent training provides professional talents for the scenic spots. To meet the needs of industrial development, colleges and universities have set up related majors, such as tourism management, digital media technology, etc., to cultivate high-quality composite management talents with digital skills. Zhejiang Tourism Vocational College makes full use of the school-enterprise cooperation mode and cooperates with Wuzhen Tourism Company to build a "smart tourism Industry College" to train high-quality high-level talents and provide fresh blood for the management of scenic spots.

2.2. Advancing Digital Communication in Cultural Tourism through Industry-University Collaboration

As a new opportunity for the transformation and upgrading of various fields of society, the integration of industry and university has increasingly become an important force to promote the digital communication of cultural and tourism industry. The integration of industry and education promotes the development and application of technology and improves the efficiency of communication. The combination of industry, university and research will apply big data, virtual reality (VR), augmented reality (AR) and other technologies to the digital communication of cultural travel, and also cooperate to develop intelligent recommendation and immersive experience to improve communication efficiency. The integration of production and learning promotes the creation and dissemination of content and enriches the content of communication. Colleges and universities cooperate with cultural tourism enterprises to jointly explore cultural connotations, create high-quality content, and enhance the influence of cultural tourism brands by creating documentaries, short videos, animation games, etc. Peking University cooperated with the Dunhuang Academy to produce documentaries on Dunhuang culture, so that Dunhuang cultural innovation was "out of the circle" and widely disseminated at home and abroad, thus attracting many customers to experience Dunhuang culture and improving the effectiveness of Dunhuang culture brand. The integration of

industry and education promotes the improvement and expansion of communication roads and enriches the forms and means of communication. Through the integration of industry and education, cultural and tourism enterprises can fully understand the current form of digital communication according to the existing market information and data of digital communication in colleges and universities, keep up with market changes, timely obtain the development direction of digital communication technology, and seek a "prophetic" digital communication road for their own innovation and development.

2.3. Advancing the Digital Preservation of Cultural Tourism Resources through Industry-University Collaboration

In May 2022, the General Office of the CPC Central Committee and The General Office of the State Council jointly issued the Opinions on Promoting the Implementation of the National Cultural Digitization Strategy, which clearly proposed the establishment of a national cultural big data system to promote the panorama of Chinese culture and the sharing of the digital achievements of Chinese culture by all ^[2]. The integration of industry and education is at the forefront of the implementation of the national strategy, and the digital protection of cultural and tourism resources is continuously promoted in practice and application. The integration of industry and science promotes the development and application of technology, and innovates and protects technology. High and new technologies such as 3D scanning and virtual reality are applied to the digital collection, storage and display of cultural and tourism resources such as cultural relics, historic buildings and intangible cultural heritage, which greatly improves the protection level. For example, the "digital Forbidden City" and Dunhuang digital murals use 3D scanning, virtual reality and other technologies to digitally collect cultural and tourism resources, and provide technical support for cultural relics protection. The integration of industry and education has led to the formulation and promotion of standards and standardized the protection process. University research institutions cooperate with cultural tourism units to participate in the formulation of relevant standards for digital protection of cultural tourism resources. For example, East China Normal University participates in the Yangtze River Delta regional cultural and tourism integration standard, which further standardizes data collection, storage, processing, display and dissemination, and ensures the scientific and normative work of digital protection. Enterprises have also entered the promotion and application of standards, greatly promoting the implementation of digital protection standards for cultural and tourism resources, and improving the overall level of the industry. The integration of industry, university and research resources has improved the protection mechanism. As a new breakthrough, the integration of industry and study provides a new idea for the digital protection of cultural and tourism resources. Through the integration of academic research and cultural tourism market demand, effectively improve the protection mechanism of cultural tourism resources, and innovate digital protection forms of cultural tourism resources. The School of Cultural Industry and Tourism of Xiamen University of Technology cooperates with rural cultural and tourism departments across the country to creatively explore and protect local historical, cultural and ecological tourism resources, providing new ideas for improving the protection mechanism of cultural and tourism.

3. Challenges in Promoting the Digital Transformation of Cultural Tourism through Industry-Academia Collaboration

In the process of digital transformation of cultural and tourism industry, the integration of industry and university has become a new driving force of transformation, which is an irreversible trend. However, it cannot be ignored that the path of cross-border cooperation between industry and academia is not smooth in the process of digital transformation of the cultural and tourism industry. The imbalance of supply and demand, the lack of cooperation mechanism perfection and the lack of multi-disciplinary talents in digital culture and tourism are all challenges that the integration of industry and learning needs to face in the process of promoting the digital transformation of cultural and tourism industry.

3.1. An Imbalance between Supply and Demand Characterized by an Insufficient Level of Matching Precision

In the cross-border cooperation between industry and academia, there is an inevitable relationship between demand and supply, which is mainly reflected in the unclear demand of enterprises, the supply of colleges and universities is divorced from reality, and the information is asymmetrical. From the perspective of universities, universities and scientific research institutions tend to start with traditional research methods, and emphasize theoretical innovation and academic research, which is out of touch with the actual needs of cultural and tourism enterprises. At the same time, due to the uncontrollable factors such as distance and time, it is difficult for the academic circle to carry out field examination and postgraduate investigation on the cultural tourism industry, so the academic circle lacks a deep understanding of the practical problems of the cultural tourism industry, so the research results cannot be directly applied to the cultural tourism industry. From the perspective of cultural tourism enterprises, in the rapidly developing digital era, cultural tourism enterprises have diverse and complex demands for digital transformation. However, many enterprises are unable to clearly express specific needs, and their personalized needs are vague, which makes it difficult for universities and scientific research institutions to obtain corresponding information and thus fail to provide targeted solutions. In short, cross-border cooperation between cultural tourism enterprises and universities lacks effective communication platforms and efficient communication mechanisms, it is difficult to accurately match the scientific research resources of universities with the actual needs of cultural tourism enterprises, the problem of information asymmetry is prominent, it is difficult for both sides to understand each other's needs and capabilities, and the problem of resource waste and low cooperation efficiency is prominent.

3.2. Superficial, Industry-university Partnerships Characterized by Inadequate Institutional Development

As far as the current development status of the cultural tourism industry is concerned, the cooperation degree between most universities and cultural tourism enterprises is relatively shallow, and most cooperation forms do not have their own innovation and characteristics. First of all, the understanding is not comprehensive, most of the school-enterprise cooperation projects "integration of industry and learning" surface concept, the depth of its deep meaning is not enough. Some industry-university projects lack sufficient understanding and understanding of the relevant policies of the state on promoting industry-university integration, and their understanding is partial. In the process of implementation, the regulation and control of details are insufficient, which cannot fully tap the inherent potential of digital technology, nor can it systematically bring into play the strong driving force of the integration of production and learning to promote the digital transformation of culture and tourism. Secondly, the level of cooperation is shallow. Many industry-university cooperation is limited to short-term technical consultation, training or single project cooperation, lacking long-term sustainable strategic planning and goals. The forms of cooperation mostly stay in signing agreements or symbolic activities, which fail to deeply solve the core problems in the digital transformation of the cultural and tourism industry. After the end of the cooperation project, the two sides often neglect the follow-up work, which makes it difficult to continue to apply and promote the cooperation results. Second, the cooperation mechanism between the two sides is not perfect. In the cooperation, universities and enterprises lack clear written regulations on the ownership of intellectual property rights and the distribution of benefits, which is easy to cause interest disputes. Although the digital development has entered a stage of rapid development, there are still high uncertainties and risks in the digital transformation of the cultural and tourism industry, and the lack of effective risk sharing mechanism in industry-university cooperation makes it difficult for both parties to define and share project risks, which naturally leads to the lack of enthusiasm and initiative of both industry and university and low cooperation efficiency, which affects the process of digital transformation of the cultural and tourism industry.

3.3. A lack of Interdisciplinary Talent in Digital Cultural Tourism Restricting the Endogenous Drive for Transformation

In the process of digital development of the cultural and tourism industry, there are not only requirements for the access of science and technology, but also high requirements for the introduction of high-level and high-quality talents. However, according to the current practice of promoting the digital transformation of the cultural and tourism industry through the integration of industry and university, there is still a shortage of hybrid talents in digital cultural and tourism, and the additional transformation power of talents is also obviously insufficient^[3]. In the aspect of colleges and universities, it is mainly reflected in the disconnection between talent training and practice. The integration of industry and university has shortcomings in personnel training, and the personnel exchange mechanism is not perfect. Although the model of industry-university integration has been practiced in the digital transformation of cultural and tourism industry, the cooperation between universities and cultural and tourism enterprises in talent training is mostly superficial, mostly short-term internship or training. College teachers and students lack the opportunity to deepen the practice of enterprises, and the technical personnel of enterprises are less involved in the scientific research activities of colleges and universities. The personnel exchange mechanism is not perfect, and the lack of a unified exchange platform is difficult to integrate the two sides. Talents trained by colleges and universities often have only a single field of knowledge, lack a comprehensive understanding of cultural tourism industry and digital technology, and the number of high-quality talents involved in all aspects and levels is very small. College education emphasizes theory, and students lack practical experience and opportunities, so it is difficult to meet the actual needs of adapting to the digital transformation of the cultural and tourism industry. And the enterprise also lacks the corresponding talent sustainable growth mechanism. Cultural tourism enterprises do not pay enough attention to the introduction of interdisciplinary talents. Cultural tourism enterprises need interdisciplinary talents who are familiar with both digital technology and cultural tourism industry, but they lack a systematic training mechanism for digital talents. Enterprises have insufficient investment in the introduction and training of digital talents, and lack of systematic and perfect internal management mechanism for high-quality talents connecting with universities, which is easy to cause talent shortage and outflow, resulting in slow transformation process.

4. Strategies for the Digital Transformation and Upgrading of the Cultural Tourism Industry via Industry-University Collaboration

In the process of digital transformation of cultural and tourism industry promoted by the integration of industry and university, there exist some problems such as the imbalance of supply and demand, the relatively shallow cooperation between industry and university, and the lack of complex talents in digital cultural and tourism. Ensuring the integration of industry and university effectively promotes the digital transformation and upgrading of the cultural and tourism industry, and realizes the high-quality development of the cultural and tourism industry is a major issue urgently needed to be solved by the academic and industrial circles.

4.1. Enhancing Supply-demand Matching between Industry and Academia by Building Efficient Communication Platforms

An effective communication platform can accurately connect the available resources of colleges and universities with the actual needs of cultural and tourism enterprises, reduce the conflicts of interest between industry and university, and create a good environment for the integration of industry and university. Universities can release disciplinary advantages, scientific research results, talent information and laboratory resources through the platform. In the process of exploring how to improve the communication efficiency between cultural tourism enterprises and universities, Sun Yat-sen University and Chimelong Group jointly built the "Chimelong - Zhongda Research Institute" to provide the two sides with a field platform for information exchange and resource sharing, and provide convenience for effectively carrying out research on tourism big data and smart scenic spots.

Cultural and tourism enterprises also release technical requirements, talent needs, cooperation projects, market data and other information. Tencent actively cooperated with Tsinghua University to establish the "Tsinghua-Tencent Interactive Media Design and Technology Center" to effectively break down information barriers, jointly research virtual reality, augmented reality and other technologies, and apply the results to cultural travel experience. All in all, cultural tourism enterprises and universities can break the departmental, regional and industrial restrictions, strengthen the synergy between universities and cultural tourism enterprises, and promote innovation collaboration, production capacity sharing, supply chain interoperability and value chain collaboration combining online and offline by building platforms such as cultural tourism digital R&D centers, laboratories and research institutes ^[4]. Using the platform to share information provides a channel for efficient communication between industry and university, facilitates joint research, and closely links the actual needs of both sides, effectively docking the supply of university resources with the actual needs of enterprises, accurately focusing on industrial pain points and solving practical problems, and improves the depth of integration between industry and university.

4.2. Deepening Strategic Cooperation Models to Enhance Collaboration Depth

The integration of industry and learning promotes the close cooperation between academia and industry in the way of collaborative education between schools and enterprises, and also provides impetus for the generation of new cooperation models, creating more opportunities for the digital transformation of the cultural and tourism industry. But the forms of school-enterprise cooperation are mostly superficial. Problems such as insufficient depth of cooperation and single mode of cooperation have posed challenges in the process of industry-university integration to promote the digital transformation of the cultural and tourism industry. The integration of industry and university is not a simple superposition of industry. Technological progress and industrial change promote the continuous transformation of industry-university cooperation mode, making it effectively adapt to the development needs of The Times and market changes. In response to the development and changes of The Times, colleges and universities should take the initiative to explore a new model of industry-university integration by using existing resources. Beijing Aeronautical University and COMAC jointly build a "big aircraft class", colleges and universities set up relevant courses to train aviation professionals, and enterprises follow up college courses to provide practical opportunities. The cultural and tourism industry should actively learn from the new forms of industry-university integration in various fields of society, seize the opportunity to cooperate with universities, make full use of high-level resources of universities, and jointly explore how to deepen the strategic cooperation model of industry and university, and effectively promote the integration of industry, university and research. Alibaba has actively cooperated with Zhejiang University to build the "Zhejiang University-Alibaba Frontier Technology Joint Research Center" to carry out cooperation in artificial intelligence, big data and other fields to promote technology transformation. School-enterprise cooperation should expand the integration of industry and university on the existing practice model, improve the depth of industry-university cooperation, so as to jointly develop more intelligent and personalized cultural and tourism products and apply efficient scientific research results to actual operations, and promote technological innovation and model upgrading of the cultural and tourism industry. At the same time, it is necessary to connect with its own development status and adhere to innovation, and walk out a path of industry-university integration with its own characteristics.

4.3. Optimizing the Talent Cultivation Model by Improving the Personnel Exchange Mechanism between Industry and Academia

The key to school-enterprise cooperation is to cultivate professional skills that are highly matched to the needs of enterprises ^[5]. School-enterprise cooperation creates opportunities for students to participate in practical projects, and provides high-quality talents for the cultural and tourism industry while improving their practical ability. Two-way cooperation cannot be separated from a sound industry-university personnel exchange mechanism. Colleges and universities can set up courses related to digital cultural tourism according to the needs of cultural tourism industry, and cultivate compound talents who understand both culture and technology. In addition to the curriculum, we can

also train high-quality compound talents of "digital cultural tourism" through practice bases and joint training, and establish a talent training system for teaching, learning, research and use. Cultural tourism enterprises should also actively introduce high-level digital talents, improve the overall strength of the cultural tourism team, adhere to the purpose of "complementary advantages, coordinated development and mutual benefit", and pay attention to the application-oriented development goal ^[6]. Tencent and Shenzhen University jointly build the "Tencent Cloud Artificial Intelligence Academy", the enterprise provides big data and artificial intelligence and other technologies, the university is responsible for scientific research and talent training, and the two sides share results and coordinated development. Therefore, enterprises should actively seek two-way cooperation with universities and accelerate the overall integration of production, study and research. Improving the industry-university talent exchange mechanism provides more young and dynamic fresh blood for cultural tourism enterprises, and the optimization of talent training mode provides a broader development field for the innovation of cultural tourism industry, and also speeds up the practice and application of innovative technologies ^[7]. By optimizing the talent training mode, the human capital level of the entire industry can be improved ^[8], so as to accelerate the digital transformation of the cultural and tourism industry, enhance the competitiveness of the industry and the ability of sustainable development.

4.4. Scaling up the Development of New Digital Infrastructure in Cultural Tourism to Sustain Innovation within Industry-academia Collaboration

Digital cultural tourism integrates digital technology into the cultural tourism industry, and takes the effective use of digital technology as an important driving force for the efficiency improvement, quality improvement and structural optimization of the cultural tourism industry. At present, there are some problems in the cultural and tourism industry, such as the imbalance of infrastructure construction in different regions and the great difference in digitization level. Technical differences hinder the communication and exchange between colleges and industries in the process of industry-university integration. The scientific research achievements of colleges and universities lack technical support and are difficult to be applied into practice and converted into productive forces in time, which is not conducive to the smooth implementation of industry-university integration and the digital transformation of the cultural and tourism industry. Therefore, the cultural tourism industry should attach importance to the construction of digital technology, infiltrate digital technology into the internal and external aspects of cultural tourism, encourage cultural tourism scenic spots to build intelligent construction of scenic spots, actively introduce and embed digital technology, create more immersive, interactive and intelligent cultural tourism new products, new scenes and new Spaces, and strive to activate and promote new business forms of cultural tourism ^[9]. At the same time, the cultural and tourism industry should increase financial support for technological innovation, constantly strengthen technological innovation and industrial ecological innovation, realize its own technological reform and industrial upgrading with the support of big data and intelligent technology, gradually form a new economy of digital cultural and tourism, lay the technical groundwork for the access of scientific research achievements in universities, and promote the formation of a large cycle of integration of production, university and research.

5. Conclusion

The continuous advancement of the digital era provides technical support for the innovation form of industry-university integration, and the continuous improvement of the model of industry-university integration accelerates the process of digital transformation and upgrading of the cultural and tourism industry. The introduction of the model of the integration of production and study not only makes the cultural tourism enterprises "enter" the school, but also draws the school "into" the cultural tourism. To deepen and expand the model of industry-university integration, we need to learn from the successful experience and start from the actual situation of the cultural tourism industry to find a road of industry-university-research integration with the characteristics of the cultural tourism industry. The continuous innovation of the industry-university integration model provides more and

more high-level resources for the digital transformation and development of the cultural and tourism industry, and will gradually become an important driving force for the digitization of cultural and tourism. The two-way "go" cooperation form opens up a more promising road for the digital transformation of the cultural tourism industry, and escorts the digital transformation and high-quality development of the cultural tourism industry.

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