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Article

Digital Transformation of the Shaolin Cultural Industry: Pathways and Challenges for Achieving Sustainable Development

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Abstract: In the context of the rapid advancement of global digitalization, traditional cultural industries are facing substantial transformations and challenges. This paper explores the digital transformation of the Shaolin cultural industry, analyzing its opportunities and challenges in achieving sustainable development. As a significant component of traditional Chinese culture, Shaolin culture embodies profound historical and cultural values; however, the path to transmission and innovation is not smooth in the modernization process. Employing grounded theory methodology combined with NVivo qualitative analysis and SWOT analysis, the study thoroughly examines the key issues faced by the Shaolin cultural industry during its digitalization process and potential solutions. The findings indicate that digitalization not only serves as an essential avenue for the transformation of the Shaolin cultural industry in terms of cultural transmission and innovation but also acts as a powerful driver for local economic and social development, providing theoretical support for the sustainable development of Shaolin culture.

Keywords: Shaolin culture; cultural industry; digital transformation; sustainable development; globalization

1. Introduction

1.1. Shaolin cultural industry

Shaolin culture, as an important component of China's cultural heritage, is renowned worldwide for its philosophy of "the unity of Zen and martial arts" and its rich historical background. In recent years, centred around the Songshan Shaolin Temple, an industrial cluster has emerged, becoming a key driver of regional economic growth. American scholar Michael Porter defines it as: "In a specific field, geographically proximate and interrelated enterprises and organizations are connected through commonality and complementarity [1]." In other words, an industrial cluster encompasses a series of related entities and industries, extending upward to complementary products or companies and downward to customers. The Dengfeng Shaolin cultural industry cluster consists of interconnected yet independent small and medium-sized enterprises that closely collaborate while maintaining both competitive and complementary relationships within the Dengfeng Shaolin Temple region. These enterprises aim to leverage the brand influence of Dengfeng Shaolin martial arts to expand their scale, achieve resource sharing, and share risks, thereby constructing an economic entity characterized by Shaolin culture. With the rapid development of the martial arts industry, a complete industrial chain has formed that includes martial arts competitions, performances, training, equipment, as well as books and audiovisual products. These industries exhibit cooperation and competition, relying on the market of the Shaolin cultural industry to achieve their respective economic objectives.

The Shaolin cultural industry has developed into a relatively complete industrial chain; from the perspective of sustainable development, its growth requires a balance among the preservation of

cultural heritage, environmental protection, and social responsibility. For example, the city of Zhengzhou in Henan Province, China, has introduced the "Zhengzhou Martial Arts Industry Development Plan (2021-2025)[2]," aiming to promote high-quality development of the martial arts industry, enhance martial arts culture, meet the fitness needs of the public, and contribute to economic and social development. Furthermore, with the rapid advancement of globalization and information technology, Shaolin culture is gradually reaching a global audience, becoming an important window for China's cultural dissemination abroad.

In the digital age, the Shaolin cultural industry faces opportunities and challenges in its digital transformation. As emphasized by TRT World, Shaolin Kung Fu, as a traditional art form, possesses unique cultural value that should not be underestimated. To maintain its relevance in the digital era, Shaolin culture must adapt and innovate to attract broader attention [3]. Digitalization not only drives industrial innovation but also enhances operational efficiency and market competitiveness through technological applications. Moreover, leveraging digital technology to create cultural content can attract greater participation and interaction, particularly among younger demographics. For example, "Kung Fu Chain" is a digital interactive platform that leverages advanced AI technologies to provide a wide range of services for martial arts enthusiasts worldwide. These include learning, practice, assessment, and competition. This platform not only modernizes how Shaolin culture is shared but also creates opportunities for collaborative learning and exchanges among martial arts practitioners, thereby boosting its global influence. In summary, as the Shaolin cultural industry undergoes digital transformation to seek economic benefits, it must commit to sustainable development principles, emphasizing the protection and transmission of cultural heritage to enhance cultural and economic value simultaneously.

1.2. Dengfeng Tagou Martial Arts School

As a leader in Chinese martial arts education, the Tagou Martial Arts School is highly regarded in the Dengfeng region. The school is known for its large scale and profound impact, distinguished by its comprehensive educational system, exceptional teaching quality, and extensive social effects. The school offers a complete educational service from kindergarten to higher education, establishing a comprehensive educational model that integrates martial arts, academics, and career planning. Moreover, the market economy has propelled martial arts into various fields. These include politics, education, economics, culture, and religion, facilitating its industrialization, commercialization, and socialization. Social martial arts emphasize entertainment, fitness, disease prevention, and talent cultivation, impacting various aspects of society, including martial arts festivals, folk martial arts, community martial arts programs, martial arts performances, martial arts tourism, equipment manufacturing, and facility services.

Shaolin Temple, as a renowned martial arts sanctuary, possesses unique resources and brand advantages. The release of the film "Shaolin Temple" popularized Shaolin martial arts worldwide, attracting an increasing number of individuals to the Tagou Martial Arts School for training. The growth in martial arts practitioners has fostered the development of Shaolin martial arts schools and training halls, driving the growth of related industries such as martial arts dining, accommodation, transportation, equipment, and audiovisual sectors, thus forming a nascent and spatially concentrated martial arts industry cluster. The primary characteristic of an industry cluster lies in the division of labour and collaboration between enterprises. Enterprises within the same industry cluster gather in a specific area, engaging in both competition and cooperation, resulting in various models of collaborative division of labour. This not only reduces average labour costs but also enhances interdependence between enterprises and the stability of local networks. Additionally, it fosters knowledge accumulation and cooperation among enterprises, contributing to local network stability and the establishment of strategic alliances. Simultaneously, it promotes both cooperation and competition among enterprises, facilitating the synergistic development of industries such as martial arts venues, schools, equipment, apparel, dining services, accommodation, and

transportation, thus forming an interdependent entity that drives the industry cluster to higher levels of development.

Under the influence of the market economy, Dengfeng's Shaolin martial arts have evolved into a comprehensive industrial cluster that integrates fitness, tourism, and leisure, blending traditional techniques with modern industries such as tourism, education, and culture. From the perspectives of tradition and modernity, the trajectory of martial arts development reflects the coexistence of traditional and contemporary models, characterized by diversity and multifaceted growth. In 1986, the Shaolin Kung Fu Performance Troupe was established, allowing Shaolin Kung Fu to emerge from the temple and travel abroad, performing worldwide and increasing awareness of Shaolin culture among a growing audience. For example, in the 2024 Chinese New Year Gala, students from the Tagou Martial Arts School presented the program "Drum and Dragon Dance," which integrates modern stage technology with traditional dragon dance performance, utilizing lighting and props to convey the festive and harmonious spirit of the New Year, enhancing the visual impact and enjoyment of the performance. Simultaneously, the program was recorded in various scenes through online micro-videos, showcasing a comprehensive digital presentation that provided audiences with a distinct viewing experience [4].

1.3. Songshan Shaolin Temple

The Shaolin Temple, recognized as the cradle of Shaolin culture, not only boasts a rich historical heritage but also embodies a distinctive philosophy that merges Zen and martial arts. By leveraging these invaluable resources, Shaolin Temple has successfully developed a diversified cultural industry system, with key components including tourism, training, and brand development. As a UNESCO World Heritage Site, Shaolin Temple attracts over one million visitors each year. These tourists are drawn by the temple's unique historical architecture, stunning natural landscapes, and captivating Shaolin Kung Fu performances, making it a prime destination for both domestic and international travelers.

In addition, Shaolin Temple has established a dedicated martial arts training center that integrates traditional martial arts techniques with Zen meditation courses, catering to the learning needs of martial arts enthusiasts and further enhancing the transmission of Shaolin culture. Moreover, the temple actively organizes overseas martial arts performances, international martial arts festivals, and various cultural exchange activities, leveraging its globally recognized brand. Through these initiatives, Shaolin Temple not only promotes its culture but also fosters cultural exchange and understanding among nations.

To further enhance the value chain of its cultural industry, Shaolin Temple has developed and marketed a diverse range of related products, including Kung Fu books, audiovisual materials, and cultural creative items. The introduction of these products not only diversifies the ways in which Shaolin culture is disseminated but also significantly amplifies its international influence, positioning it as a prominent representation of China's rich cultural heritage. Additionally, Shaolin Temple actively participates in the "Digitalization Project of Chinese Shaolin Culture," which aims to create a comprehensive digital cultural platform. This platform will integrate various digital resources to facilitate educational dissemination, academic research, and the development of cultural products, effectively linking innovation with cultural transmission in the digital age. Through these initiatives, Shaolin Temple has made substantial contributions to the protection and transmission of traditional culture while also playing a vital role in promoting cultural innovation and international exchange.

1.4. Shaolin Temple Museum

The Shaolin Temple Museum, as the core venue for the transmission of Shaolin culture, is dedicated to preserving this important cultural heritage while providing the public with an immersive experience to understand its history, martial arts, and Zen philosophy. With the rise of digital transformation in the cultural industry, digital technologies such as artificial intelligence, virtual reality, and big data are profoundly changing the preservation and dissemination of cultural

heritage. Researcher Pari [5] points out that digitalization not only aids in the protection of cultural heritage but also enhances its global accessibility, fostering exchanges between different cultures. At the same time, Navarrete and Mackenzie [6] Owen emphasize that the establishment of digital archives extends the lifecycle of cultural assets and reduces the environmental impact of physical storage and transportation. As an important component of the Shaolin cultural industry, the Shaolin Temple Museum showcases three fundamental characteristics of the cultural industry: resource dependence, innovation-driven development, and comprehensive benefits. Within the framework of sustainable development, the museum promotes the local tourism industry and the expansion of the Shaolin cultural value chain through artifact exhibitions, cultural activities, and the development of creative products, thereby creating diversified economic value. Furthermore, the museum's educational programs and international exchange activities enhance social cohesion and cultural identity, promote the integration of multiculturalism, and prioritize digital and green development to reduce resource consumption, achieving a harmonious coexistence of ecological protection and cultural dissemination.

The Shaolin Temple Museum is not only a platform for cultural transmission but also emphasizes the critical role of the cultural industry in sustainable development. By promoting the modernization and globalization of traditional culture, the museum highlights the potential of cultural institutions to integrate heritage protection with economic, social, and environmental objectives. This comprehensive effort ensures the protection, recognition, and sustainable use of cultural resources, fully demonstrating the transformative power of museums in fostering sustainable progress.

2. Literature Review and Theoretical Background

2.1. Digital Transformation in Cultural Industries

Neil Bell [7], a scholar at Harvard University, first introduced the concept of "cultural industry" in his work *The Coming of Post-Industrial Society*. With the arrival of the knowledge economy, cultural industries have gradually gained attention from governments worldwide due to their knowledge intensity, high added value, and role in optimizing industrial structure. The integration of market and culture reveals the interaction between the two: culture not only satisfies market demands for aesthetics and sophistication but also promotes cultural development. This concept liberated Germany from the constraints of traditional cultural industries, advocating for a market-driven approach to cultural development that emphasizes the public's right to cultural consumption, thereby enhancing aesthetic appreciation and alleviating the conflict between industrial mechanisms and cultural values [8].

In 1998, the UK government introduced the concept of "creative industries," encompassing various fields such as advertising, art, film, and music, which reflect the core values of cultural industries [9]. It is evident that creative industries encompass the core values of cultural industries. The Finnish Cultural Industries Council introduced the concept of "content industries" in its 1999 final report, emphasizing the integration of cultural production with advanced information technology, marking an advanced stage in the convergence of culture and information technology. Meanwhile, UNESCO defines cultural industries as a series of production, reproduction, and distribution activities of cultural products and services conducted according to industrial standards, a framework that emphasizes the commodification of labor in cultural production.

The digital transformation of cultural industries has become a significant trend in the integration of cultural economies and technological innovation. It not only reshapes the production and dissemination of cultural content but also redefines the economic, social, and cultural values of culture itself. The concept of cultural industries was first introduced by Theodor Adorno and Max Horkheimer of the Frankfurt School [10]. In their seminal work *《Dialectic of Enlightenment》*, they criticized the commodification of culture in capitalist societies, arguing that standardized production processes stripped cultural products of their independence and critical nature. While their critique

was deeply pessimistic, it illuminated the profound connection between cultural industries and economic interests, laying the foundation for subsequent studies. In the late 20th century, Throsby [11] offered a more constructive perspective with his "dual value" theory, positing that cultural products embody a balance between economic and cultural values. He emphasized that cultural industries should center on cultural content while leveraging market mechanisms to achieve economic benefits and preserve cultural heritage. This theory provides important academic support for the digital transformation of cultural industries. However, scholars such as Champion [12] caution that excessive commercialization risks diminishing the deeper meanings of culture. In the context of Shaolin culture, the digitization of Shaolin martial arts, Buddhist teachings, and traditional practices offers a unique opportunity to merge ancient traditions with modern technologies. For example, VR-based Shaolin Kung Fu training platforms or online Buddhist meditation courses can create immersive cultural experiences [13].

Digital transformation is broadly defined as the process of driving innovation and change within organizations, industries, or societies through digital technologies [14]. In cultural industries, this transformation manifests in the digitization of cultural content, diversification of dissemination channels, and enhancement of user experiences. Big data enables the analysis of user behavior to support the creation and marketing of cultural products, such as optimizing exhibition designs based on audience preferences [15]. Artificial intelligence plays a significant role in cultural heritage preservation and content generation, such as restoring ancient manuscripts or creating virtual tour guides [16]. Nevertheless, digital transformation comes with challenges. Smith and Telve [17] note that digitizing cultural industries often requires significant financial investment and specialized technical expertise, which traditional institutions may struggle to acquire. Additionally, ensuring inclusivity and respecting the cultural integrity of localized traditions remain recurring concerns [18].

Digitalization forms the core technological foundation of enterprise production and serves as a key pathway for connecting markets and meeting consumer demands [19]. Firstly, by utilizing the internet and big data technologies, enterprises can gain deeper insights into consumer needs and provide comprehensive solutions that include both products and services. Secondly, smart manufacturing drives innovation in production methods, achieving flexible manufacturing to accommodate personalized demands. Thirdly, smart products establish a service system for their entire lifecycle, enhancing service value by analyzing product data. Fourthly, internet communities and co-creation platforms encourage consumers to participate in product design and provide feedback and suggestions. The value creation through digitalization prompts the transformation of enterprise value chains into integrated industrial value chains, merging the value-added segments of manufacturing and services.

2.2. Sustainable Development

The term "sustainable development" first appeared in the 1980 document *World Conservation Strategy: Living Resource Conservation for Sustainable Development*, published by the International Union for Conservation of Nature, the United Nations Environment Programme, and the World Wildlife Fund. The document emphasizes that sustainable development must consider the three dimensions of economy, society, and ecology, focusing on the foundations of both biological and non-biological resources, as well as the short-term and long-term benefits of choices [20]. In the 1987 report *Our Common Future*, the World Commission on Environment and Development clearly stated that sustainable development should meet the needs of the present without compromising the ability of future generations to meet their own needs. In 1992, the United Nations Conference on Environment and Development adopted the Rio Declaration on Environment and Development and the Agenda 21, further affirming sustainable development as a consensus for human societal development and urban construction. China formulated the Agenda 21 for China based on its national conditions and submitted the Sustainable Development Report to the United Nations in 1997, emphasizing that the core of sustainable development lies in development, the sustainable use of resources, and a sound ecological environment. Unlike the sustainable development of general natural resources or

ecological environments, the sustainable development of cultural industries focuses on the sustainable development of cultural resources, the sustainable production of cultural products, and the sustainable expansion of cultural markets. This perspective highlights the necessity for the cultural industry to undergo shifts in concepts and behavioral norms to achieve sustainable development strategies, ensuring the long-term continuation and prosperity of cultural values.

Sustainable development is defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs [21]. This concept has gained significant traction in cultural industries, promoting practices that balance economic, social, and environmental objectives. Sustainable practices within the cultural sector, especially in frameworks like the United Nations Sustainable Development Goals (SDGs), emphasize cultural diversity, heritage preservation, and community participation [22]. In the case of the Shaolin cultural industry, sustainability emphasizes not only the preservation of its rich cultural heritage but also its ability to innovate and adapt in a rapidly changing digital landscape. Integrating digital transformation within this framework becomes imperative for promoting long-term sustainability and economic resilience [23] argue that digital transformation can reduce the carbon footprint of cultural dissemination through virtual platforms. However, they also raise concerns about the environmental costs associated with large-scale data storage and energy consumption [24]. Technologies such as virtual reality and augmented reality offer immersive cultural experiences, including virtual tours of historical sites or interactive traditional culture learning [25]. Blockchain technology provides new solutions for digital copyright protection and cultural product transactions, particularly in the realm of digital art and NFTs [26]. These technologies not only enhance the efficiency and innovation of cultural industries but also make cultural content dissemination more globalized and personalized. At the same time supporting efforts to reduce the carbon footprint of traditional cultural practices. Shaolin Kung Fu, as its most iconic symbol, can be digitally showcased through VR and motion-capture technologies, providing immersive learning experiences for global audiences [27]. Zen philosophy can expand its reach through online meditation courses and Buddhist cultural videos. Meanwhile, 3D modeling and virtualization of Shaolin Temple's architecture and artifacts not only aid in heritage preservation but also attract a worldwide audience through virtual tours. However, the digital transformation of Shaolin culture also faces challenges, such as balancing cultural authenticity with commercialization and managing the high costs associated with technological development and application.

In addition, Effective policy frameworks are critical for fostering the digital transformation and sustainability of cultural industries. Various governments and organizations have recognized the importance of supporting cultural heritage through legislation, funding, and strategic initiatives. Research shows that countries with comprehensive digital policies tend to exhibit more successful digital transformations in their cultural sectors [28][29]. In the context of the Shaolin cultural industry, understanding and leveraging these policies can be essential for overcoming challenges related to resources, technology adoption, and stakeholder engagement [30][31].

In summary, in the current research context, the impact of digital transformation on the economic development of the cultural industry has primarily been assessed by scholars. However, research regarding the effects of digital transformation on the sustainability and environmental impact of the Shaolin cultural industry remains insufficient. Although many studies have explored the factors driving the green transformation of traditional cultural industries, quantitative analyses of the specific impacts of digital technology on the transformation of the Shaolin cultural industry are largely theoretical. To address this gap, a comprehensive analytical framework was employed, and semi-structured interviews were conducted to gather insights from various stakeholders, including cultural workers, business managers, and consumers, to deeply understand their views and expectations regarding digital transformation. By utilizing the NVivo analysis tool, crucial factors integral to the digital transformation of the Shaolin cultural industry, including technology, market demand, and cultural heritage, were identified. Based on these critical factors, practical strategies and recommendations were proposed through a SWOT analysis to aid the Shaolin cultural industry in achieving sustainable development during its digital transformation. The findings

indicate that, despite learners facing challenges in accessing comprehensive content related to Shaolin culture and a scarcity of electronic translated texts, the Shaolin cultural industry can enhance resource accessibility and participation through effective digital strategies. Ultimately, this study supports the green development of the Shaolin cultural industry and offers recommendations for global climate change initiatives, emphasizing the importance of considering stakeholder needs during the digital transformation process.

3. Methodology

3.1. Interview Subjects and Sample Selection

This study employs the grounded theory research method to systematically gather and analyze data for developing a theoretical framework surrounding Shaolin martial arts practice. Interviews were conducted with 16 participants from six different countries, comprising 8 coaches, 3 cultural managers from Shaolin Temple, 3 consumers, and 2 school principals. All participants had over 16 years of experience in practicing Shaolin martial arts, which ensured that their extensive practical knowledge provided reliable and comprehensive first-hand insights for the research. The geographical distribution of the participants was as follows: 2 from the United States, 4 from Costa Rica, 1 from Colombia, 2 from Chile, 1 from China, and 6 from Argentina. The criteria for selecting participants included: (1) a minimum of ten years of experience in Chinese martial arts training; and (2) at least three years of employment at Shaolin Temple. These criteria were designed to ensure that the chosen participants had a robust practical background and significant experience.

The research process employed the grounded theory method, which was organized into several stages: open coding, axial coding, and selective coding. This approach effectively refined and integrated the data obtained from the interviews. In the open coding stage, key concepts and categories related to Shaolin martial arts practice were identified through a detailed word-by-word analysis of the interview transcripts. Next, the axial coding stage further examined and established relationships among these categories, enhancing the understanding of the meanings associated with the language, techniques, and practice experiences of Shaolin martial arts. Finally, during the selective coding phase, attention was directed toward several core categories, culminating in the development of a theoretical framework outlining the key influencing factors in the practice of Shaolin martial arts. These factors encompass cultural heritage, training systems, the impact of coaches, and learning motivation. Furthermore, this study paid particular attention to the impact of different cultural backgrounds on the experience of practicing Shaolin martial arts, aiming to explore how Shaolin martial arts can continue to be promoted and passed on across various regions and cultures in the context of globalization. Overall, by employing the qualitative research method of grounded theory, this study not only provides theoretical support for the practice of Shaolin martial arts but also serves as a reference for future related research, aiming to deepen the understanding of Shaolin martial arts culture and advance its dissemination and further development on the international stage.

3.2. Interview Design and Implementation

During the interview process, recording and verbatim transcription methods were employed to ensure the accuracy and completeness of the collected information. Upon completion of data collection, the interview data were imported into NVivo software for qualitative analysis, allowing the extraction of key themes and patterns, as well as the identification of core issues and insights reflected by the interviewees. Additionally, using the SWOT analysis framework, the study further explored the strengths, weaknesses, opportunities, and threats faced by the Shaolin cultural industry in the context of digital transformation. This analysis not only validated the interview results but also

provided a systematic perspective for understanding the inheritance and innovation of Shaolin culture in the global digital landscape. Combined with international comparative analysis, the study also identified effective strategies and solutions, offering practical guidance for the sustainable development of the Shaolin cultural industry. Through these methods, the study provides systematic and comprehensive empirical support for the digital transformation of Shaolin culture and offers valuable references for policymakers in promoting the sustainable development of the cultural industry.

4. Results

This study employs the three-level coding method of grounded theory to systematically summarize and analyze the key factors related to the digital transformation of the Shaolin cultural industry identified in the interviews. Through open coding, axial coding, and selective coding of the data, we identified the key factors influencing the digital transformation of the Shaolin cultural industry and categorized them into the following main groups:

Table 1. Coding Results of Key Factors in the Digital Transformation of Shaolin Cultural Industry.

Original statement	Sub-categories	Main category	Core Areas
"I believe this requires us to be more open in our transmission and teaching... From my perspective, they want Shaolin to be disseminated globally."	A more open and inclusive mindset	Market demand factors	Key factors for the digital transformation of the Shaolin cultural industry
"However, in other cases, watching the videos has indeed sparked people's interest and encouraged them to attend classes, which is positive in some respects."	Spark public interest		
"I believe so, but not because of the transformation of Shaolin itself; rather, it's because we live in a world that requires us to engage with everything through digital media."	Dependence on digital media		
"However, I have been involved in some animation production, such as fight animations, and have also filmed short videos, interviews, and photos, contributing to events and social media outreach."	Animation production	Technical factors	

<p>"I find artificial intelligence to be extremely helpful, especially in translating and interpreting certain content. I often refer to texts on Shaolin culture, and AI has greatly assisted me in translation, particularly when I need to translate historical texts or documents."</p>	Artificial Intelligence		
<p>"In terms of communication, social media is incredibly useful. Platforms like Instagram, Facebook, and even WeChat in South America have their roles—though WeChat is not widely used in Argentina, it is a tool with great potential. I believe that every practitioner of Shaolin Kung Fu should have a WeChat account to stay updated on the latest developments in Shaolin. This will become a goal."</p>	Social media		
<p>"Language is key; language issues affect the speed of transformation. To achieve a more effective transition, we need more channels for translation and information dissemination, rather than relying solely on one or two individuals."</p>	Real-time translation		
<p>"But I know that platforms like YouTube, movies, and instructional videos already exist. There are also some teachers who have created explanatory videos."</p>	Video production		
<p>"So, what you need most right now is communication technology, right?" "Yes."</p>	Communication technology		

<p>"I am currently preparing a foundational course with six sessions, during which I will explain Buddhism and Shaolin culture."</p> <p>"How are these sessions conducted? Are they online, via Zoom?"</p> <p>"Yes, they are online through Zoom, available to all participants."</p>	Online course		
<p>"We have conducted some strength and movement tests using 3D capture technology, such as creating videos with 3D garments. In our collaborative project with the University of Costa Rica, we experienced the benefits of this technology."</p>	Virtual 3D		
<p>"We have collaborated with the Confucius Institute, the University of Costa Rica, cultural centers, and several national production companies on successful projects. For instance, during the Spring Festival event, we utilized videomapping projection technology combined with live performances, and we also organized international Tai Chi and Qigong conferences."</p>	Collaborate with other organizations	Economic resource factors	
<p>"Digitalization primarily aims to bridge distances and facilitate communication, allowing me to reach the same level as someone living in Shaolin without having to visit three times a year. We go once a year to record videos and review our progress."</p>	Break geographical limits	Educational and training factors	

<p>"There are aspects I don't particularly like because personalized teaching has many advantages that digital education cannot provide. Learning through videos may lead to missing some elements... However, as technology advances, these issues may gradually be resolved."</p>	<p>Balance personalized teaching</p>		
<p>"Some people purchased a 3D Tai Chi tutorial through the App Store, but they couldn't fully keep up, so they came to our school for lessons. In this case, digital tutorials are indeed helpful in assisting them to remember the routines."</p>	<p>Teaching assistance</p>		
<p>"The biggest challenge is adapting to the use of these digital tools, such as Zoom, WeChat, and Instagram, for content sharing. We need to ensure that students and teachers share information in their Instagram and WhatsApp statuses, and each teacher sends their activities to be published by Heart Home or the school. This is new content, like a new subject, and we are just starting to learn how to use these communication methods effectively."</p>	<p>Training in the skills for using digital tools</p>		
<p>"Perhaps one day, masters or abbots will be able to convey information through live broadcasts, and everyone will have WeChat or another effective way to listen to messages from a master at the temple. This platform</p>	<p>Development of digital teaching resources</p>	<p>Factors of cultural heritage transmission</p>	

already exists, but we hope for more flexible communication."			
"Because it is essential to find a balance between traditional teaching and ethics and new methods, Shaolin kung fu and its culture will not lose their original depth and spiritual heritage."	Ensuring the authenticity of culture		
"On the dissemination of concepts in each discipline. For example, in the field of Qigong, explaining practices, theories, philosophies, and Traditional Chinese Medicine can facilitate treatment and communication with colleagues or patients, making technology very practical."	Popularization of fundamental concepts		
"Especially after the destruction of the Shaolin Temple and the loss of books, collecting that information became very difficult. Today, digitalization and global storage have made preservation easier. Furthermore, more people are becoming aware of it, making dissemination simpler."	Protection of cultural heritage		
"Therefore, during the digitalization process, it is necessary to focus on certain content, with the Shaolin headquarters controlling the dissemination direction while ensuring the authenticity of the information."	Control the direction of dissemination	Organizational and management factors	
"Currently, we are establishing such a department, both within the Argentine Association and in the Latin American	Establish a promotion department		

organization I oversee. We are enhancing our video editing skills for event promotion and are in the process of setting up a project department."			
"The coach has significant responsibilities; digital content needs to be reviewed collaboratively during its creation. Therefore, the coach's role is to ensure that the work is correct and that students learn in the right way when the content is disseminated."	Coaches strengthen management		
"First is our collaboration with the Chinese Martial Arts Association. I believe having the association's logo on our certification is very important as it validates our legitimacy."	Certification by an authoritative body		
"At the same time, it can be disseminated in the correct way by reviewing the videos with mentors and collaboratively making corrections."	Correcting disseminated content		

This study indicates that the digital transformation of the Shaolin cultural industry is a key pathway to achieving sustainable development, At the same time also facing numerous challenges and opportunities. Through an in-depth analysis using grounded theory, we identified several influencing factors, providing theoretical support and guidance for the formulation and implementation of relevant policies. The specifics are as follows:

Market Demand Factors

Market demand plays a vital role in driving the digital transformation of the Shaolin cultural industry. Interviews indicate that an open and inclusive mindset, heightened public interest, and the use of digital media are critical factors influencing market demand. To effectively engage the public, Shaolin culture must produce compelling content through digital platforms, utilizing formats such as short videos and online courses to attract younger audiences.As information technology rapidly advances, audiences have altered how they access digital content. Consequently, the Shaolin cultural industry must actively harness digital media to improve communication effectiveness and enhance audience engagement in response to this trend. It is crucial for the Shaolin cultural industry to stay

attuned to market demands and employ digital strategies to enhance dissemination effectiveness while meeting the learning needs of a broader audience.

Technical factors

The incorporation of animation and VR technology can vividly showcase the movements and philosophy of Shaolin martial arts, offering audiences an immersive experience. This application not only diversifies the methods of cultural dissemination but also enhances audience engagement. Additionally, the integration of AI technology in translation and content generation effectively removes language barriers, enabling international audiences to better understand and appreciate Shaolin culture. Such technological advancements facilitate global promotion. For instance, through online platforms like Zoom and various social media channels, the learning and sharing of Shaolin culture can overcome geographical limitations. This flexible learning approach is likely to attract broader audience participation.

Economic resource factors

By partnering with institutions like Confucius Institutes, universities, and cultural centers, the Shaolin cultural industry can facilitate resource sharing and create mutual benefits. This collaboration not only yields economic returns but also boosts the visibility and influence of Shaolin culture.

Education and training factors

Education and training are vital elements in the digital transformation of the Shaolin cultural industry. Interviews revealed that overcoming geographical barriers, accommodating personalized teaching, providing instructional support, and training in the use of digital tools are key factors in education and training. Digital technologies enable the removal of geographic limitations, allowing a broader audience to access learning opportunities in Shaolin culture. Furthermore, personalized teaching approaches can be implemented to develop tailored learning plans that align with the diverse needs and characteristics of individual students, thereby enhancing educational outcomes. Additionally, training in instructional support and digital tool usage is essential, as it equips students with the knowledge and skills necessary to fully engage with Shaolin culture. This comprehensive approach ultimately improves the overall learning experience and satisfaction of participants.

Cultural Preservation Factors

Cultural heritage preservation is one of the core objectives of the digital transformation of the Shaolin cultural industry. Interviews emphasized that the development of digital teaching resources, the assurance of cultural authenticity, the dissemination of fundamental concepts, and the protection of cultural heritage are crucial aspects of cultural preservation factors. Through digital means, the essence and connotations of Shaolin culture can be digitally presented and disseminated, allowing more people to understand and appreciate its charm. Additionally, by ensuring cultural authenticity and the widespread understanding of fundamental concepts, the depth and spiritual legacy of Shaolin culture can be preserved throughout the transmission process. Furthermore, cultural heritage protection is an indispensable component, as it enables the preservation and transmission of Shaolin culture through digital methods, preventing the loss and damage of cultural heritage.

Organisational and managerial factors

Organization and management are essential safeguards for the digital transformation of the Shaolin cultural industry. Interviews revealed that controlling the direction of dissemination, establishing a publicity department, enhancing management by coaches, obtaining certification from authoritative institutions, and revising dissemination content are critical organizational and management factors. By directing the dissemination of Shaolin culture, the industry can ensure it remains aligned with its objectives throughout the digital transformation process. Establishing a publicity department and improving video editing techniques will enhance both the efficiency and effectiveness of cultural dissemination. Furthermore, strengthening management through coaches

and obtaining certification from recognized bodies ensures the accuracy and legality of the content shared. Revising dissemination content allows for continuous refinement and optimization of the methods and materials used in promoting Shaolin culture, ultimately improving quality and effectiveness.

5. Discussion

In the context of digital transformation, unprecedented opportunities and challenges are faced by the Shaolin cultural industry. On one hand, as the sources of information increase, the public's acceptance of traditional culture has significantly improved, providing new opportunities for cultural dissemination. However, the challenges of information overload and misinformation have also emerged. Respondents highlighted that the role of coaches in information management has become increasingly important; only by effectively filtering and conveying reliable cultural content can the healthy dissemination of Shaolin culture be promoted [32]. Furthermore, social media platforms such as Instagram and WeChat have provided new channels for the dissemination of Shaolin culture. Although the current number of followers is limited, the school can attract a broader audience and enhance interaction with the audience through formats such as short videos.

On the other hand, the challenges to the master-apprentice relationship posed by digital education cannot be overlooked. Although the increase in online learning resources has provided convenience for learners, face-to-face guidance and interaction remain indispensable elements of martial arts education. Concerns expressed by respondents indicate that while online teaching serves as an emergency solution, balancing online instruction with traditional face-to-face guidance will be crucial in the long term. Furthermore, while the openness of digital platforms has lowered the barriers to learning, it may also lead to the fragmentation of knowledge, thereby impacting educational quality. Therefore, during the digital transformation process, the Shaolin cultural industry must find a balance among enhancing acceptance, strengthening information management, maintaining the master-apprentice relationship, and ensuring educational quality to achieve sustainable development. An effective policy framework and educational strategies will be key to achieving this goal.

A SWOT analysis clearly identifies the strengths and weaknesses of the Shaolin Temple cultural industry. Its significant strengths lie in its profound cultural heritage and exceptional brand value. As a cultural symbol with a 1500-year history, the martial arts culture of the Shaolin Temple is rich and diverse, attracting a large number of domestic and international visitors [33][34]. Through long-term development, the Shaolin Temple has become a globally recognized brand, with its far-reaching influence laying a solid foundation for further growth. Additionally, the diverse products and services offered by the Shaolin Temple, such as martial arts training, the Shaolin Cultural Festival, and cultural lectures, effectively meet the varied needs of different visitors, thereby creating a competitive advantage in the market. However, the Shaolin Temple cultural industry also faces several weaknesses, including the inadequacy of some traditional cultural institutions in digital technology and equipment, which may lead to inefficiencies in transformation [35]. Furthermore, cultural products are gradually becoming rigid and lacking innovation, which may hinder their ability to effectively attract the new generation of visitors.

In terms of opportunities, the rapid growth of the global cultural tourism market provides new development space for the Shaolin cultural industry, while technological advancements offer new tools and platforms, and government support policies have also optimized the external environment to some extent. However, the Shaolin Temple cultural industry also faces threats from intense market competition and changes in consumer preferences. The rapid development of other cultural and sports projects may weaken the market influence of Shaolin martial arts, while the risk of content homogenization during the digitalization process may also affect its uniqueness and appeal. To effectively address these challenges, the Shaolin Temple cultural industry should adopt multiple strategies. First, increased investment in technology is necessary to enhance digital infrastructure, particularly in the application of virtual reality and augmented reality technologies, to enrich cultural

experiences and attract younger audiences [36]. Second, promoting the diversification and innovation of cultural products and developing interactive cultural products aimed at younger audiences will help enhance market appeal. Simultaneously, optimizing management models and reconstructing the existing management framework are essential to improve operational efficiency and ensure the effective protection and transmission of cultural heritage [37][38]. By leveraging social media and online platforms to strengthen marketing efforts, the Shaolin Temple can enhance brand awareness and cultural identity [39]. Furthermore, establishing a sustainable development indicator system and conducting regular assessments of the effectiveness of digital transformation are crucial to ensuring its positive impact on the economy, society, and environment, thereby achieving continuous improvement.

In conclusion, the digital transformation of the Shaolin Temple cultural industry is not only an effective strategy to address modern market challenges but also an important measure to promote the coordinated development of the economy, society, and environment. By integrating digital technology with traditional culture, the Shaolin cultural industry will achieve sustainable development in the context of globalization, offering valuable insights and experiences for other cultural industries. This study not only enriches the theoretical framework of digital transformation in the cultural industry but also provides practical guidance for related practices, promoting the sustainable development and innovation of the cultural industry in the digital age.

6. Conclusions

As an important component of Chinese cultural heritage, the Shaolin cultural industry showcases significant cultural appeal and economic potential through its unique philosophy of "integration of Zen and martial arts" and rich historical background. This industry not only carries rich cultural assets but has also formed an industry cluster centred around the Shaolin Temple, becoming a vital driver of regional economic development. In the process of implementing digital transformation, the Shaolin cultural industry should focus on the following key areas. First, by leveraging advanced technologies such as virtual reality and augmented reality, immersive cultural experiences should be created to attract younger audiences and enhance their sense of identity and engagement with traditional culture. Second, promoting the diversification and innovation of cultural products and developing interactive offerings that meet modern market demands will enhance consumer engagement and satisfaction. Additionally, active utilization of social media and online platforms for branding efforts will enhance the global visibility and influence of Shaolin culture.

Finally, establishing a sustainable development indicator system is essential to ensure the effective protection and transmission of cultural heritage during the digitalization process, thereby achieving coordinated development of the economy, society, and environment. Through these strategic initiatives, the Shaolin cultural industry can not only preserve its cultural essence but also rejuvenate its vitality in the digital age, further consolidating its position in the global cultural landscape. Looking ahead, the Shaolin cultural industry should continue to explore innovative pathways, leveraging modern technology and market mechanisms to achieve dual prosperity in culture and economy.

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analysis, facilitated interviews with participants, and played a key role in outreach efforts. Contributed to the compilation of materials necessary for the study, ensuring a well-organized and comprehensive dataset.

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