

ENHANCING ORGANIZATIONAL EFFICIENCY OF THE LANTERN FESTIVAL IN PENGHU, TAIWAN THROUGH INFORMATION TECHNOLOGY: KEY FACTORS ANALYSIS

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ABSTRACT

The Lantern Festival in Penghu, Taiwan, has become one of the region's most important cultural events, attracting numerous tourists and garnering extensive media coverage. This festival combines local traditions and religious beliefs, serving as not only a symbol of the holiday but also a key attraction for Penghu's tourism. However, despite the festival's long history, the growth in visitor numbers has been relatively limited. To enhance the event's impact effectively, organizers face several challenges, including resource allocation, event content design, and promotional strategies. This study systematically analyzes and evaluates the key success factors of the Lantern Festival using the Analytic Hierarchy Process (AHP) method and establishes a related framework. The results reveal three major dimensions: A. Event Planning and Resource Support, B. Event Execution and Promotional Communication, and C. Cultural Heritage and Industrial Activities. These three dimensions encompass a total of twelve specific indicators, such as the design of the event theme, government funding and policy support, marketing and promotion, local community involvement, and cultural innovation and preservation. Through an analysis of the Penghu Lantern Festival, this study identifies the core factors contributing to the event's success and how they are integrated with local culture and tourism development. These findings provide a valuable reference for other regions planning similar festivals, helping improve the quality and appeal of events and laying the foundation for long-term development. Additionally, the study offers festival planners a practical action framework to review key factors during the preparation phase, ensuring smooth execution and meeting the expectations of all stakeholders.

KEYWORDS

Festival activities, Key success factors, AHP

1. INTRODUCTION

1.1. Research Motivation and Purpose

In Taiwan's tourism industry, festivals play an important role in preserving history and culture. Despite the ongoing impact of the 2022 pandemic, the domestic tourism market has seen a strong resurgence. Local governments have seized this opportunity to design festivals with unique regional characteristics, aiming to attract more visitors. The Penghu County Government has actively promoted winter tourism, with the Lantern Festival being one of the most representative events [1, 2].

The motivation for this study is to explore the overall atmosphere of the Penghu Lantern Festival, the local residents' cultural identity, and the educational value of the event. The study will also analyze how local industries design activities based on different attributes and examine the role of the central government in supporting the event, including the provision of funds and resources. Additionally, the study will assess whether innovative methods attract tourists and whether the event can sustain its appeal in the long term. Since Taiwan implemented the two-day weekend policy in 2001, domestic tourism has seen a significant increase [1]. The successful hosting of the Penghu International Fireworks Festival in 2003 demonstrated that with policy support from both central and local governments, along with efforts from local businesses, regional visibility and economic benefits can be greatly enhanced [2]. These experiences have inspired this study, which seeks to further explore the success factors of the Penghu Lantern Festival.

1.2. Research Process

This study follows the following steps: First, a preliminary framework for the "Key Success Factors of the Penghu Lantern Festival" is proposed. Next, through expert discussions and revisions, the final hierarchical structure is established. Subsequently, expert questionnaires are analyzed and organized, leading to conclusions and recommendations based on the results.

2. LITERATURE REVIEW

2.1. Types of Festivals

According to data from Taiwan's Tourism Bureau in 2022 [3], festivals in Taiwan can be categorized into five major types: Taiwan Tourism Biennial Calendar, Traditional Festivals, Religious Celebrations, Indigenous Activities, and Hakka Cultural Events. These festivals showcase the unique cultural characteristics of various regions and attract both domestic and international tourists. For example, events such as the Taiwan Lantern Festival and the Hakka Tung Blossom Festival have become international tourism highlights and are recommended by global media as some of the world's best festivals.

2.2. Lantern Festival Activities

The Lantern Festival, also known as the Yuanxiao Festival, is celebrated on the 15th day of the lunar new year and symbolizes the arrival of spring and family reunion. On this day, people enjoy lantern displays, solve riddles, and eat tangyuan (sweet glutinous rice balls) to pray for peace, happiness, and reunion in the coming year. Lantern Festival activities vary across regions, such as the Pingxi Sky Lantern Festival, Tainan's Yanshui Beehive Fireworks, and Penghu's Lantern Festival celebrations. These festivities not only showcase rich folk culture but also strengthen community cohesion, making them a beloved festival [4].

2.3. Benefits of Festivals

Festivals not only enhance the visibility of local culture but also generate economic benefits [5, 6, 7]. These events offer distinct advantages to different groups: the government can improve service quality, residents gain employment opportunities, tourists enjoy diverse recreational options, and businesses can boost their brand image [8-10]. Both religious and culturally distinctive festivals significantly contribute to regional economic growth and tourism development.

2.4. Key Success Factors

Key success factors refer to the essential conditions required to achieve desired goals. Scholars have offered insights across various fields [11-15]. For instance, Chen Hong-Yan and Chen Kai-Jie [9] identified key success factors for sporting events, while Qiu Cheng-Ying [16] proposed four dimensions for conferences and exhibitions: resource management, marketing, on-site management, and overall image. These studies provide specific guidance for the success of different projects.

2.5. Analytic Hierarchy Process (Ahp)

The Analytic Hierarchy Process (AHP) [17,18] is an effective decision-making tool that systematizes complex problems and performs quantitative analysis. AHP uses pairwise comparisons to determine the relative importance of different dimensions and indicators and employs consistency checks (C.I. and C.R.) to ensure the reliability of the results. This method has been widely used in decision-making processes for both government and businesses [17-21].

3. RESEARCH METHODOLOGY

3.1. Research Framework

This study establishes a research framework based on literature analysis and research objectives to explore the key success factors of Penghu Lantern Festival activities. The goal is to provide a reference for future event planning.

3.2. Research Subjects

The study employs the Modified Delphi Method [20,21], inviting ten experts and scholars who have long participated in Lantern Festival activities. These experts come from government, academia, and industry, with extensive experience in festival planning. Table 1 presents the list of experts and their background.

Table 1. Experts Consulted in the Questionnaire

Expert Representative	Relevant Experience or Affiliation	Involvement in Major Festivals
Government Official	Former Deputy Director of Tourism Bureau	Taiwan Lantern Festival, Pingxi Sky Lantern Festival
Government Official	Current Director of a County Cultural Bureau	Taiwan Lantern Festival, Penghu International Fireworks Festival
Scholar	Dean of a Tourism College	Taiwan Lantern Festival, 2016 Velo-city Global
Scholar	Associate Professor of Industry-University Cooperation	Taiwan Lantern Festival, Taipei Lantern Festival
Scholar	Assistant Professor of Tourism Department	Taiwan Lantern Festival, Iron Rose Music Festival
Industry Expert	Chairman of a Private Company	Taiwan Lantern Festival, Hakka Tung Blossom Festival
Industry Expert	Owner of a Restaurant in Penghu	Penghu International Fireworks Festival, Lantern Festival Celebration
Industry Expert	Owner of a Guesthouse in Penghu	Penghu International Fireworks Festival, Lantern Festival Celebration
Industry Expert	CEO of a Consulting Firm	Taiwan Lantern Festival, Penghu International Fireworks Festival
Industry Expert	General Manager of a Travel Agency	Taiwan Lantern Festival, Bombing Han Dan, Yanshui Beehive Fireworks

3.3. Research Tools and Execution

- Literature Review: In line with the research objectives, relevant literature was analyzed, and a modified research framework was developed. The key success factors for Penghu Lantern Festival activities were identified, and the Analytic Hierarchy Process (AHP) was used to rank evaluation criteria.
- Confirmation of Hierarchy and Evaluation Items: Based on expert input, the hierarchical structure and evaluation items were validated to ensure that the study's findings are persuasive and practically valuable. The process involved consulting experts and utilizing hierarchical analysis questionnaires.
- Evaluation Scale: A five-point nominal scale was used for pairwise comparisons in the questionnaire to determine the importance of each indicator. The evaluation scale ranged from "equally important" to "absolutely important," with relative weight analysis conducted based on expert judgment.

3.4. Data Processing and Analysis

According to Saaty's consistency check method [17], consistency index (C.I.) and consistency ratio (C.R.) were applied to verify the consistency of the pairwise comparison matrix. The C.I. and C.R. should be less than 0.1 to ensure the reliability of the results.

4. EMPIRICAL RESULTS

4.1. Establishment of Hierarchical Structure

After initially outlining dimensions and evaluation items [22-25], this study revised the structure based on expert feedback, ultimately establishing a hierarchical framework. The first level is divided into three main dimensions: “A. Activity Planning and Resource Support Factors,” “B. Activity Execution and Promotion Factors,” and “C. Festival Culture and Industry Activity Factors,” encompassing a total of twelve evaluation items.

4.2. Collection of Hierarchical Analysis Questionnaires

A total of 8 valid questionnaires were collected in this study, and the Analytic Hierarchy Process (AHP) was used to calculate the relative weights and importance rankings among the dimensions and evaluation items. These results help identify the key success factors for the activities.

- **Consistency Check of the Hierarchical Analysis Questionnaire:** Based on the collected data, a consistency check was performed on the various dimensions and items. Table 2 presents the results of the consistency check and weight analysis of the hierarchical analysis questionnaire. All items’ consistency index (C.I.) and consistency ratio (C.R.) values fall within an acceptable range, indicating good judgment consistency of the model and reliable results. All consistency indicators (C.I.) and consistency ratios (C.R.) were below 0.1, demonstrating a high degree of consensus among the experts.

Table 2. Consistency Check Table of the Hierarchical Analysis Questionnaire

Level	Consistency Index (C.I.)	Consistency Ratio (C.R.)	Passed/Failed
Overall Dimension	0.0507	0.0433	Passed
Dimension A Items	0.0677	0.0769	Passed
Dimension B Items	0.0457	0.0745	Passed
Dimension C Items	0.0634	0.0517	Passed

- **Overall Weight Ranking and Discussion of Key Success Factors for Lantern Festival Activities:** Based on the collected questionnaire data, the three main dimensions and their respective items were ranked by weight. Table 3 summarizes the relative importance of each dimension and key factors, providing insights into the critical elements for successful activities and facilitating further discussion.

Table 3. Overall Weight Ranking of Key Success Factors for Lantern Festival Activities

Dimension	Dimension Weight	Ranking	Evaluation Item	Local Weight	Overall Item Weight	Overall Ranking
A. Activity Planning and Resource Support Factors	0.4914	1	A-1 Activity Strategy Planning	0.3597	0.1768	1
			A-2 Clear Activity Theme	0.3328	0.1635	2
			A-3 Innovative Activity Design	0.1689	0.083	5
			A-4 Resource Funding Injection	0.1386	0.0681	6
B. Activity Execution and Promotion Factors	0.2103	3	B-1 Activity Execution Capability	0.4899	0.103	4
			B-2 Enhancing Participation Willingness	0.3011	0.0633	7
			B-3 Media Exposure and Promotion	0.1879	0.0395	10
			B-4 Activity Promotion Mix	0.0211	0.0044	12
C. Festival Culture and Industry Activity Factors	0.298	2	C-1 Local Cultural Identity	0.5236	0.1562	3
			C-2 Educational Value of Activities	0.1478	0.0441	9
			C-3 Overall Regional Atmosphere	0.1236	0.0369	11
			C-4 Alignment with Local Industries	0.205	0.0612	8

4.3. Discussion

From Table 3, it is evident that “A. Activity Planning and Resource Support Factors” is the most critical dimension for the Lantern Festival, with a weight of 0.4914, indicating that the success of the activity highly relies on careful planning and resource allocation. Specifically, “A-1 Activity Strategy Planning” and “A-2 Clear Activity Theme” rank as the top two evaluation items, reflecting the essentiality of strategic planning and clear thematic focus for overall activity performance. This underscores that meticulous planning and a well-defined direction are prerequisites for ensuring the event’s success.

Next, “C. Festival Culture and Industry Activity Factors” ranks second with a weight of 0.298. Within this dimension, “C-1 Local Cultural Identity” has the highest local weight (0.5236), indicating that participants' recognition of local culture is a significant motivator for attracting attendees. Cultural identity not only contributes to the event's success but also fosters synergy with local industries. While the weight of “C-4 Alignment with Local Industries” is relatively lower, it still highlights the importance of the connection between activities and the local economy.

“B. Activity Execution and Promotion Factors” ranks third with a weight of 0.2103. Within this dimension, “B-1 Activity Execution Capability” is the most critical evaluation item, emphasizing that smooth execution of activities is key to ensuring success. Although “B-2 Enhancing Participation Willingness” and “B-3 Media Exposure and Promotion” have lower weights compared to other items, they play significant roles in increasing awareness and attracting more participants.

In summary, the success of the Lantern Festival relies on thorough event planning, adequate resource support, and respect for and integration with local culture. Effective execution and promotional strategies are also indispensable. A multi-faceted collaborative development will collectively promote the success of the event.

Analyzing the “Overall Item Weight” from Table 3 reveals that the success of the Lantern Festival primarily depends on strategic planning, clarity of themes, and enhancement of local cultural identity. While execution capabilities and innovative designs are secondary, they should not be overlooked, especially when the event's objectives expand to a broader audience. Effective resource allocation and promotion strategies will play supportive roles in ensuring event success and enhancing long-term impact.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

- **Weight Proportions of Key Success Factors for Lantern Festival Activities**

Based on the results of the questionnaire analysis, the weight ranking of the three main dimensions is as follows: “A. Activity Planning and Resource Support Factors,” “C. Festival Culture and Industry Activity Factors,” and “B. Activity Execution and Promotion Factors.” Experts unanimously agree that among the Lantern Festival activities hosted in the Penghu region, the weight of “A. Activity Planning and Resource Support Factors” is the highest, reaching 0.4914. This highlights the significance of the activity theme and planning details in achieving success. The weights of “C. Festival Culture and Industry Activity Factors” and “B. Activity Execution and Promotion Factors” are not significantly different, indicating that these two dimensions also play important roles in the success of festival activities.

- **Relative Weight Ranking of Evaluation Items for Key Success Factors**

In planning the Lantern Festival activities, it is crucial first to establish a clear activity strategy and then to define the activity's core theme. This approach helps participants develop a sense of belonging. Additionally, enhancing “Local Cultural Identity” and improving “Activity Execution Capability” will make the event more attractive and engaging. In the realm of “Activity Execution and Promotion Factors,” there should be an emphasis on increasing media exposure and promotion to further enhance the regional atmosphere, thereby encouraging participation from both local residents and tourists. Furthermore, optimizing the promotional mix will enhance the attractiveness of the activities.

5.2. Specific Improvement Recommendations for the Penghu Lantern Festival

The study indicates that the most critical success factors are “Activity Strategy Planning” and “Clear Activity Theme,” which collectively account for a total weight of 0.3403. Although the 2022 Lantern Festival in Penghu saw participation from the Penghu National Scenic Area Administration and the Penghu County Government Tourism Office, it was primarily organized independently by local temples, lacking in-depth coverage and promotion from the government and media. Moreover, the website of the Ministry of Transportation and Communications only features events like Pingxi Sky Lanterns, Tainan Yan Shui Beehive Fireworks, and Taitung's

Fried Cold One, while the Penghu Lantern Festival was not included, indicating a need for improved visibility and promotion.

Although the Penghu County Government has included the Lantern Festival as one of Taiwan's four major Lantern Festival events and has worked on enhancing its visibility through promotion, further efforts are necessary. It is recommended that the Penghu County Government establish strategic alliances with relevant industries such as aviation, tourism, and hospitality to capitalize on the winter low season when tourist numbers decrease. They could design three to four-day promotional packages that combine island-wide tours with Lantern Festival activities. Additionally, extensive media advertising should be utilized to promote the historical and cultural significance of the event and provide attractive lodging and dining deals to attract more travelers. This would stimulate tourism and ensure the sustainable development of the festival.

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REFERENCES

- [1] Lai, Tsung-Cheng, Liu, Hsi-Lin, & Wu, Chu. (2023). Possible pathways and actions for the recovery of the tourism industry in Penghu under the pandemic. *Chinese Local Governance*, 76(5), 3-18.
- [2] Chen, Liang-Yuan. (2022). The tourism industry and environmental resources in Penghu. *Chinese Local Governance*, 75(4), 3-32. [https://doi.org/10.6581/lsgc.202204_75\(4\).0002](https://doi.org/10.6581/lsgc.202204_75(4).0002)
- [3] Taiwan Tourism Bureau, Ministry of Transportation and Communications. (2023, January 15). Taiwan's festival activities. Retrieved from <https://www.taiwan.net.tw/>
- [4] Taiwan Tourism Bureau, Ministry of Transportation and Communications. (2024, January 1). Taiwan's festival activities. Retrieved from <https://www.taiwan.net.tw/>
- [5] Chu, Hao. (2014). Research on the development strategies of large local festival activities in our country. Taipei City: Executive Yuan Research and Development Commission.
- [6] Liu, Chao-Jin, Liu, I-Hui, & Meng, Hsiang-Jen. (2008). Constructing the cognitive model of participants' perceived benefits of local festival activities in Taiwan. *Humanities and Social Sciences Research*, 2(2), 141-162. [https://doi.org/10.6284/NPUSTHSSR.2008.2\(2\)7](https://doi.org/10.6284/NPUSTHSSR.2008.2(2)7)
- [7] Cheng, Kuang-Ching. (2017). Analysis of local residents' evaluation of the benefits of festival activities: A case study of the "2015 Xiaoliuqiu King Festival." *Island Tourism Research*, 10(1), 52-76.
- [8] Chen, Pei-Ti, Chen, Wen-Fang, Luo, Xiang-Ching, & Pei, Lei. (2022). A study of the local economic impact of festival: Take "Dating with Hsinchu County" as an example. *Journal of Tourism and Leisure Management*, 10(1), 28-39. [https://doi.org/10.6510/JTLM.202206_10\(1\).0003](https://doi.org/10.6510/JTLM.202206_10(1).0003)
- [9] Ngernyuang, Krittanai, & Wu, Pei-Ying. (2020). Using social media as a tool for promoting festival tourism. *International Journal of Computer Science & Information Technology*, 12(3), 17-32. <https://doi.org/10.5121/ijcsit.2020.12302>
- [10] Chen, Pei-Ti, Chen, Fu-Ding, Kung, Ren-Hua, & Pei, Lei. (2012). Distribution of festival economic impacts - A longitudinal study. *Leisure Industry Research*, 10(2), 23-44. [https://doi.org/10.6746/LIR.201206_10\(2\).0002](https://doi.org/10.6746/LIR.201206_10(2).0002)
- [11] Chen, Pei-Ti, Lin, Hsiao-Yun, Hsieh, Yu-Ni, & Chan, Chia-Hua. (2018). A study on the relationship of marketing strategy and satisfaction of local festival - A case study of Hsinchu City International Kite Festival. *Journal of Tourism and Leisure Management*, 6(2), 26-38. [https://doi.org/10.6510/JTLM.201812_6\(2\).0003](https://doi.org/10.6510/JTLM.201812_6(2).0003)

- [12] Hamto, Imee W., Tsai, Yao-Hsu, & Wu, Jerwei. (2024). Exploring the leisure participation and quality of life of Filipino migrants in Taiwan. *International Journal of Organizational Innovation*, 16(3), 25-42.
- [13] Chen, Yu-Mei. (2011). Exploration of critical success factors in the exhibition industry (Master's thesis). Department of Tourism and Leisure Management, National Ling Tung University.
- [14] Chen, Hung-Yan, & Chen, Kai-Chieh. (2009). A study of critical success factors for hosting international sports events in Taiwan. *Taiwan Journal of Sports Management*, 8, 17-33. <https://doi.org/10.6547/tassm.2009.0002>
- [15] Qiu, Cheng-Ying, Chen, Ya-Hung, You, Cheng-Kai, Chang, Wen-Ya, Lin, Yu-Cheng, & Hsu, Hsiao-Feng. (2014). Exploring key success factors for promoting international conferences and exhibitions in Taiwan. *Management Information Computing*, 3(1), 99-119. [https://doi.org/10.6285/MIC.3\(1\).07](https://doi.org/10.6285/MIC.3(1).07)
- [16] Chang, Yi-Ching, & Wang, Hsueh-Ming. (2011). Research on key success factors of cultural and creative industry parks (Master's thesis). College of Management, Da-Yeh University.
- [17] Saaty, Thomas L. (2004). Decision making—the analytic hierarchy and network processes (AHP/ANP). *Journal of Systems Science and Systems Engineering*, 13(1), 1-35.
- [18] Chang, I-Ying, & Chang, Wan-Yu. (2022). Study of the construction in environmental protection of MICE (Meetings, Incentives, Conventions, Exhibitions) evaluation indicators based on AHP. *Journal of Environmental Protection and Ecology*, 23(6), 2534-2540.
- [19] Huang, Han-Chen, & Hou, Cheng-I. (2017). A study on coffee product categories sold in landscape coffee shops. *International Journal of Computer Science and Information Technology*, 9(3), 71-78. <https://doi.org/10.5121/ijcsit.2017.9306>
- [20] Huang, Han-Chen, Hou, Cheng-I, & Tseng, Ying-Han. (2017). Research on decision making regarding dating events for unmarried female junior high school teachers. *International Journal of Computer Science and Information Technology*, 9(1), 85-93. <https://doi.org/10.5121/ijcsit.2017.9107>
- [21] Hsiao, Ying-Yu. (2020). Exploring the military's assistance in disaster prevention and relief using the modified Delphi method. *Military Social Science Quarterly*, 16, 111-133. [https://doi.org/10.6915/PMSS.202003_\(16\).0007](https://doi.org/10.6915/PMSS.202003_(16).0007)
- [22] Chung, Cheng-Wei, Chen, Huan-Tun, & Tu, Hsin-Yun. (2012). Research on constructing sustainability indicators for local festival activities. *Journal of Sports, Leisure, and Hospitality Research*, 7(2), 45-64. [https://doi.org/10.29429/JSLHR.201206_7\(2\).03](https://doi.org/10.29429/JSLHR.201206_7(2).03)
- [23] Liu, Chao-Jin, Liu, I-Hui, & Meng, Hsiang-Jen. (2008). Constructing the cognitive model of participants' perceived benefits of local festival activities in Taiwan. *Humanities and Social Sciences Research*, 2(2), 141-162. [https://doi.org/10.6284/NPUSTHSSR.2008.2\(2\)7](https://doi.org/10.6284/NPUSTHSSR.2008.2(2)7)
- [24] Liao, Tsai-Ling, & Su, Jun-Yi. (2015). A study on festival activities as urban marketing: A case study of the Huashan Simple Life Festival. *Journal of Visual Communication and Art*, 2015, 405-416.
- [25] Liu, Chao-Jin, Huang, Lu-Ching, Cheng, Chi-Mei, Tseng, Ying-Han, Lin, Yu-Fang, & Tsai, Pei-Chun. (2008). A study on the participation behavior of Taiwanese people in local festival activities. In *Proceedings of the 2008 Sports and Leisure Industry Management Academic Conference*, Taiwan. <https://doi.org/10.29463/2008chanye.200804.0508>
- [26] Chang, Shih-Ping, Huang, Han-Chen, Hou, Cheng-I, & Lin, Ping-Chang. (2022, June). Key success factors of festival activities: A case study of the Penghu Lantern Festival. In *18th Conference on Technology and Society*. Hsinchu City, Taiwan.
- [27] Chang, Shih-Ping. (2022). Exploration of key success factors of festival activities: A case study of the Penghu Lantern Festival (Master's thesis). Chung Hua University.