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Developing a novel Intuitionistic Fuzzy Importance–performance Analysis for evaluating corporate social responsibility in sport tourism event

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ABSTRACT

The purposes of the study were to evaluate corporate social responsibility (CSR) and developing a novel Intuitionistic Fuzzy Importance–performance Analysis (IFIPA) for sport tourism event. IFIPA implies intuitionistic fuzzy theory to Importance–performance Analysis (IPA) for providing a promising decision-making value when IPA encounters uncertain situations. The results indicated that the proposed IFIPA is more effective and accurate than conventional IPA in two causes. First, the IFIPA can clearly express the real implication under uncertain environment; reversely it is failed from conventional IPA. Second, the IFIPA can provide more credible predictions (membership and non-membership) for decision-makers than the conventional IPA model. Based on the IFIPA, the results indicated that host organization can have the advantages by adopting CSR and promote social concern and sustainable development. The first priority for sport tourism event host organization's concentration were "involving community dwellers as part of this event", "actively donate part of their revenue for public welfare", and "follow environmental regulations". Consequently, the IFIPA successfully offers the promising results than IPA and provides the reference for future sport tourism event analysis and practical suggestions for future sport tourism event organizations.

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1. Introduction

Corporate social responsibility (CSR) is a business strategy or approach that enables organizations to act in a socially responsible manner based on their premises (Asif, Searcy, Zutshi, & Fisscher, 2013), and is perceived as an instrument for driving sustainable development (Hamann, 2004; Mutti, Yakovleva, Vazquez-Brust, & Di Marco, 2012) and maximizing long-term benefits for organizations (Mohr, Webb, & Harris, 2001). In addition, CSR is the volitional contribution by organizations to improve the environment, society, and economy based on either altruism or competitive advantage enhancing. CSR has a long history and has developed alongside the business concept, but had not become critical to business strategies until the 1990s (Blowfield & Murray, 2008). Organizations and companies previously considered only on the economic benefits (Anderson, 1989); however, recently companies have begun more focusing on the environment and social effects (Kassinis & Vafeas, 2006; Welford, Chan, & Man, 2008).

Tourism-related industries (e.g., airlines, casinos, hotels, and restaurants) and the sport industry have recently engaged in various CSR activities (e.g., Holcomb, Upchurch, & Okumus, 2007; Inoue & Kent, 2012) including community involvement, customer connections, employee relations, green management (Holcomb et al., 2007), and environmental sustainability (Trendafilova, Babiak, & Heinze, 2013). Recently, tourism has become increasingly unified based on the power of sport attractions and has become a new participant in cross-cultural markets (Cappato & Pennazio, 2006). Sport tourism, travel associated with physical activity and sports, has become one of the fastest growing aspects of tourism (Gibson, 1998), because it transcends the boundaries of culture, society, ethics, and religion.

However, recently developed sport tourism event, stylish road running, had become popular but created social and environmental (Trendafilova et al., 2013), cultural heritage preservation (Gammon, Ramshaw, & Waterton, 2012), economic (Roche, Spake, & Joseph, 2013) issues. Sport tourism event organizations' social responsibility has less likely been studied compare with

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Table 1
The recent IPA literatures.

Author(s)/Year	Technology	Applied problem
Martilla and James (1977)	IPA	Evaluating consumer acceptance
Tonge and Moore (2007)	IPA & service quality gap approach	Evaluating the quality of visitor experiences and protecting the natural environment
Deng (2008)	Fuzzy importance–performance analysis (FIPA)	Determining critical service attributes for achieving superior customer satisfaction
Deng, Chen, and Pei (2008)	Back-Propagation Neural Network based Importance–Performance Analysis (BPNN-IPA) approach	Integrating back-propagation neural network and three factor theory to assist practitioners in determining critical service attributes
Lin, Chan, and Tsai (2009)	IPA & gap analysis	Developing a transformation function of integrating IPA and gap analysis to construct a comprehensive resource distribution model for measuring service quality
Hu et al. (2009)	In conjunction with IPA models established with BPNN and DEMATEL	Evaluating the quality characteristics and identifying the core Order-Winners and Qualifiers problems
Geng and Chu (2012)	New IPA approach (integrating Kano' model and DEMATEL)	Evaluating consumer value and satisfaction based on product-service system
Mikuliæ & Prebežac (2012)	Back-propagation neural network (BPNN)-based IPA approach	Dealing with the problem of asymmetric effects in customer satisfaction formation
Taplin (2012)	Competitive importance–performance analysis (CIPA)	Benchmarking against competitors to determine cross-hair placement, reduce measurement bias and market position for Australian wildlife park
Cheng, Chen, Hsu, and Hu (2012)	Importance–performance & gap analysis (IPGA) model & DEMATEL	Exploring the service quality improvement of fine-dining restaurants and the causal relationship between service quality attributes
Ho et al. (2012)	Modified IPA (using the multiple regression analysis and DEMATEL) techniques	Using supplier quality performance assessment (SQPA) to promote supplier quality for the industrial computer industry
Hu, Horng, Teng, and Yen (2013)	Ridit (relative to an identified distribution) IPA	Identifying the importance and performance of low carbon literacy of tourism and hospitality students
Chen (2014)	New IPA approach (integrating the Kano model)	Elucidating the market competition position of service and product attributes for restaurant chain
Chen (2014)	Constructing an analytical framework- CZIPA (competitive zone of tolerance service quality based IPA)	Evaluating service quality on Taiwanese hot springs hotel

other organizations. The linkage between sport tourism event organizations and the social responsibility must been strengthened. Therefore, one of the purposes of the study was to evaluate the CSR in the tourism sport event organization.

A strategic CSR approach promotes an understanding of organization and company's reputation, competitor differentiation, brand loyalty, competitive advantage, and economic performance (Walters & Tacon, 2010). A previous study elaborated on how the role of CSR affected tourist attitudes and the purchasing behaviors (Smith & Langford, 2009). Despite an increase in CSR activities among sport organizations (Breitbarth & Harris, 2008; Smith & Westerbeek, 2007; Walters & Tacon, 2010), an appropriate technique for evaluating CSR roles in sport tourism event organizations is lacking. Martilla and James (1977) determined that Importance–performance Analysis (IPA) is a simple, effective, and popular customer-driven tool for evaluating the consumer acceptance of market activities. IPA has emphasized the knowledge gaps between customer's perception of importance and the satisfaction, and has enabled organizations and companies to clarify market competition and identify improvement priorities for numerous attributes of products and services (e.g., Tonge & Moore, 2007; Chen, 2014). There were certain IPA-related literatures (Table 1); however, some research variables or attributes might be unpredictable. In line with this, Sampson and Showalter (1999) proposed that the level of Importance–performance was negatively correlated. Matzler, Sauerwein, and Heischmidt (2003) noted that the results of conventional IPA might cause inaccurate company decision-making because the level of customer satisfaction formed a linear structure of quality features. The linear structure may cause the evaluated attributes be coordinated on the cross of axes either into one of the four quadrants. The conventional IPA model must be extended to address these types of problems. Therefore, the fuzzy set and logic proposed by Zadeh (1965) represented another useful tool for managing these uncertainties. The fuzzy set theory is considered a useful technique for solving complex systems because the changeable outcomes are highly unpredictable.

Several studies had extended decision models to fuzzy set/linguistic terms (Deng, 2008; Geng & Chu, 2012; Ho, Feng, Lee, & Yen, 2012; Hu, Lee, Yen, & Tsai, 2009). Furthermore, Atanassov (1986) introduced the intuitionistic fuzzy set (IFS), in which the fundamental characteristics of the values of membership and non-membership functions were vague rather than exact numbers. The IFS is an extremely useful tool for interpreting fuzziness and uncertainty, because IFS can be formed without any data requested in its stimulation for any activities and processes. IFS has recently received wide attention and numerous scholars applied IFS to solve complex problems, such as decision-making (Atanassov, 1999; Banerji & Hiris, 2001; Chaira & Ray, 2008; Chen & Tan, 1994; Holland, 1975; Levis & Papageorgiou, 2005; Lin, Pai, & Yang, 2011), clustering (Akram & Dudek, 2013), pattern recognition (Chaira, 2011; Li, 2005), and medical complications (Burillo & Bustince, 1996; Cui & Yan, 2009; Kennedy, Eberhart, & Shi, 2001).

These studies had applied IFS and achieved high performance in handling uncertain data. However, no research has applied IFS technology to an IPA model to more effectively measure service attributes for industries and organizations. Therefore, this study combined intuitionistic fuzzy sets with IPA to develop a novel intuitionistic fuzzy IPA (IFIPA) for evaluating CSR in the sport tourism event. Specifically, the purposes of this study were 1) to develop a novel IFIPA model for sport tourism event and 2) to verify the benefits of adopting this analysis to serve as a reference index for improving CSR criteria.

2. Developing Intuitionistic Fuzzy Importance–performance Analysis

2.1. Basic definition of the intuitionistic fuzzy set

Fuzzy set theory, originally proposed by Zadeh (1965), has been successfully applied in various fields. This theory proposes that the membership of an element to a fuzzy set is a single value between zero and one. However, it cannot realistically define that the level

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