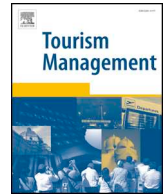




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Tourism Management

journal homepage: www.elsevier.com/locate/tourman

Festival gamification: Conceptualization and scale development

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ARTICLE INFO

Keywords:

Festival gamification
Scale development
Flow experience
Festival tourism
Self-determination theory

ABSTRACT

Based on self-determination theory, this study developed a Festival Gamification Scale (FGS). Through multi-study method, in study 1, five FGS dimensions were sorted through literature review, followed by twelve in-depth interviews. A total of 296 statements were extracted from interviews and were later narrowed down to 33 items under six dimensions. In study 2, 226 responses were collected from a cycling festival for exploratory factor analysis, resulting in twenty items under five dimensions. In study 3, 253 responses were obtained from a marathon festival for confirmatory factor analysis, resulting in sixteen items under five dimensions. In study 4, for examining model extension of the developed five-dimensional 16-item FGS, cross-validation analysis was performed using 219 responses from a religious festival.

1. Introduction

Festival is a common form of cultural celebration (Getz, 2005). Festival tourism offers themed environments for tourists to collectively enjoy (William, 1997) and utilizes features such as ritual or ceremony, special ambience and service, high levels of personal contact and interaction, and crowd (Shone & Parry, 2001). Like the current trend of co-creation in the service industry (Vargo & Lusch, 2008), festival tourism also aims to co-create experiences with tourists. To improve experiences at festivals, the effectiveness of gamification on enhancing participation and perceived value (Huotari & Hamari, 2012) should be applied when planning the festivals. Seaborn and Fels (2015) explained that gamification is utilizing game design elements and game mechanisms in non-game situations, and pointed out that applying gamification in non-game situations could change human behavior. Xu, Weber, and Buhalis (2014) also pointed out that gamification could stimulate tourists' participation in activities and enrich their tourism experiences. Players' interactions and loyal intentions toward an activity could be strengthened through game design (Crawford, 2011), revealing the feasibility for involving gamification in festivals. Although gamification has been concerned and applied in the tourism industry, limited literature could be found in tourism academy (Xu, Buhalis, & Weber, 2017; Xu, Tian, Buhalis, Weber, & Zhang, 2016). Therefore, to contribute knowledge in festival gamification, it becomes

essential to start by establishing a Festival Gamification Scale (FGS).

This study defines festival gamification as the extent of a festival to involve game elements and game mechanisms. Gamification motivates humans to experience a physiological process that guides their persistent playing behavior toward a gamified event (Moos & Marroquin, 2010). Tourists' engagement in festival gamification could be supported by self-determination theory (SDT), which explains self-determined and self-motivated functions in motivation (Ryan & Deci, 2002). Self-determination theory emphasizes the importance of human inner competence on personality development and self-control of behaviors (Ryan, Kuhl, & Deci, 1997). Self-determination theory explains human mental growth and psychological needs as foundations for self-motivation (Ryan & Deci, 2000). In terms of what motivates people to engage in tasks, according to SDT, competence, autonomy, and relatedness are three psychological needs that drive human inner motivation (Ryan & Deci, 2000). Deci and Ryan (1980) pointed out that intrinsic motivation could sustain people's engagement in tasks more than extrinsic motivation. Therefore, this study conceptualizes festival gamification through both the intrinsic motivation of SDT and the three psychological needs.

For the three psychological needs of SDT, competence refers to people's subjective confidence about their capability to overcome tasks and challenges (Covington, 2000), autonomy represents the awareness of using actions to demonstrate personal interests and integrated values

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<https://doi.org/10.1016/j.tourman.2019.04.005>

Received 30 August 2018; Received in revised form 9 April 2019; Accepted 10 April 2019

Available online 28 April 2019

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(Deci & Ryan, 1985; Ryan, 1993), and relatedness involves meaningful connections and relationships with others (Deci & Ryan, 2002). For the intrinsic motivation of SDT, Deci and Ryan (1985) argued that intrinsic motivation drives people to actively work on something because they have fun about doing the work. Therefore, to attract players' attention and motivate them to play, it is important to involve fun elements in game design (Lazzaro, 2004; Zichermann & Linder, 2010). Driven by intrinsic motivation in playing games, players could gain mastery based on accumulated playing experiences. The process of gaining senses of mastery could sustain players' interest to play (Koster, 2013) because players may consider mastery as a type of mental reward and achievement for playing games (Zichermann & Linder, 2010). Based on SDT, competence, autonomy, relatedness, fun, and mastery are the five key elements that form the concept of festival gamification.

Former studies in festival tourism mainly focused on issues of tourists' motivations (Lee, Arcodia, & Lee, 2012; Crompton & McKay, 1997; Lee, Lee, & Wicks, 2004), special events and motivation to volunteer (Monga, 2006), ego-involvement (Havitz & Dimanche, 1999; Ryan & Lockyer, 2002), satisfaction, and revisit intention (Lee, Kyle, & Scott, 2012; Lee, Lee, & Choi, 2011; Wan & Chan, 2013), lacking discussions and understanding of gamification in festivals. Hence, the purpose of this study is to develop a Festival Gamification Scale (FGS). The development of FGS could provide valuable theoretical and practical contributions. For theoretical contributions, the conceptualization of FGS could contribute knowledge to the issue of festival gamification, and the FGS could serve as an important research tool for future studies. Compared to former tourist motivation scales, the originality and value of FGS lies in building and examining its scale items at gamified festivals, rather than simply relying on motivation theories and motivation scales. Through inputs from practitioner experts in festival gamification (interviews in study 1), frequent visitors to gamified festivals (interviews in study 1), and general tourists at gamified festivals (surveys in studies 2, 3, and 4), new insights about festival gamification could be developed in this FGS, making our FGS different from former scales in the tourism literature. For practical contributions, the development of FGS could assist festival management organizations understand the content of festival gamification, and then utilize FGS on improving planning, management, and marketing of festivals.

The following sections of this paper will be presented with literature review, four studies for developing the FGS, discussion, and conclusion. Literature review covers literature of game and gamification, SDT and gamification, and FGS dimensions. The four studies for developing the FGS include item generation (study 1), purification of measures (study 2), re-purification of measures (study 3), and model extension (study 4). The discussion includes theoretical implications and practical implications. Finally, summary of this study and limitation and suggestions for future research will be addressed in conclusion.

2. Literature review

2.1. Game and gamification

Avedon and Sutton-Smith (1971) defined games as voluntary activities controlled by regulations, which require equal competitive actions and may result in different results. Salen and Zimmerman (2004) argued games as simulated competitions that allow players to play under regulations and generate numerable results. McGonigal (2011) proposed four basic elements of games: goal, rule, feedback system, and voluntary participation. Game design enables players to achieve goals while agreeing to follow game rules, and could be designed with a reward system to inform players (McGonigal, 2011; Salen & Zimmerman, 2004). Although badges, levels and rewards are not necessary elements of game design, these elements could strengthen players' engagement (McGonigal, 2011).

Bunchball (2010) stated that game mechanics include points, challenge, levels, virtual goods, and classification table. First, points can be

used to monitor playing behavior, count scores, and provide feedback (Zichermann & Linder, 2010), stimulating players' continuous participation (Seixas, Gomes, & Filho, 2015). Second, challenge involves gaining experience through completing tasks in a game. Rewards such as badges or moving to an advanced level are offered to increase players' senses of accomplishment and to provide chances for players to show off. Third, levels are planned in a game as an organized structure to demonstrate players' positions in a game based on their achievements and experiences (Zichermann & Linder, 2010). Players are motivated to keep entering and playing a game in order to obtain the symbolic value of levels (Bunchball, 2010). Fourth, virtual goods are intangible items existing in a game. Players normally can exchange points for virtual goods, and therefore have the desire to earn more points. Fifth, a classification table is a ranking of game players based on their earned points. Being listed in a classification table is a strong incentive for players' game engagement (Bunchball, 2010), but the difficulty to get listed in the classification table may also reduce low performers' play motivation (Zichermann & Linder, 2010).

Gamification is defined as the use of game elements and concepts in non-game situations (Seaborn & Fels, 2015; Zichermann & Cunningham, 2011). Different from games that are created for fun and leisure purposes, gamification could be utilized to motivate people's engagement in non-game situations and to improve the whole engagement experience (Rodrigues, Oliveira, & Costa, 2016; Seixas et al., 2015). The effectiveness of gamification has attracted applications and explorations in several fields. In management, gamification has proved helpful in improving employees' task performance and goal commitment (Landers, Bauer, & Callan, 2017). In marketing, Harwood and Garry (2015) proposed a model of a gamified customer engagement experience, explaining the effects of gamification on positively changing customer behaviors (such as social exchange), emotions (such as fun and satisfaction), and outcomes of customer engagement (such as loyalty and relationship).

In tourism, Negrușă, Toader, Sofică, Tutunea, and Rus (2015) suggested applications of gamification in sustainable tourism in three areas: (1) developing relationships with tourists, (2) strengthening human resource management for tourism sectors (3) sustaining community support for tourism. Through focus groups, Xu et al. (2016) proposed tourists' motivation to play tourism games consisted by curiosity, explore the destination, socialize, fun and fantasy experiences, and challenge and achievement. Xu et al. (2017) further pointed out benefits of using gamification in tourism marketing as: raising brand awareness, enhancing tourist experiences, increasing engagement, improving customer loyalty, providing entertainment, and streamlining employee management. The above literature reveal the potential for utilizing gamification in festival tourism to enrich tourists' festival experiences and motivate their festival participation.

2.2. Self-determination theory (SDT) and gamification

Xu, Webber, and Buhalis (2014) pointed out that, through satisfying players' psychological needs of competence, autonomy, and relatedness in game design, players could perceive the meaning of play and become active on continuous play. In game design, in addition to utilizing the mechanism of extrinsic motivation by reward systems and badges, it is important to sustain players' active long-term engagement through stimulating their intrinsic motivation (Deterding, Dixon, Khaled, & Nacke, 2011; Ryan & Deci, 2000). Hence, according to SDT, this study focuses on both psychological needs and intrinsic motivation to conceptualize gamification.

2.2.1. Psychological needs

One of the assumptions of SDT is that people have the natural tendency to connect with personal inner feelings, other individuals, and social groups (Ryan & Deci, 2002). When individuals perceive the connection between an action with private concerns or values, they are

more willing to automatically engage in the action (Vansteenkiste, Lens, & Deci, 2006), revealing the importance of considering tourists' private psychological needs and understanding how to engage them through gamification.

Competence is defined as the capability to take actions based on integrating skills and knowledge in special situations (Hansen, 1997). Lasnier (2000) added competence is the concept of know-how-to-act, which requires the ability to integrate both cognitive and affective skills. Following the key words of know-how-to-act and the integration of Lasnier (2000), competence not only covers "know how" but also includes "know how to be" (Esfandiari, Seporaa, & Mahadia, 2015). Competence is achieved through the integration of multiple skills, and knowledge (Albir, 2007). Sometimes, people gain senses of competence through perceiving chances to show their competence in front of others (Harter, 1985). Covington (2000) argued that competence guides individuals to seek personal challenges, enables personal persistence, and plays an important role in building a personal value system. To satisfy the need for competence and obtain confidence, people seek challenges that match with or improve their own abilities (Ryan & Deci, 2002).

Autonomy represents the free willingness for people to decide and select their own actions (Deci & Ryan, 1985). Dworkin (1988) pointed out that autonomy drives people to be independent and desire certain values or emotions. People perceive the increase of autonomy on an action when they become interested and gain the chance to freely and/or independently do the action (Deci & Ryan, 1985; Ryan, 1993). That is, with autonomy, people free to show long-term engagement for interested tasks because they have freedom to independently decide their behaviors. Additionally, people's demand for autonomy is related to their personal interest and value system; even though some actions might be influenced by external factors, as long as individuals are working on their own decided actions with autonomy, they could still feel that they are actualizing their own interests and value system (Ryan & Deci, 2002).

Relatedness means people's expectations for having feelings of safety and acceptance in social settings (Ryan, 1995). In SDT, Deci and Ryan (2002) argued relatedness exists in interactive environments where individuals can freely express personal feelings without others' judgments, or even receive friendly feedback from others. People feel a sense of relatedness when they have connections with others, care or are cared for by others, or identify with social groups (Ryan, 1995). Relatedness could be built by warm feelings in social relations and close emotional connections with others (King, 2015). To enjoy the warm and emotional benefits from relatedness, people could be driven to work on social actions (Walton, Cohen, Cwir, & Spencer, 2012).

2.2.2. Intrinsic motivation

Both the amount and type of motivation influence human behavior in work and game play (Ryan & Deci, 2000). Deci and Ryan (1985) proposed two types of motivation: (1) intrinsic motivation, which refers to people's intention to automatically work on something simply because of fun or interest; and (2) extrinsic motivation, which refers to actions driven by some external factors, such as rewards, the expectations of others, or social stress (Zichermann & Cunningham, 2011). Dale (2014) explained that people could become unwilling to work on something if they are always motivated to do it purely by rewards. If the external motivation, rewards, is missing from game design, players might easily lose their motivation to play (Cruz, Hanus, & Fox, 2015; Deci, Koestner, & Ryan, 1999).

Dale (2014) explained that intrinsic motivation is driven by intrinsic rewards, which include recognition, personal achievement, responsibility, power, fun, and mastery. Adding intrinsic rewards in game design could motivate players to take game challenges and gain senses of achievement through playing experiences (Hamari & Eranti, 2011). During game challenges, players may need to cooperate with other players, gain social interaction through playing, perceive deep participation and recognition in the game by the social group, and be aware of

personal responsibility and mutual trust in the game playing group (Sailer, Hense, Mandl, & Klevers, 2013). Additionally, adding fun elements in game increases the motivation to play (Lazzaro, 2004; Zichermann & Linder, 2010). Mastery in a game is also an important intrinsic reward because players view mastery as a record for their achievement and they are proud of being in the senior level among all players of the game (Zichermann & Linder, 2010).

Based on SDT, both intrinsic and extrinsic motivations could cause changes in human behaviors (Ryan & Deci, 2000). Deci and Ryan (1980) argued that intrinsic motivation could sustain people's long-term engagements better than extrinsic motivation because people feel "they want to" rather than "they need to" under intrinsic motivation. Some studies also found that, although external game rewards such as points or badges could motivate players to play a game, creating target players' intrinsic rewards in game design is the key to sustaining long-term play (Ryan, Rigby, & Przybylski, 2006). For the purpose of sustaining tourists' long-term participation in festivals, players' intrinsic motivation should be emphasized. Therefore, this study involves the concept of intrinsic motivation from SDT into conceptualizing FGS.

2.3. Dimensions of FGS

Based on three psychological needs and two elements of intrinsic motivation in SDT, this study extracted five dimensions for FGS: competence, autonomy, relatedness, mastery, and fun. These FGS dimensions are different from factors and domains covered in former tourist motivation studies in festival tourism (Crompton & McKay, 1997; Lee et al., 2004; Monga, 2006). Crompton and McKay (1997) proposed the following six domains to be incorporated into a festival motivations scale: cultural exploration, novelty/regression, recover equilibrium (rest and relaxation/escape), known group socialization, external interaction/socialization, and family togetherness (enhancing kinship relationships). Lee et al. (2004) pointed out six factors to be incorporated into a festival motivations instrument: cultural exploration, family togetherness, novelty, escape, event attractions, and socialization. Monga (2006) developed a five-dimensional MTV (special events and motivation to volunteer) scale, including affiliatory, egoistic, altruistic, instrumental, and solidary dimensions. Each FGS dimension is explained as follows:

2.3.1. Competence

The concept of competence comes from Deci and Ryan (2002) about the feelings for people to present personal competence. This study defines competence in FGS as festival tourists' feelings about how much they could present their ability to achieve personal goals in a festival. For example, tourists at a marathon festival may feel high in competence when achieving the goal of a 10K run. Players normally intend to achieve game goals through their own competence (Xu et al., 2014). To enhance players' perceived competence in game play, Xu et al. (2014) suggested that goals in game design should be clear, feasible, and attainable. Sometimes, big challenges could be separated into small gates allowing players to gradually achieve goals (Groh, 2012). Positive feedback or reward systems are important for encouraging players' continuous play (Xu et al., 2014). To improve players' perceived competence, Groh (2012) proposed the concept of juicy feedback, and explained that "juicy" means the feedback should be made fresh and made by various approaches. Based on received juicy feedback, players could feel from various moments in playing experiences that they are capable of continuing a game. In festival gamification, festival experiences should be designed with challenges and reward systems for tourists to attain competence.

2.3.2. Autonomy

The concept of autonomy comes from Deci and Ryan (1980) about individuals' willingness to work on something and have the right to make decisions. This study defines autonomy in FGS as festival tourists'

perceived flexibility for types and depths of participation in a festival. For example, tourists at a cosplay festival could enjoy a sense of autonomy when they freely decide what to dress up as for the festival and how to interact with other tourists at the festival. Autonomy in game design implies the feasibility for players to freely decide when to enter or exit a game (Xu et al., 2014). To improve perceived autonomy, game design could offer flexible options for mission completion or add dynamic reward systems to positively encourage different types of play actions (Ryan et al., 2006). It is important to notice that players may lose intention to play once they feel lack of autonomy due to being controlled by fixed game systems (Deterding et al., 2011; McGonigal, 2011). Based on the above, to involve gamification in festivals, flexibility in participation and dynamic reward systems should be designed for tourists to perceive autonomy.

2.3.3. Relatedness

The concept of relatedness comes from Akbari, Pilot, and Simons (2015) about the feelings to be needed by others and belong to a social group. This study defines relatedness in FGS as festival tourists' feelings about how they connect or interact with other tourists in a festival. For example, tourists at a music festival may share their passion for a musician with other tourists nearby, and these tourists may become good friends through the music festival. Xu et al. (2014) argued the importance of relatedness in gaming exists in the cooperation with other players to complete game challenges or experience sharing through social networking with other players. Through relatedness, players become connected to each other and enjoy a sense of community. The social groups established in a game could sustain mutual support on continuous play (McGonigal, 2011). McGonigal (2011) mentioned that social connection in a game could also improve players' subjective well-being through a sense of belongingness. Taken together, to enhance gamification in festivals, tourists' feelings of relatedness should be considered in festival planning, making tourists feel they are part of the community.

2.3.4. Mastery

The concept of mastery comes from Pearlin and Schooler (1978) referring to individuals' senses of having control over progress in situations, abilities, and life events. This study defines mastery in FGS as festival tourists' feelings about the progression of their abilities, skills, and knowledge during a festival. For example, tourists at a wine festival may perceive high in mastery when attending sessions of wine testing and gaining knowledge of wine from the festival. Zichermann and Linder (2010) called the concept of mastery as progression to maturity, meaning the importance to emphasize the progress of advancement. To assist players in achieving mastery, games should be designed with different levels of difficulty for players to gradually gain skills and confidence through achievements and rewards (Koster, 2013). For players, mastery itself could be considered a mental reward which motivates them to achieve advancements through passing levels in a game (Zichermann & Linder, 2010). Following former findings of the usefulness of mastery in game design (Koster, 2013; Zichermann & Linder, 2010), festivals could be planned with a series of attractive activities for tourists to participate in and subsequently experience the positive feelings of mastery. Dividing a difficult big challenge into small pieces and allowing tourists to gradually pass the final big challenge is helpful for gaining mastery in festivals.

2.3.5. Fun

The concept of fun refers to the feelings of enjoyment (Koster, 2013). This study defines fun in FGS as festival tourists' feelings about the extent of enjoyment in a festival. For example, tourists at a lantern festival may have fun because of the interesting design and the beauty of the lanterns. Lazzaro (2004) proposed four keys to creating fun in a game: hard fun, easy fun, altered states, and the people factor. First, hard fun refers to the opportunities for players to have fun by passing

challenges in a game. To pass levels in a game, players sometimes need to utilize strategies and think creatively, thereby enjoying positive feeling from their achievements when getting advancements. Second, easy fun represents the pure pleasure gained in a game. Players could perceive easy fun from interesting designs or cute elements of a game, exploring funny or attractive game stories or content, or simply feeling relaxed when forgetting daily tasks during play. Third, altered states are functions of therapy from games that allow players to reduce negative emotions while increasing positive mental feelings. Fourth, the people factor strengthens fun in a game through enjoying friendship and cohesion, social interaction, or pursuing common goals through teamwork. Koster (2013) added that fun feelings of a game come from learning and suggested that game design should assure that players could keep getting chances to learn before exit the game because they always feel bored and uninterested when there are no new things to learn. Based on the above, festivals should be planned with the four keys and learning chances for tourists to have fun in the gamified festivals.

3. Developing the FGS

According to the guidelines suggested by Churchill (1979), the FGS was developed through a multi-study method, including steps for defining constructs, generating items, purifying measures, and assessing scale reliability and validity. The overall procedure for developing FGS includes four studies. In study 1, items for FGS were generated by literature review and in-depth interviews. Then, three festivals with gamification features were selected for studies 2, 3, and 4. In study two, to measure purification, data was collected from a cycling festival, Mt Wuling Cycling, and analyzed by explorative factor analysis. In study three, to confirm the measures purified from study two, data was collected from a marathon festival, Taiwan's Rice Heaven—Tianzhong Marathon, and analyzed by confirmatory factor analysis. To check model extension, different from data collection from sport festivals in study two and three, data was collected from a religious festival, Dajia Mazu Pilgrimage, for cross-validation analysis in study four.

3.1. Study 1: item generation

Following Churchill (1979), this study explored dimensions of FGS through literature review, and then conducted in-depth interviews to generate items for FGS. Five dimensions for FGS emerged through literature review: competence, autonomy, relatedness, mastery, and fun. To systematically complete the understanding and content of FGS, in-depth interviews were then conducted to extract items. The number of interviewees was decided by information saturation, which exists when there is no new information regarding the same questions by adding one more interviewee. A total of twelve interviewees (age, 30–75 years) participated in this study. Four of them were experts in festivals and tourism with related work or research experiences. Eight were frequent festival tourists with festival experiences at Dajia Mazu Pilgrimage, Taiwan's Rice Heaven—Tianzhong Marathon, Taipei Marathon, Mt Wuling Cycling, Ingress Mission Day In Tainan, and Asia Super Team. Table 1 shows profiles of these twelve interviewees, consisting of five males and seven females. Two had high school degrees, four had bachelor degrees, and six had graduate degrees. The length of the interviews ranged from 50 min to 90 min. After the in-depth interview with the twelfth interviewee, no new information was found compared to the former eleven interviews, representing information saturation of the information collection.

Each dimension of FGS was defined by literature review before in-depth interviews. In the beginning of in-depth interviews, interviewees read definitions of these five dimensions (competence, autonomy, relatedness, mastery, and fun) and the definition of festival gamification. Then, each participant answered the same semi-structured questions regarding each dimension of their festival experiences. These semi-

Table 1
Interviewees' profile.

No.	Institution	Position	Gender	Age	Education	Tenure ^a	Length ^b
1	Department of Tourism and Leisure, Hsing Wu University	Assistant Professor	Female	55	Ph.D.	5	60
2	Chiayi County Government	Consultant	Male	75	Master	45	75
3	Tourism Bureau, Republic of China (Taiwan)	Technical Specialist	Female	43	Bachelor	18	75
4	Chinese Taipei Road Running Association	Consultant	Male	60	Master	35	80
5	Tourism Bureau of Tainan City Government	Division Chief	Female	43	Master	22	75
6	Taiwan External Trade Development Council	Section Chief	Female	49	Master	23	60
7	Section of Agricultural Extension, Sikou Township	Advisor of Home Economics	Female	62	High school	27	75
8	NA	Housewife	Female	47	High school	0	50
9	Freelance	NA	Male	32	Bachelor	2	60
10	Administration of Alishan National Scenic Area	Administrative assistant	Female	39	Bachelor	15	60
11	TH Industries	Business Specialist	Male	30	Bachelor	3	75
12	Siang Lin Elementary School	Teacher	Male	39	Master	14	90

Note.

^a Length of job tenure is measured by years.

^b Length of each interview is measured by minutes.

structured questions included: (1) based on your personal festival experiences, please share how you perceive “competence” at festivals; (2) based on your personal festival experiences, please share how you perceive “autonomy” at festivals; (3) based on your personal festival experiences, please share how you perceive “relatedness” at festivals; (4) based on your personal festival experiences, please share how you perceive “mastery” at festivals; (5) based on your personal festival experiences, please share how you perceive “fun” at festivals; and, (6) based on your personal festival experiences, please share how you perceive festival gamification, especially the experiences not covered in the above five dimensions. To collect rich experience sharing, interviewees were encouraged to give examples from their visited festivals to answer these questions.

All the interviews were recorded by a recording pen and transcribed into transcripts. Recorded responses were systematically categorized by content analysis (Kassarjian, 1977). One event researcher and one expert in content analysis worked as assessors and coded the transcripts independently into 296 statements. These two assessors read and classified items iteratively, reaching agreement of 279 statements. The 279 statements were then narrowed down by assessors into 33 statements under six dimensions. Inter-assessor reliability of these two assessors exceeded 0.90, showing high content validity in this classification (Davis & Cosenza, 1993). Table 2 shows results of this content analysis and sample statements for each item. The code is named by “number of the interviewee-number of the sorted dimension-number of sorted item of the dimension.” For example, A1-3-2 is a coded statement sorted into the second item of the third dimension from the first interviewee. Number of coded statements ranged from 37 to 79 in each dimension, and the number of coded statements ranged from 5 to 11 in each item.

Through in-depth interviews, this study found one new dimension for FGS, narratives. Different types of festivals were used by interviewees to share statements about narratives. This study defines narratives in FGS as: the level of narrative sense in a festival. Narratives is very helpful in human reasoning, enabling people to attach meaning with their experiences, frame thought, and guide actions (Polkinghorne, 1988). The function of game narratives is to create stories about characters and plots under the time sequence of beginning, middle, and end (Lu, 2015). Through narrative game scenarios, players can get involved in the game and be guided to obtain and practice related game skills (Malone, 1981). The concept of narratives is commonly used by storytellers or writers to attract audiences and readers to get immersed into the relationships among characters, events, and situations (Moyer-Gusé, 2008; Slater, 2002). Additionally, narratives have been utilized to improve comprehension in information communication (Laurillard, 1998) as well as serving as a means of navigation in multi-media environments (McLellan, 1993).

Finally, 33 statements for FGS were identified and categorized into

six dimensions, including four statements for competence, five statements for autonomy, five statements for relatedness, six statements for mastery, eight statements for fun, and five statements for narratives.

3.2. Study 2: purification of measures

The 33 items generated from study 1 were turned into a survey questionnaire and were rated by a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Through convenience sampling, the survey questionnaire was distributed at a cycling festival, 2016 Mt Wuling Cycling, in Taiwan. A total of 226 valid responses were collected. The subjects to item ratio was 6.85:1, passing the criteria of 5:1 suggested by Gorsuch (1974).

In data analysis, item-to-total correlations were analyzed for the 33 items, passing the criteria of 0.30 (Churchill, 1979). Exploratory factor analysis (EFA) with a component analysis and orthogonal varimax method was then conducted. Based on eigenvalue and scree plot to identify numbers of factors, this study found five factors for FGS (Hair, Black, Babin, & Anderson, 2010). To purify measures, items were deleted if their eigenvalue were lower than one or if they had factor loadings lower than 0.5 on one factor and higher than 0.3 on other factors. Based on these criteria, 13 items were deleted. To ensure the data had sufficient inherent correlations to run EFA, Kaiser-Meyer-Olkin (KMO) and Bartlett test of sphericity were analyzed. The KMO index was 0.872, and Bartlett's test of sphericity was significant at the level of 0.001, justifying the use of EFA. The scree plot showed that a 20-item five-factor solution (competence, relatedness, mastery, fun, and narratives) was the optimal solution. The combined factor loadings accounted for 64.66% of the total variance. Table 3 shows the EFA results of the 20-item FGS.

3.3. Study 3: Re-purification of measures

3.3.1. Confirmatory factor analysis

Study 3 aims to re-evaluate the factor structure of FGS using confirmatory factor analysis (CFA), and examine its criterion-related validity. The CFA model is a first-order five-factor oblique model. Using a survey questionnaire with the 20-item FGS developed from study 2, data for CFA was collected by onsite convenience sampling from a marathon festival, 2016 Taiwan's Rice Heaven—Tianzhong Marathon. A total of 253 valid responses were received from the marathon festival and the subjects to item ratio was 12.65:1, passing the criterion of 5:1 for sample size by Gorsuch (1974).

Using LISREL 8.80, the CFA was performed with maximum-likelihood. Based on Hair et al. (2010), four low-loading items (< 0.50) in CFA were removed, resulting in sixteen items under five dimensions. Then, the five-dimensional 16-item FGS showed high fit indices

Table 2
Results of the content analysis.

Items	Sample coded statements	Number ^a
Competence		37
X1. I feel I could grow in this activity.	"Like there are some many road running races. And you would probably start with a few, say 3 km, and then I gradually add more. So eventually I could make a 13-k race." (A10-1-1)	8
X2. I feel I could do well regarding the content in this activity.	"I did a poe divination for the Salt of Peace Festival. Regarding the divination, one could say it might be from the deities or how piously you dedicate. But at the moment when I did it, it was more of my own sense of accomplishment." (A5-1-2)	9
X3. I am capable of participating in this activity.	"During the Dajia Mazu Pilgrimage, I had a lot of fun biking along, and didn't actually feel tired." (A8-1-3)	10
X4. I feel my physical strength is ok for this activity.	"The first time I did 21-k. I thought the scenery around Tien-Hsiang was really gorgeous, but it was beyond the turning point of the 21-k route. Next year I did the 42-k, and I was really satisfied by getting there and ultimately seeing the scenery." (A9-1-4)	10
Autonomy		38
X5. I can choose the content of the activity according to my own interest.	"The maps of the Mission Day, hosted by Tainan City Government, they are independent from each other. They are the pictures of each site. So you're not limited to start from point A and have to work one after another all the way to point Z. Therefore, you won't get everyone crowded from point A to point Z, and everyone can spread out and pick the sites they choose to complete first." (A5-2-1)	10
X6. I could freely choose the way I participate in this activity.	"Take the Dajia Mazu Pilgrimage. There is this hope that people of different ages can all achieve their goals very easily. Like there isn't even a threshold. It only takes one to show up and meet whatever goal one sets." (A1-2-2)	10
X7. I feel this activity allowed me to express my own style.	"During the process of Tianzhong Marathon, I could engage in cosplay, with funny characters such as Hello Kitty or Piggy, Snow White, etc." (A4-2-3)	6
X8. I feel this activity has a special meaning to me.	"As you run, you can have a clear look of the people and things along the road. These will easily imprint on your memory, since you are recording all these in a slower pace. You can really experience the custom and customs, and experience the beauty of Taiwan." (A9-2-4)	6
X9. I could reflect on my daily life experience through the experience of participating in this activity.	"Although this was my first time in Mt Wuling Cycling, and a typhoon was also coming, I kept telling myself 'never give up,' repeatedly. For some unknown reason I was persistent, tough, and steadfast." (A12-2-5)	6
Relatedness		46
X10. I had a chance to meet others who participated.	"I would take the initiative and look out for others. 'How're you doing today?' And the next day when I met them, 'oh, hello again!' And then we might exchange numbers afterwards." (A7-3-1)	6
X11. I enjoyed completing this activity with other participants.	"In some of these activities, it takes a team to work together, and people need to cooperate. For example, the assignment might be puppets, like Taiwanese glove puppetry drama. And you need to paint the puppets, and put out a show, a fairy tale. And this would take the five members of our team to work together." (A6-3-2)	10
X12. It was comfortable for me to participate in this activity with others.	"While running is running, most of the time I do it alone. But during the race, there are people I can chat with, making it a lot more fun!" (A9-3-3)	8
X13. I like that the host provided an opportunity for participants to interact and socialize.	"The other day I joined a beer relay race, held within the club. Five people were put in a group, and we ran to, say Taichung City Hall. All five groups started together, and the next runner goes after the previous one finishes a loop. And whoever comes back first wins the race, and you get treated beer. It mandates the interaction and bonding among your group members." (A9-3-4)	11
X14. I like the interaction with other participants in this activity.	"When we took a break during the pilgrimage, we would give each other a massage, or to rally and cheer each other up. It felt very warm and sweet." (A8-3-5)	11
Mastery		38
X15. I feel it was not easy to fully participate in the entirety of this activity.	"I have taken part in this activity five years in a row. But each time I could only join for three days. It would visit one hundred temples. My physical condition prevents me from take the entire journey." (A7-4-1)	5
X16. I could take a step-by-step approach to complete the contents of this activity throughout the process.	"In a road race, I would often 'hit the wall' around 25th to 26th or 38th to 39th kilometer. But I would talk to myself that I could finish it. I would enjoy the juxtaposition of physical pain and a status of mental joy." (A5-4-2)	5
X17. There were some challenges to overcome in the participation of this activity.	"Take Asia Super Team as an example. It's like they have had one round of filtering online, and the top five teams come to Taiwan. It's like they have competed in our games, through challenges we had designed in advance. And it's through the process of taking part in these games that they could win their scores." (A6-4-3)	6
X18. It took some brains, and not only pure luck, to complete the content of this activity.	"A cycling race over 100 hundred kilometers takes some pacing. You can't sprint all the way through, or go at a very slow speed for that matter. The physical strength is bound to drop gradually. And you try to maintain at whatever rate for the first 30 km of the entire hundred. As your energy drops, the speed is definitely going to drop as well, but you try your best to slow the drop, especially against the heat during the mid-noon, which accelerates the drop for sure." (A3-4-4)	6
X19. I was constantly encouraged by the accumulated experiences throughout my participation to continue and complete this activity.	"First time I lost in a road race, I would think 'I would lose steam at the end if I run so fast in the beginning.' Later I thought to myself 'I could be a sustainable battery, because I know what technique, what strategy I'll apply to pace myself.'" (A4-4-5)	9
X20. Through the completion of each phase of this activity, I feel there was a gradual improvement of my relevant abilities.	"In comparison to most people I am still quite behind, at the beginner level. Many do about one hundred marathons in two years, and they complete one in three to 4 h. But nonetheless, it's not necessary to compete with others. It's more important to overcome myself and have some growth. You got to stay positive." (A9-4-6)	7
Fun		79

(continued on next page)

Table 2 (continued)

Items	Sample coded statements	Number ^a
X21. I feel I could explore new things through this activity.	"In Taiwan, there are six to eight hundred marathons each year. I could do the one at Danda Forest Road to get close to the mountains, or others that feature produce like the Red Wine Marathon, or the Yanchao Dates Marathon. Nowadays there are more competitions with fresh issues, adding more fun to the game." (A10-5-1)	11
X22. I feel the process of participating in this activity could bring me an abundant sensory experience.	"It might be said that there would be cheer leaders of pretty chicks or high school girls for some marathons, coming to cheer for you. Some would hear the rumor and would then sign up with great expectations." (A4-5-2)	10
X23. I feel the process of experiencing and participating in this activity could stimulate my own imagination.	"This year at the award presentation ceremony of Asia Super Team, each team were told to design and do ten different poses, to illustrate their team morale. This is also one of the graded categories for them." (A6-5-3)	9
X24. I feel there was perceivable creative ingenuity in the design of this activity.	"At one stop I heard them playing 'Pen Pineapple Apple Pen,' at another there was dragon and lion dance, and at yet another there was a martial parade formation of four or five people. Each stop was quite fun, never boring, and you got treated food as well as having some fun and take a picture with them." (A10-5-4)	11
X25. I feel this activity could stimulate my curiosity.	"The Puli iRunning Club offered to host a stop. And they announced before the competition that they would be providing wild boar pork barbecue and beer. A lot of people might have gone solely to get that." (A4-5-5)	8
X26. I felt the uniqueness of this activity.	"Like in the Tianzhong Marathon, the track was quite plain and flat, and the whole town gathered around the track and cheered for me. And Yan Yongneng, a singer, wrote a theme song for this activity, and there was live performance. It's was so cool!" (A9-5-6)	10
X27. The facilities of this activity brought pleasure to my participation experience.	"During the pilgrimage, when I could no longer walk, I could hop on a shuttle. Along the way there were also stands with free food provided by local people, and free accommodation. It was very heart-warming." (A8-5-7)	9
X28. The service planned in this activity made me comfortable.	"So far the activity offers apps or Facebook links for live streaming and interacting between bikers. Ginger tea, mineral water, and fruits are provided at stops. And there's also the cheering for the final sprint, which makes you feel so good!" (A11-5-8)	11
Narratives		41
X29. I was interested in the origin of this activity from the beginning.	"For a Taiwanese biker, Mt Wuling Cycling is a must-go once in a lifetime, because of its slogan, advocating it as road of the heros, 'Veni, vidi, vici.'" (A12-6-1)	11
X30. I like relevant stories or reports of this activity.	"Actually, before coming to Taiwan, one might need to have some understanding of Taiwan's stories. The organizer would set up a specific website, so that contestants could browse over there and know a little bit of Taiwan's historic background, and the country's special cultures and traditions. Then, as they physically are here, participating in activities, more or less there would also be stuff like that for exploration." (A6-6-2)	8
X31. I understand the relevant stories of this activity.	"The theme of Tainan Cuisine Festival is mastery. The way a chef uses ground pork sauce, it can be used on rice, dry noodles, or the famous soup noodles. After identifying all these different categories of street food, [the organized] would seek volunteers from these restaurants, and would hide clues or props in them. And the participants would sign up and be put into groups, and would go on to solve the puzzle. And those who finish first, and come back with perhaps a completed puzzle, would be awarded." (A5-6-3)	8
X32. My personal emotion would ebb and flow along with the process of participating in this activity.	"Reality game is a big thing in Tainan now, found in Anping as well. It's like the treasure hunt for <i>Koxinga's</i> treasure. It's basically riddle solving. You probably need to know some history about Cheng ChengKung, about early Taiwanese development in Anping. And then you can decipher the clues one by one, and get the puzzle pieces to transfer yourself back to the present. Therefore, in this game you'll have to dress in clothes of the Ching Dynasty, because you've been transferred back to that time, and you need to solve the riddles to return to the present." (A5-6-4)	7
X33. I am interested in knowing the itinerary and content planning of this activity.	"The mission day held by Ingress in Tainan city, the city government picked twelve sites. Around each of them there were six mini-sites, which you need to conquer in order to get the picture of the main site. That means in total there would be seventy-two sites. And you had to get to the sites. That's how you're required to explore those sites in depth, to attack that photo, and to gain that virtual medal you want." (A5-6-5)	7
Total	279	

Note.

^a Number of coded statements.

($\chi^2 = 149.73$, $df = 94$, $p < 0.05$, $\chi^2/df = 1.59$, $GFI = 0.93$, $SRMR = 0.05$, $RMSEA = 0.05$, $NFI = 0.95$, $NNFI = 0.98$, $CFI = 0.98$, and $AGFI = 0.90$) in CFA. Table 4 shows the results of CFA. All sixteen items were significant ($p < 0.01$) with factor loadings ranging from 0.59 to 0.90, all factor loadings are higher than 0.45, t-values of factor loading were significant ($p < 0.01$) in all items, all factors' composite reliabilities exceeded 0.7, and all factors' average variance extracted exceeded 0.5. Table 5 shows that the coefficients for correlations between pairs of factors were lower than 0.85 and lower than the squared root of AVE of each factor, proving adequate discriminant validity (Fornell & Larcker, 1981; Hung & Petrick, 2010). All factors' composite reliability (CR) ranged from 0.76 to 0.80, showing adequate internal consistency (Hair et al., 2010). Results shown above confirmed reliability and validity of the five-dimensional sixteen-item FGS (Bagozzi & Yi, 1988).

3.3.2. Dimensions of FGS, flow experience, and intention to revisit

The concept of flow experience was originally from Csikszentmihalyi (1975), referring to the optimal psychological status when individuals recognize something efficiently, deeply engage in something, have high motivation to do something, and/or gain high happiness through experiencing something. The flow experience is the integration of several senses, including having clear goals, gaining rewards, facing capable challenges, paying attention, trying to focus, controlling personal intentions and behaviors, losing self-awareness, forgetting time, and having goals for actions (Csikszentmihalyi, 1997). Revisit intention refers to the behavioral loyalty perceived by a tourist toward a destination (Batra, Ahuvia, & Bagozzi, 2012; Loureiro & Kaufmann, 2012). Most researchers measure revisit intention by the extent of tourists' willingness to visit the same destination again in the future, and whether tourists consider a destination as the top priority to

Table 3
Results of EFA (cycling festival, n = 226).

Items	Mean	Factor loading	Variance (%)	Cronbach's α
Factor 1: Relatedness			34.36	.87
X13 I like that the host provided an opportunity for participants to interact and socialize.	3.81	0.80		
X 14 I like the interaction with other participants in this activity.	3.79	0.79		
X 10 I had a chance to meet others who participated.	3.83	0.74		
X 11 I enjoyed completing this activity with other participants.	3.90	0.74		
X 12 It was comfortable for me to participate in this activity with others.	3.86	0.65		
Factor 2: Mastery			9.77	.83
X 19 I was constantly encouraged by the accumulated experiences throughout my participation to continue and complete this activity.	3.96	0.77		
X 21 I feel I could explore new things through this activity.	4.01	0.75		
X 17 There were some challenges to overcome in the participation of this activity.	4.02	0.74		
X 22 I feel the process of participating in this activity could bring me an abundant sensory experience.	4.02	0.67		
X 20 Through the completion of each phase of this activity, I feel there was a gradual improvement of my relevant abilities.	3.93	0.67		
Factor 3: Competence			8.24	.74
X 4 I feel my physical strength is ok for this activity.	3.86	0.87		
X 3 I am capable of participating in this activity.	4.03	0.87		
X 2 I feel I could do well regarding the content in this activity.	3.80	0.56		
X 5 I can choose the content of the activity according to my own interest.	4.08	0.55		
Factor 4: Fun			6.71	.76
X 24 I feel there was perceivable creative ingenuity in the design of this activity.	3.56	0.85		
X 23 I feel the process of experiencing and participating in this activity could stimulate my own imagination.	3.63	0.73		
X 25 I feel this activity could stimulate my curiosity.	3.66	0.63		
Factor 5: Narratives			5.58	.73
X 31 I understand the relevant stories of this activity.	3.50	0.79		
X 29 I was interested in the origin of this activity from the beginning.	3.76	0.75		
X 30 I like relevant stories or reports of this activity.	3.67	0.69		

Table 4
Results of CFA (marathon festival, n = 253).

Items	Mean	Factor loading	t-value of factor loading	Construct reliability	Average variances extracted
Factor 1: Relatedness				0.78	0.55
X 12 It was comfortable for me to participate in this activity with others.	3.96	0.60	9.32		
X 13 I like that the host provided an opportunity for participants to interact and socialize.	3.91	0.75	14.38		
X 14 I like the interaction with other participants in this activity.	3.95	0.85	10.05		
Factor 2: Mastery				0.80	.50
X 19 I was constantly encouraged by the accumulated experiences throughout my participation to continue and complete this activity.	3.98	0.68	9.52		
X 20 Through the completion of each phase of this activity, I feel there was a gradual improvement of my relevant abilities.	3.98	0.64	12.48		
X 21 I feel I could explore new things through this activity.	4.00	0.75	14.55		
X 22 I feel the process of participating in this activity could bring me an abundant sensory experience.	4.04	0.75	11.32		
Factor 3: Competence				0.76	0.52
X 2 I feel I could do well regarding the content in this activity.	3.77	0.59	10.33		
X 3 I am capable of participating in this activity.	3.95	0.90	12.76		
X 4 I feel my physical strength is ok for this activity.	3.81	0.64	12.76		
Factor 4: Fun				0.77	0.53
X 23 I feel the process of experiencing and participating in this activity could stimulate my own imagination.	3.74	0.67	10.85		
X 24 I feel there was perceivable creative ingenuity in the design of this activity.	3.78	0.76	12.63		
X 25 I feel this activity could stimulate my curiosity.	3.73	0.75	12.34		
Factor 5: Narratives				0.79	0.56
X 29 I was interested in the origin of this activity from the beginning.	3.77	0.69	11.43		
X 30 I like relevant stories or reports of this activity.	3.83	0.83	14.28		
X 31 I understand the relevant stories of this activity.	3.62	0.72	12.09		

visit compared to other similar destinations (Kim, Kim, & Kim, 2009; Loureiro & Kaufmann, 2012).

To assist players in gaining flow experience in playing games, game developers consider the pairing between players' skills and game challenges (Sweetser & Wyeth, 2005). Some games are designed for players enjoy flow experience through gradually offering small challenges toward long-term goals (Groh, 2012). Through passing small challenges, players mature game skills and receive game rewards, as well as enjoy flow experience in the playing process (Chen, 2007). Meanwhile, players and tourists in sport festivals could develop

affective connection to the festivals, as well as performing loyalty behaviors to the festivals (Filo, Funk, & O'Brien, 2010; Funk & James, 2006). Experiences and perceived environmental cues give tourists hedonistic value and social identification at sport festivals, resulting in the development of tourists' intention to revisit toward the festivals (Grappi & Montanari, 2011). Therefore, festivals that involve game design elements and game mechanisms should be able to significantly improve tourists' flow experience and intention to revisit. Based on the above, dimensions of FGS are hypothesized to be positively related to flow experience and intention to revisit.

Table 5
Correlations and squared roots of AVE (marathon festival, n = 253).

	Factor1	Factor2	Factor3	Factor4	Factor5
Factor 1: Relatedness	0.74				
Factor 2: Mastery	0.59	0.71			
Factor 3: Competence	0.44	0.39	0.72		
Factor 4: Fun	0.52	0.55	0.32	0.73	
Factor 5: Narratives	0.43	0.50	0.46	0.60	0.75

Notes: 1. The diagonal elements are the squared root of the average variance extracted.

2. The off-diagonal elements are the correlations between the constructs ($p < 0.05$).

3.3.3. Criterion-related validity

In section 3.3.2, this study argues the extent of gamification in a festival could improve tourists' perceived flow experience. To examine criterion-related validity of FGS, effects of FGS dimensions on both flow experience and intention to revisit were tested. A three-item scale revised from Han (1988) was used to measure flow experience. A two-item scale revised from Kim et al. (2009) was used to measure intention to revisit. All the items were rated by a five-point Likert-type rating scale ranging from (1) for "strongly disagree" to (5) for "strongly agree." As shown in Table 6, all coefficients were significant at the 0.01 level, supporting criterion-related validity of FGS.

3.4. Study 4: model extension

Model extension is a cross-validation analysis to check replicability of FGS in different types of festivals. Since samples collected for both EFA and CFA were from sport festivals, for testing model extension, this study collected 219 valid survey samples through onsite convenience sampling with the sixteen-item FGS from 2016 Dajia Mazu Pilgrimage, a famous religious festival in Taiwan. The subjects to item ratio was 13.69:1 of the data from Dajia Mazu Pilgrimage, passing the criteria of 5:1 by Gorsuch (1974). Following multi-group analysis (Jöreskog & Sörbom, 1993), model extension was analyzed by comparing the data from Taiwan's Rice Heaven—Tianzhong Marathon and the data from Dajia Mazu Pilgrimage.

Dajia Mazu Pilgrimage covers features of the five FGS factors. First, while attending the pilgrimage, participants get chances to interact with other participants during the nine-day walk. Very often, participants would encourage each other to complete the long walk, exchange religious experiences, and become friends along the way. Meanwhile, participants gain social interactions with residents along the route, especially those who donate food and services to the pilgrims. These interactions support the FGS factor of relatedness. Second, in the FGS factor of mastery, some participants take the Dajia Mazu Pilgrimage as a must-complete activity at least once in a lifetime. It's common to see, among the pilgrims, elders who have attended every year for decades. Third, because the whole Dajia Mazu Pilgrimage takes nine days to walk the entire 400 km, it takes physical strength, stamina, and perseverance to complete, representing the FGS factor of competence. Fourth, in the fun factor, the festival experience at Dajia Mazu

Table 6
Results of criterion-related validity (marathon festival, n = 253).

Factor	Flow Experience	Intention to Revisit
Factor 1: Relatedness	.53 ^a	.52 ^a
Factor 2: Mastery	.70 ^a	.54 ^a
Factor 3: Competence	.66 ^a	.48 ^a
Factor 4: Fun	.53 ^a	.62 ^a
Factor 5: Narratives	.58 ^a	.65 ^a

Note.

^a Correlation coefficients are significant at the 0.01 level.

Pilgrimage includes several fun religious activities, such as receiving Mazu's blessings through diverse rituals, visiting over one hundred temples, and getting food and service donations offered by local residents along the route. Fifth, in its narratives, based on the long history of Dajia Mazu Pilgrimage, significant amount of religious experience stories and participants' self-reflections are reported in domestic and international news. Participants not only experience what have been reported, but also create something spiritual and individual to be reported through their own participation.

Table 7 shows the results of the cross-validation analysis, which covers strategies of loose replication, moderate replication, and tight replication (MacCallum, Roznowski, Mar, & Reith, 1994). As listed in Table 7, contributions to the chi-square test for the validation sample were 40.44% in loose replication, 40.77% in moderate replication, and 43.95% in tight replication. Findings of the loose replication confirmed that the same factor structure could be found in both the marathon festival (Taiwan's Rice Heaven—Tianzhong Marathon) and the religious festival (Dajia Mazu Pilgrimage). The $\Delta\chi^2$ value between the loose replication and the moderate replication was 24.85 (with 16 *df*, $p > 0.05$), indicating samples from these two festivals were equivalent to the factor loadings. The $\Delta\chi^2$ value for these two models between the moderate replication and the tight replication was 99.30 (with 26 *df*, $p < 0.05$), proving inconsistency of measurement errors and construct-level metrics between these two samples. Additionally, the lowest value of ECVI existed in the moderate replication model. Based on the above, factor loading matrix invariance existed in the FGS cross samples collected from the marathon festival and the religious festival (Cheung & Rensvold, 2002), confirming the extended FGS model had good external validity.

4. Discussion

Based on SDT, this study conceptualized the concept and content of festival gamification, and developed a systematic and comprehensive set of items for FGS. Following the multi-study method of Churchill (1979), the scale development process was conducted through steps of item generation, purification of measures, re-purification of measures, and model extension. Finally, a five-dimensional 16-item FGS was developed, which includes dimensions of relatedness, mastery, competence, fun, and narratives. It is interesting to notice that although competence, autonomy, relatedness, mastery, and fun are the five dimensions extracted through literature review for FGS, during the scale development process, "autonomy" was deleted while "narratives" was added as one dimension of FGS.

4.1. Theoretical implications

This study contributes several valuable theoretical implications. First, this study enriches the knowledge of festival gamification by proposing the concept and items of FGS. The concept of gamification has been studied in management (Landers et al., 2017), marketing (Harwood & Garry, 2015), and tourism (Negruşa et al., 2015; Xu et al., 2014, 2016, 2017). However, limited literature could be found to propose measurement scales for gamification. To fulfill this knowledge gap, based on SDT, this study developed a multi-dimensional FGS with 16 items. The development of FGS advances studies in gamification from the use of gamification into non-game contexts into measuring the extent of gamification in a multi-dimensional approach. The application of FGS can not only be utilized in festivals, but also in other contexts such as educational activities, employee development programs, or marketing campaigns. For the tourism academy, the FGS could further be applied in other sub-fields such as destinations, theme parks, cruise trips, or resorts.

Second, this study highlights the importance of narratives as a dimension in FGS. "I understand the relevant stories of this activity," "I was interested in the origin of this activity from the beginning," and "I

Table 7
Results of the cross-validation analysis.

Strategy	Overall model fit		Contribution to chi-square		%
	MFF χ^2 (df)	WLS χ^2 (df)	ECVI	MFF χ^2 (df)	
Loose replication	369.37 (188)	366.74 (188)	1.14	149.39 (188)	40.44
Moderate replication	394.22(204)	391.18 (204)	1.12	160.73 (204)	40.77
	$\Delta\chi^2 = 24.85, \Delta df = 16, p > 0.05$			$\Delta\chi^2 = 11.34, \Delta df = 16, p > 0.05$	
Tight replication	493.52 (230)	526.02 (230)	1.30	216.89 (230)	43.95
	$\Delta\chi^2 = 99.30, \Delta df = 26, p < 0.05$			$\Delta\chi^2 = 56.16, \Delta df = 26, p < 0.05$	

Note: marathon festival, n = 253; religious festival, n = 219.

like relevant stories or reports of this activity” are three items under narratives in the FGS. Although the dimension of narratives was not extracted from literature review and SDT, findings of in-depth interviews revealed the key role of narratives in festival gamification. This finding confirmed former literature (Lu, 2015; Schneider, Lang, Shin, & Bradley, 2004) about the role of stories and narratives in game design. For festival tourism, narratives represent the history, legend, story, memory, and tradition that form reasons for the celebration of festivals (Getz, 2005). Hence, the dimension of narratives in FGS demonstrates a key role to represent the specific feature for gamification in festivals.

Third, different from previously developed tourist motivation scales (Crompton & McKay, 1997; Lee et al., 2004; Monga, 2006), FGS is a new scale specifically developed for festival gamification. Compared to Crompton and McKay (1997), Lee et al. (2004), and Monga (2006), FGS demonstrates its uniqueness and originality at its dimensions and items. One significant new element is one of the aforementioned FGS dimensions, namely, narratives. The concept of narratives did not exist in former tourist motivation literature (Crompton & McKay, 1997; Lee et al., 2004; Monga, 2006). Rooted in qualitative inputs and survey responses from gamified festivals, FGS contributes new insights to the study of festival tourism and will lead future empirical investigations of festival gamification.

4.2. Practical implications

This study also contributes to several valuable practical implications. First, the FGS provides festival management organizations and festival planners with systematic and complete information about festival gamification. The FGS offers five dimensions with items for festival management organizations and festival planners to understand the content of festival gamification and the multi-dimensional direction for improving gamification at festivals. Moreover, the sample coded statements listed in Table 2 provide information on tourists' perspectives about how tourists experience each FGS item in their festival experiences. For festival performance assessment, this FGS could also be utilized in tourist surveys for evaluating the extent of gamification of a festival. Based on the results of the performance assessment by FGS, festival management organizations and festival planners could learn the relative scores among dimensions of FGS, and plan for future improvement of gamifying the festival.

Second, the FGS could be applied in positioning a gamified festival. Festival management organizations and festival planners could firstly consider the features and types of their festival, and then gamify their festival based on investing resources in key FGS dimensions. For example, marathon festivals might normally be experienced by tourists with high in mastery because they experience challenges in completing the run and improving their physical status. To distinguish themselves from other marathon festivals and position a gamified marathon festival, festival management organizations and festival planners could take a deeper look into other dimensions and items of the FGS. Maybe they could position the gamified marathon festival with the FGS dimension of fun and focus on encouraging tourists to dress creatively for the run or engage innovative cheer groups from local communities. Or,

maybe they could position the gamified marathon festival with the FGS dimension of relatedness, emphasizing the experience of supportive dynamic interactions while running through a smartphone app developed by the festival.

Third, the FGS can be applied in festival marketing for potential tourists to understand how a gamified festival could be experienced. Based on decisions of positioning and target tourists for a gamified festival, festival management organizations and festival planners could plan opportunities for tourists to experience feelings of gamification at the festival. For example, through setting up booths at tourism fairs, the facility of virtual reality could be used to show booth attendees how fun the gamified festival would be, how the sense of mastery could be experienced through the process of participating the festival, or how other tourists in the festival will mutually interact and play to enhance potential tourists' expectations about relatedness of the gamified festival. By utilizing the FGS in festival marketing, festival management organizations and festival planners could gain the chance to shape potential tourists' expectations for gamified festivals and extend tourists' engagement with a gamified festival even before they attend it.

5. Conclusion

Based on SDT, this study defines festival gamification as the extent of a festival to involve game elements and game mechanisms. The major contribution of this study is the development of a five-dimensional 16-item FGS, including dimensions of relatedness, mastery, competence, fun, and narratives. Findings of the cross-validation analysis proved that the extended FGS model is stable and can be applied in both sport and religious festivals. The FGS enriches knowledge of gamification in the festival literature and provides a research tool for future studies to build knowledge in festival gamification. The FGS also contributes valuable information for festival management organizations to strategically plan, manage, and marketing festivals.

The FGS developed in this study could serve as an important research tool for future studies. With the FGS, future studies are able to monitor the longitudinal changes of each FGS dimension, clarifying when and how tourists' perceived festival gamification is formed. With FGS, future studies could explore the dynamic changes of tourists' ratings on the FGS before, during, and after a festival experience. The FGS could also serve as a starting point for examining the mechanism of festival gamification in changing tourists' attitudes and behaviors. Antecedents and outcomes of the FGS could be proposed and examined in future research. Focusing on the purpose of conceptualization and scale development for FGS, this study only tested flow experience as a stable outcome for dimensions of FGS. Future studies are encouraged to clarify the application of FGS on improving tourists' attitudes and behaviors, such as utilizing festival gamification to improve tourists' attitudes toward cultural conservation or to increase tourists' pro-environmental behaviors.

On the other hand, cultural differences of FGS is another further direction for contributing knowledge in festival gamification. Cultural differences in FGS should be analyzed to demonstrate the cross-cultural applicability of this FGS. This study used three different festivals in

Taiwan for data collection and scale testing. However, people from different cultures may think of and participate in gamified festivals differently, resulting in potential cultural differences in FGS for future research. Finally, for the purpose of testing external validity and generalizability, future studies are suggested to examine FGS in diverse types of festivals, including hallmark events and mega events.

Author contribution

Chyong-Ru Liu. She conceived of the presented idea and developed the theory and performed the computations. She encouraged the team to investigate this issue and supervised the findings of this work. She contributed to the final version of the manuscript.

Yao-Chin Wang. He developed the theory and performed the computations. He wrote the manuscript with support from Chyong-Ru Liu and Wen-Shiung Huang.

Wen-Shiung Huang. He performed the analytic calculations and performed the numerical simulations. He contributed to the final version of the manuscript.

Wan-Ching Tang. She carried out the survey. All authors discussed the results and contributed to the final manuscript.

Acknowledgement

This work was supported by the Ministry of Science and Technology, Taiwan under Grant Contract No. MOST 106-2410-H-015-039.

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