Gamification Design: Towards developing image perception scales for Generation Z consumers

Nikolaos Stylos*
University of Bristol Business School, Bristol, United Kingdom

Chris A. Vassiliadis
Department of Business Administration, University of Macedonia, Greece

Abstract

Purpose – Drawing from the Personal Construct Theory, this research study analyzes the impact of employing gamified apps on user behavior by investigating the service-related images and individual preferences of Generation Z (GenZ) consumers, as these emerge from gamified applications in a tourism context.

Design/methodology/approach – The Repertory Grid Analysis (RGA) elicited the top elements that reflect GenZer perceptions in tourism from empirical studies in the United Kingdom and Greece. Generalized Procrustes Analysis (GPA) was used to investigate the structure of the data for the creation of representative Consensus Biplots of the most important conceptual constructs to advance consumer decision-making modelling via gamification.

Findings – As per different gamified app best-practices considered, we extract common perceptual elements (e.g. place informative aspects, exploration, lodgings, food/catering), but also different image components (e.g. virtual/interactive, business vs. commercial traveling, entertainment, heritage/cultural informative aspects) from comparing UK with Greek GenZers' responses. These extracted attributes are then presented in two dimensional charts, respectively, towards creating tourist perception scales.

Research limitations/implications – Notwithstanding the wide availability of gamified apps, research on gamification design in tourism and hospitality is still in the early phase. This study demonstrates the need to identify and optimize the formation of different images among GenZers. It also highlights the advantageous nature of the proposed combination of Procrustes analysis with the RGA.

Originality/value – This research is among the first empirical ones towards creating scales for measuring tourist perceptions of GenZers coming from different consumer markets. It responds to scholars' recent calls for better informing gamification design and improving contemporary consumer experience.

Keywords: Gamification apps; Repertory Grid Analysis; Generalized Procrustes Analysis; Tourism marketing; Best-practices; Generation Z

Article Classification: Research paper

Introduction

Gamification reinforces, encourages, and influences behavioral change in individuals and is associated with technological applications and innovations such as VR (virtual reality), AR (augmented reality), MR (mixed reality), 3D imaging, or environment applications (Wei et al., 2023). According to Sigala (2018), interactivity, innovation, and creativity in service marketing is supported by the adoption of gamification applications. Specifically, consumer attitudes and user-behaviors can change via gamified apps depending upon design elements and the incentives provided to the users/consumers. Application design and development should include game elements that meaningfully connect the users with their real-world experiences for gamification applications to stimulate participation in activities performed in the real-world environment (Buhalis et al., 2023).

The global gamification market has been appraised at over 10 billion US$ in 2021 and is predicted to increase to about 97 billion US$ by 2030 (Precedence Research, 2022). Gamification is expected to become increasingly more important in the tourism sector; relevant applications have already started being applied in zoos, museums, city tours, heritage sites, and resort locations (Pasca et al., 2021). The UK is one of the countries that is predicted to outperform in Europe. Greece is ranked as one of the countries listed under "rest of the European countries" in terms of market share,

indicating there is ample market space for implementing gamification, especially with respect to tourism and rich cultural heritage sites (CTI Diophantus, 2021).

To date, there has been insufficient research focusing on monitoring and analyzing the psychological mechanisms and the impact of gamification applications on user-behavior according to Krath et al. (2021). Specifically, the extant research has significant gaps with respect to the design of game elements and their impact on user participation (e.g. Rapp et al., 2019). Although some scholarly research initiatives have been taken, the research in tourism and hospitality is in need of ongoing gamification design inquiry (Parapanos and Michopoulou, 2023) that would reflect a timely, clear connection of users' perceptions and needs with service organizations' interest in influencing targets consumers' behavioral mechanisms.

As part of this study, two field research investigations have been conducted in the UK and Greece to address the above aims. The UK is known as a top outbound tourism performer despite the impact of the recent COVID-19 pandemic policies in 2020 and 2021. Indeed, in 2022, outbound UK tourism increased by 200% on a year-by-year basis with young people being the primary demographic drivers (IBISWorld, 2022). The UK GenZers represent a large portion of the British budget-friendly international trips and as well as a majority having preferences for high-ranking hotel accommodations (European Travel Commission, 2020). On the other hand, the majority of the Greek population, especially the youth, prefer to take advantage of the proximity of beautiful local destinations situated closer to their residencies due to rising living costs in Greece (Oghanna, 2022). Different travel profiles of these two tourism markets may indicate different travel priorities, attitudes, and behavioral patterns, which could also result to different perceptions emerging from apps usage (Ahmad et al., 2021). Besides, GenZers are similar digital natives of both countries but express differences in terms of vacation preferences and choices. Thus, this study focuses on identifying and comparing the image elements that are the most important to GenZers in relationship to influences of gamification in these two respective countries. The research question is how new technologies, in this case gamified apps, impact perceptions of GenZ consumers coming from diverse

tourism markets; and in turn, how gamified apps can benefit from identifying the image characteristics of GenZ individuals to inform and improve gamification design.

There are four objectives for this research study. First, to gain specific contemporary insights into GenZer perceptions of tourism services. Second, to build GenZ-specific measurement scales of image attributes; suitable research tools would better inform gamification design and reveal opportunities in improving contemporary consumer experience, as per Shin's et al. (2022) call. Third, to underscore the important role of gamified apps in shaping consumer images and influencing the 'prosumption' (service production and consumption) processes, which can have profound impacts on the technological, business, and social aspects of the tourism industry. Lastly, to offer a set of digital marketing priorities based on gamification focusing on GenZ consumers.

This research takes a user-centered approach in mapping perceptions on gamified characteristics, since an adequate understanding of consumers' motivations and gaming experiences is critical for designing gamified apps. It seeks to identify user perceptions of targeted GenZ populations and extract behavioral pattern elements that can be grouped under respective dimensions through a perceptual mapping and positioning process. Theoretically, this research is among the first empirical ones towards creating scales for measuring tourist perceptions of GenZers coming from different consumer markets in a gamification context. This is particularly important because tourists are key users of gamified apps. Lamentably, their subjective image characteristics emerging from gamified apps usage are largely understudied. Further to the context of this study, tourism gamified apps are usually utilized while consumers are visiting new physical environments and thus have relatively limited time availability to focus upon and familiarize themselves with the surroundings. Thus, this research study offers opportunities for comparing and enhancing the understanding of consumers' perceptions with respect to various tourism sector contexts (e.g., travel, hospitality, aviation, recreational activities, and cultural heritage) across different cultures, considering the potential impact of gamification on the individual images, attitudes, and decision-making. From a managerial viewpoint, this study provides software engineers and managers of the tourism sector

with measurement scales of GenZer perceptions as influenced by gamified apps and relevant design elements that could better shape tourism offerings to GenZ consumers.

Literature Review

Generation Zers and consumer trends

GenZers, also known as “digital natives”, “iGen”, or “post millennials” (Katz et al., 2021), are a population segment comprised of individuals born between the mid-1990s and the end of the 2000s or until the first couple of years of the second decade of 21st century; generally speaking, a wide consensus among scholars, practitioners, and survey organizations places GenZers in the period 1996 – 2010 (Stylos et al., 2021). GenZers are different in terms of their priorities and preferences compared to the consumption patterns of previous generations. As Rahimi and Stylos (2022) reported, GenZers are primarily looking for originality and authenticity and will make consumption choices accordingly. They demonstrate their individuality and consumption preferences as extensions of their own values and choices. This is a key differentiator compared to previous generations, thus serving as major drive for scholars to concentrate on the investigation of GenZers’ behavioral patterns.

Three factors influence GenZers' tourism decisions according to Stylos et al. (2021): a) family and friends; b) the local environment; and c) influences from the international environment. The potency of these influences in hospitality and tourism is facilitated via new technologies (Industry 4.0, see Cheng et al., 2023). Oftentimes, GenZers commence their travel and accommodation research and planning without considering a specific destination in mind. Instead, they tend to search with smart devices for inspiring places to explore along with exciting activities and relevant booking options (Jiménez-Barreto et al., 2022). Therefore, a GenZer will readily access online options and use smart apps, including gamified features, which significantly upgrade the user/tourist experience as a routine behavior (Law et al., 2021; Xu et al., 2021). Therefore, choosing Generation Z individuals for

shaping gamification design elements seems to be a prime choice for better understanding of the present as well as future patterns of consumption across the tourism sector.

Gamification in Hospitality and Tourism

The extant hospitality and tourism literature highlights positive effects of gamification apps on visitor experience (e.g. Lee, 2022) due to the creation of special memorable experiences, and the ease of learning about relevant information and characteristics of exhibits/sites (Yu et al., 2022). Encouragement to further examine the influence of gamification on users' attitudes and behavior of different characteristics and cultures has been made in online marketing contexts and across different cultures (Hua et al., 2023). The call to highlight the importance of designing gamified apps for OTA platforms to better facilitate and enhance tourists' experiential consumption within online shopping events is noted in Shi et al. (2022). Additionally, Sigala (2015a) recommended a detailed specification of gamification elements for maximizing the marketing effectiveness of gamified apps.

Additionally, Aebli (2019) investigated individuals' motivations to engage with gamified apps while taking holidays and concluded that the combination of gamification design features functionality with individuals' sense-making is key to improving user-engagement with the apps. Nonetheless, research on gamification applications in tourism is still in the early phase (Parapanos and Michopoulou, 2023). Further progress can be made by capitalizing on the inputs emerging from tourists' attitudes and behavior. Xu et al. (2017) noted that games which support tourism applications such as web-games and mobile application games can enhance the awareness of potential tourists, guests, and/or visitors, arouse their interest, stimulate, and inspire potential visitors, and increase brand awareness of the tourism services and the destination. Importantly, virtual reality (VR) and 3D applications are especially effective during the early engagement phase of tourist decision-making. Insights can be further improved upon for the benefit of consumers and tourism organizations according to Wei et al. (2023). Augmented reality (AR) game-based applications also support

promotional activities with reward elements such as coupons, prizes, points, and other enticements, which may lead to repeat visits and the creation of a loyal customer base.

The ability to influence users and the possibility of having fun and obtaining a unique user experience depends on the content of the gamified app (Leclercq et al., 2020). The perceptions and reactions of consumers should be further and continually investigated to reach effective designs of the gamified service with respect to co-creating activities. Consequently, proper concept design according to the service context and user-contribution would include topic selection, game concept analysis, and game element preparation analysis for achieving the goals of a gamified application (Mingoc et al., 2019).

Gamification apps and selected best-practices

Case study research is a useful method for achieving suitability and alignment of gamification apps with the marketing objectives of an organization and/or brand. Therefore, gamification best-practices may be evaluated and categorized via content analysis of the projected benefits expected for the app-users as well as the organization (Piekkari et al., 2010). Weber (2014) encapsulates the content and qualitative analysis of ten selected best practices utilizing gamified applications (apps) in the wider tourism sector. The results are presented in the form of a presentation of each individual case and an analysis of their key characteristics. These critical characteristics are essential application criteria that strengthen the attractiveness of gamification applications in tourism from the user's point of view (e.g. Jang and Kim, 2022). The ten gamification app practices employed are considered acceptable for the application of the RGA technique. They allow for comparisons between the different elements based on triads of selected elements considered by the respondents in the process of learning personal constructs.

Methodology

RGA and perceptual mapping

Marketing scholars use perceptual maps to uncover cognitive constructs and identify essential metrics. Two-dimensional charts are visually recreated in a spatial relationship with defined points determined by respondents after a process of measuring perceptions on a Likert-type scale. Instead of using a 5-point scale, a scale with opposite poles with values +2 to -2 is used. This is typical of a bi-polar or semantic differential scale. Marketing researchers can measure both the direction and intensity of how the respondents perceive competitive elements to define gaps, identify opportunities, and ultimately define new markets and/or efficient communication strategies.

Researchers face problems when trying to identify and analyze consumer perceived perceptual attributes using non-eliciting methods of questioning and analysis. However, RGA is a well-known technique for identifying the personal constructs that consumers use to interpret and evaluate various stimuli, ideas, and objects or even key people or situations in their lives. RGA was anchored with the Personal Construct Theory (Kelly, 1955) and reaffirmed decades later by Jankowicz (2005). This theory proposed that individuals conceptualize the world in their own distinct way, and the differences in how they behave emerge from these personal, distinct interpretations of current events and anticipation of future ones (To and Wong, 2020). George Kelly suggested that constructs are bipolar, and the comparison of similarities and dissimilarities of certain elements based on a system of constructs can lead to rich insights and evaluations. RGA technique yields greater depth than semi-structured and structured questionnaires and diminishes any errors arising from social desirability bias. Nowadays, it is possible to process data using software especially created for constructing RGA grids with Principal Components Analysis (PCA) capability in RGA applications.

Design of Field Research and Data Collection Processing

One sample GenZ group from each country (i.e. the UK and Greece, respectively) was chosen to identify common and different constructs related to the identification and characterization of selected best practices on gamification covering various aspects of the tourism value chain. Data collection and analysis of primary research data emerged from the interviews with GenZers who responded to

Facebook invitations to participate in the research studies. The data collection processing was conducted in three phases, took place in the UK and Greece under similar conditions and fashion in both countries, and lasted four weeks altogether during September 1-30, 2022. Two teams of three experienced field researchers each, i.e., one team per selected country, conducted the three study stages, respectively. Of special note: during the reference period of September 2021 - August 2022 COVID-19 hygiene-related policies relaxed – including travelling from / to – in both the UK and Greece; and since September 2022, COVID-19 fell under general health and wellbeing advice in these countries. Moreover, residents in both the UK and Greece have started travelling again as they used to do so before the COVID-19 breakout, and various means of travel/transportation (e.g., airports, ports etc.) have been reporting record-high passenger traffic, thus matching or even exceeding pre-COVID-19 figures (IATA, 2022).

The selection of participants for each study set was based on a non-probability sampling technique. Given the topic and aim of this research, the older GenZers – "the first connected kids" – have been selected to be interviewed. This GenZ group is vibrant and notably self-reliant as mature adults. They also have extensive experience in using the latest digital technologies and related technological applications (Rahimi and Stylos, 2022). Research participant familiarity and previous time dedication to the subjects/topics under study is also key for the proper selection of the interviewees with a purposive sampling approach. Also, the initial control questions of the characteristics of the selected English and Greek individuals ensures proper coverage of the relevant research conditions. Thus, for this study preference is given to individuals who dedicate a considerable amount of time to online game activities and entertainment applications, including gamified ones. A pre-interview questionnaire comprised of three control questions was used to evaluate the suitability of interested participants who volunteered in the field research studies via Facebook invitation/call for participation. The first control question sought to clarify the individual's age and designation as a GenZer; the second question asked whether Facebook users travelled in the last 12 months (i.e., anytime between September 2021 and August 2022); and the third control

question was about previous usage experience of any gamified apps. Sample size considerations were based on advice and rules-of-thumb provided in similar empirical studies. As per Tan and Hunter (2002), a sample between 15 and 25 participants is expected to produce an adequate number of constructs that would cover the conceptual needs of the selected topic in a meaningful manner. Indeed, recent studies with nearly identical research procedures as the present study, closely follow this rule-of-thumb. This led to satisfactory outputs, as shown by the cases of Hadley and Grogan (2023) with a sample of 21 subjects, and Napier et al. (2009) with 19 interviews in total. Thus, a conservative approach was taken in the current study, and a sufficient sample size was determined by the data collection processes which were conducted until theoretical saturation was reached. Hence, the proposed sample size was initially set at 20 interviewees per tourism market (UK and Greece) and, additionally, an a-priori stopping criterion of three interviews was employed. These two criteria together determined the final number of interviews to 24 for the UK market and 26 for the Greek market. Overall, the sample sizes for both studies are deemed to be adequate.

Next, preparation and assessment of skill-competencies with gamified apps followed the selection of participants. This preparation phase included information and training sessions with material related to the study shared at the university premises, and then an online visit to the respective website related to the ten selected gamification app practices in tourism (Weber, 2014). In this first part of this preparation phase, no one had more than two errors in either field research locations, which was ratified after asking participants anonymously via the Socrative software. Then, all participants were given additional time to study and familiarize themselves with the same set of gamification app practices. After a two-week period, all the participants were invited to demonstrate once more their knowledge and familiarity with the correct matchings of the applications of the gamification app practices with the corresponding relevant descriptive texts and were ready for the next phase.

After the preparation and competency assessment phase, the research elicited participant GenZer perceptions by making use of the Personal Construct Grid. The third phase took place again

at university premises, namely meeting rooms specifically booked for conducting this last part of field research. Each interviewee was provided a three-page form with a grid illustration of the selected ten gamification app best-practices in tourism. The illustrations in the form of pictures (elements) were at the top of each page. The first column addressed similarities and the twelfth column represented contrasts. Two sets of interviews were conducted with each participant in order to complete a Personal Construct Grid. The procedure involved the use of 10 cards; each card had a picture and title denoting a "good" gamification business practice in tourism that was then compared via triadic elicitation in order to elicit constructs (Kelly, 1955). The two cards selected by the individual from the triad were marked as similar based on the personal conceptual construct as expressed by each individual. This information was recorded in the first column of the Repertory Grid. Subsequently, the construct of the differences or non-homogeneity of the cards that were not selected compared to the other two cards was noted in the twelfth column of the grid. Then, all elements of the gamification practices were rated by the respondents on a 5-point scale with 1= *strongly agree with the left pole of similarity*, 2= *agree with the pole of similarity*, 3= *agree with both elements*, 4= *agree with the pole of non-similarity* located on the right side of the grid, and 5= *strongly agree with the pole of non-similarity*. Each of the ten selected gamification app practices was rated by the respondents using one of the above five numerical options. It was observed that a total of 96 constructs were collected from the 26 participants coming from Northern Greece, and 100 constructs from the 24 participants coming from Southwest England. The average time to complete the grids was 35 and 38 minutes respectively.

Data Analysis and Statistical Processing of the Repertory Grids

Next, statistical processing software Idiogrid version 2.4 was used to generate a total of 50 grids with the cognitive constructs and the names of the ten best-practices of the two investigation groups as well as their corresponding scores. The statistical analysis was conducted using Generalized Procrustes Analysis (GPA) to investigate the structure of the collected primary data constructs and

grades using data collected from respondents via Repertory Grids. GPA allows for processing different numbers of cognitive constructs as long as the number of elements remains constant. It is a statistical technique that analyzes three-dimensional data tables as well as compares the results of interviews from different individuals or even those of the same individual at different times and situations (Grice, 2007). Also, the Idiogrid 2.4 GPA analysis technique enables the creation of a representative Consensus Grid by expressing the perceptions of the respondents on a sub-set of observations or all observations of the respondents in the study. The adjusted data elements can then be presented in a dimensional system using the Principal Component Analysis (PCA) technique.

In conclusion, the reliability and validity of the RGA extracted attributes is enhanced via the General Procrustes Analysis since the GPA technique conducts simultaneous similarity transformations. GPA avoids the deterministic solutions of the classical normal equation systems, as no prior information is requested for the geometrical relationship existing among the different components/attributes. Thus, the corresponding transformation parameters are computed directly and effectively based on a selected set of corresponding point coordinates. This technique makes the two different samples directly comparable.

Results

Twenty-six grids were produced for the Greek sample and twenty-four grids for the UK sample. The grids had different numbers of sets of cognitive constructs in both the Greek and UK samples. The number of grid elements related to the ten gamification practices remained constant for each of the 26 and 24 output grids, respectively. The analysis of variance of the ten gamification app practices elements resulted to a total consensus portion 62.94 ~ 63% indicating a statistical significance level of $p<0.01$ and a medium to fairly high agreement among the 26 grids analyzed in the Greek interviews. In the UK sample the consensus portion was 80%, which means that there is a high level of agreement at the level of statistical significance $p<0.01$ between the 24 grids analyzed.

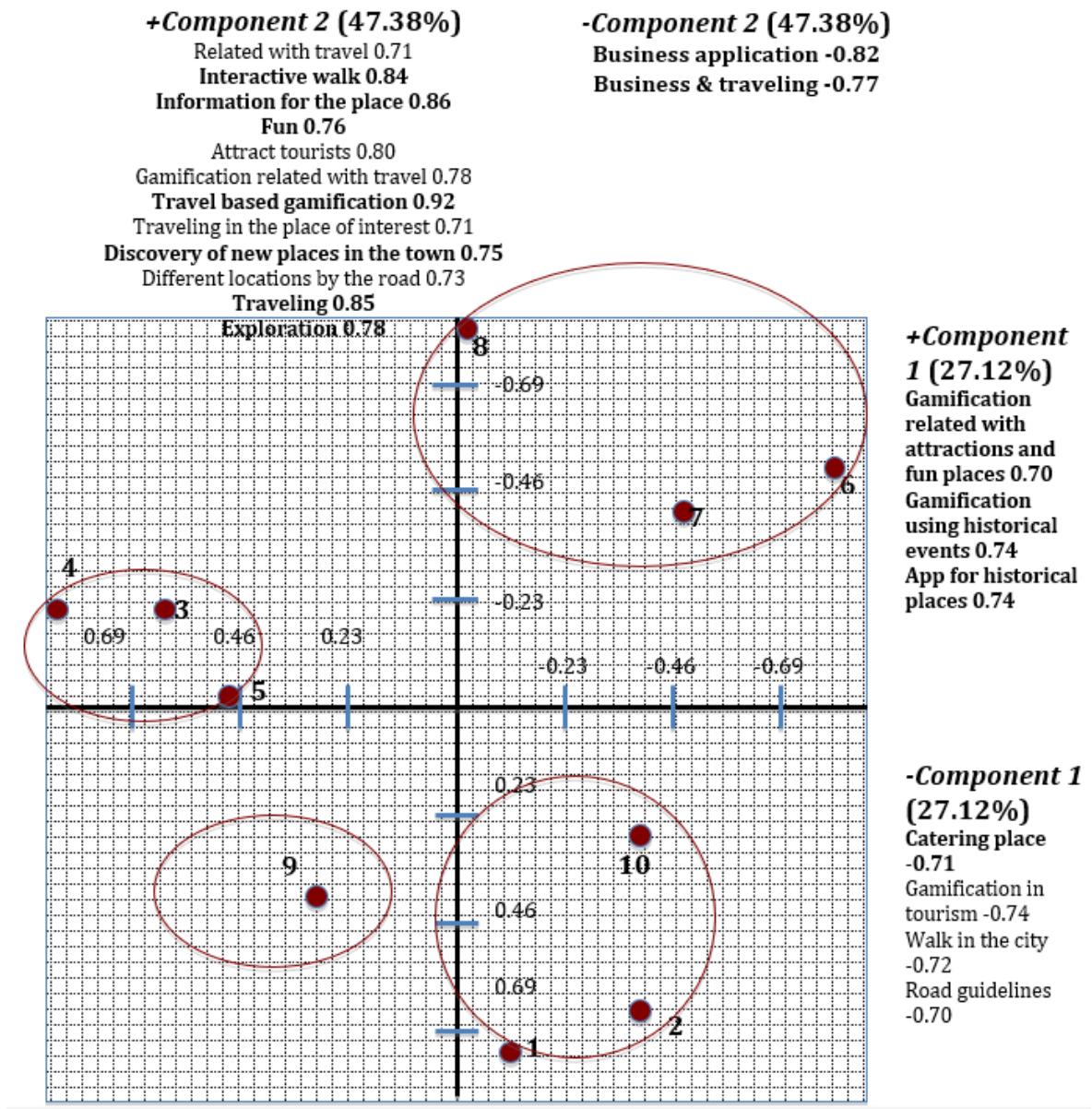
Of particular importance are the factor/component loadings and the "communalities (comm)" which present the overall interpretation of the variance of the two-component model for each conceptual construct. Significant values of communalities of each variable "construct" were considered as those values were equal to or above 0.70, but also with a loading at least equal to or above 0.70 on one of the two components (Grice, 2007). The Principal Component Analysis (PCA) mentioned previously resulted in 96 constructs of the field research in Greece and 100 constructs of the structured interviews in the UK. The Consensus Biplot of GPA for the Greek study depicts the following conceptual constructs that met the significance criterion of 0.70 and/or above (Figure 1): “Gamification involving applications to attractiveness; gamification related with attractions and entertainment venues and fun places”; “App for historical places”; and “Gamification using historical events”. With opposite negative pole of the first dimension described by these constructs: “Catering Place”; “Gamification in Tourism”; “Walk in the city”; and “Road guidelines”.

The second dimension of the Greek "Consensus Biplot of GPA" sample presents the following elements of conceptual constructs: “Travel based Gamification”; “Information for the place”; “Traveling"; “Interactive walk”; “Attract Tourists”; “Exploration”; “Fun”; “Discovery of new places in the town”; “Different locations by the road”; “Traveling in the place of interest”; and “Related with Travel”. The negative pole of the second dimension of Figure 1 is described by these constructs: “Business Application”, and “Business & traveling”.

The results of the survey from the sample collected in the UK revealed the following constructs that are considered most significant for the interpretation of the two dimensions. The first dimension of Figure 2 shown below is interpreted in terms of its positive pole by the following cognitive constructs: “Places”; “Fun”; “Cultural”; “Adventure”; “Architectural” (0.80); “Informative”; “Behind Senses”; “Story telling”; and “Old”. Similarly, the negative pole of the axial system of the first dimension of Figure 2 is interpreted by the following cognitive constructs: “Commercial”; “Humanistic”; “Foody”; “Clear”; “Authentic”; “Easy going”; and “Promotional”. The second dimension of Figure 2 depicting the GPA consensus biplot of the UK Study, presents

significant conceptual constructs with respect to the positive pole of the “Cultural” attribute. The negative pole of the second dimension of the Gen Z sample collected in the UK is described by the following conceptual constructs: “Virtual”; and “Globally world-wide”.

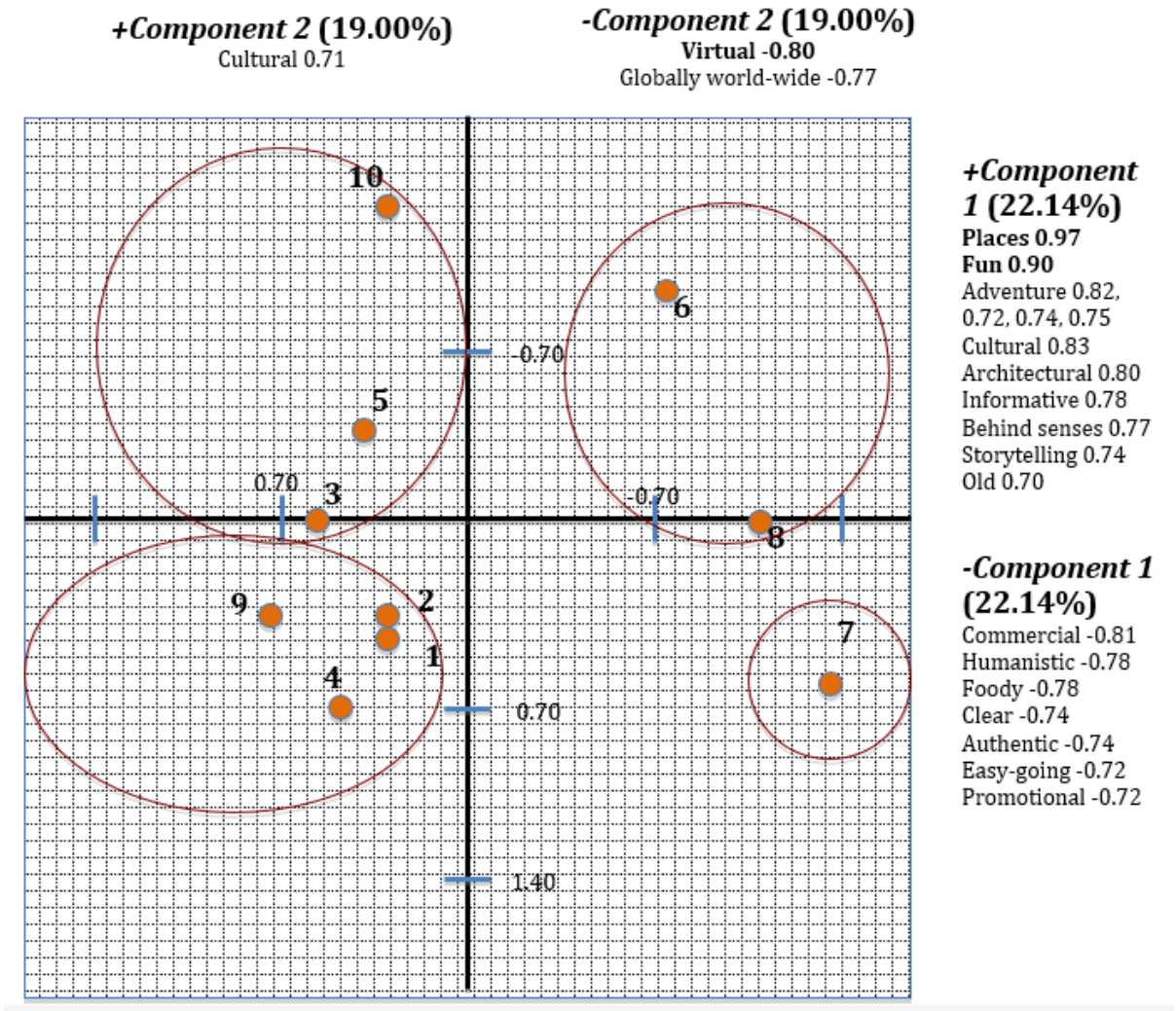
RGA included the PCA to minimize the dimensions and visually render the scored elements of gamified app best practices in bi-exploratory plots. The PCA supported the correlations of the consensus grid; therefore, two principal components were created and used in the bipolar visualization diagram. In the Greek study, the first two components account for 74.50% of the total variance in the consensus grid. The first component (component1; Comp 1) explains 27.12% while the second component explains 47.38% of the total variance, as presented in Figure 1. The cognitive constructs with coefficients less than 0.70 have been removed in order to highlight the most significant ones (Grice, 2007). In the UK sample the first two components account for 41.14% of the total variance. The first component (component1; Comp 1) explains 22.14% while the second component explains 19.00% of the total variance, as presented in Figure 2. The distribution of the construct components in space and the description of the characterization quadrants of the selected ten cases of gamification app practices are illustrated below.



Note

1=Location based augmented reality games (Tripventure)
2=Gamified travel apps work for tourist guides (Drallo apps)
3=Augmented playful experiences in adventure parks (Efteling game app)
4=Ghost game Wartburg castle. Germany (Cultural heritage Bauhaus University Weimar)
5=Gamification in Transmedia storytelling (for DMOs)
6=Gamified restaurant experience (Campaign)
7=Application of Gamification in Hospitality (Gamified hotel experience)
8=Gamification in the aviation industry (Meat & Seat campaign)
9=Virtual cultural heritage online (3D models)
10=Gamified virtual travel experience (Expedia's Around the world)

Figure 1. *The Greek Study Consensus Biplot of GPA.*



Note

1=Location based augmented reality games (Tripventure)
2=Gamified travel apps work for tourist guides (Drallo apps)
3=Augmented playful experiences in adventure parks (Efteling game app)
4=Ghost game Wartburg castle, Germany (Cultural heritage Bauhaus University Weimar)
5=Gamification in Transmedia storytelling (for DMOs)
6=Gamified restaurant experience (Campaign)
7=Application of Gamification in Hospitality (Gamified hotel experience)
8=Gamification in the aviation industry (Meat & Seat campaign)
9=Virtual cultural heritage online (3D models)
10=Gamified virtual travel experience (Expedia's Around the world)

Figure 2. *The UK Study Consensus Biplot of GPA.*

Mapping and Positioning of the selected Gamification app practices

The GenZ sample from Greece

Based on the above bipolar diagrams concerning the Greek case study, four modules/states of perceptual positioning of good gaming practices were distinguished. In the first module, cases numbers 3, 4, and 5 form a group of gamification practices that can be characterized based on

respondent conceptual constructs as an entire group of "Mostly funny gamification apps for business purposes with emphasis on historical and place exploration aspects". The second module includes items related to cases relatively close to the negative axes, including: 6, 7, or 8. These cases are characterized as “Mostly tourism business (aviation, Food & Beverage (F&B) and lodging services) oriented with emphasis also in catering services, road map apps and place exploration and city walking proposals”. The third module consists of the cases closest to the axes space, which are: 1, 2, and 10. Based on respondent conceptual constructs they can be classified as gamified apps of the type: “Mostly interactive exploration, entertaining and place informative oriented, supporting apps”.

The only distinct case of the ten cases of gamification app practices for the Greek respondents is case 9. It is an exception from the others since it is placed autonomously in the space of the negative poles of the axes. Based on the conceptual constructs expressed by the respondents it could be classified as “Mostly entertaining, place, travel and an interactive historical exploration guide”. The above highlighted modules are the defining RGA elements of personal constructs of interpretation expressed by the 26 GenZ respondents of the Greek sample that emerged from the ten study cases.

The GenZ sample from the UK

Similarly, in the case of the UK respondent group, four modules of characterizations of the ten gamified applications were identified. The first group includes cases: 3, 5, and 10. These apps can be classified based on respondent personal constructs as the group of “Mostly globally available entertainment virtual based gamification apps with emphasis on informational cultural and place exploration aspects”.

The only distinct application case that was located autonomously in a spatial quadrant of the axial analysis is case 7. This exception is based on the conceptual constructs expressed by the respondents. It could be identified as “Mostly for commercial purposes for traditional lodgings with commercial/promotional and humanistic content and focus on facilities and emotional/entertaining

experiences". The third spatial app module includes data concerning the cases relatively close to the negative axes: 6, and 8. These cases are identified by the UK respondents as "Mostly commercial and virtual based; world-wide oriented apps with emphasis on F&B services and easy-going facilities". The fourth module consists of the cases closest to the axes space: 1, 2, 4, and 9. Based on respondent conceptual constructs they can be classified as gamified applications of the type: "Mostly heritage or culture oriented gamified apps with focus on entertainment and informative aspects". The modules described above are the defining RGA elements of constructs of interpretation expressed by the 24 GenZ respondents from the UK as interpretive concepts of the ten study cases.

Discussion and Conclusions

The data analysis yielded results that could stimulate further research and manifest into concrete management applications. The elements "informative" and "fun" are common interpretive constructs of gamified apps 1 and 2. Apps practices 3 and 5 are characterized by common perceptual elements of the two groups of consumers, which include "exploration" at the "places" visited and "historical/cultural" at the place of visit, which is largely in line with Khan et al. (2020). Then, gamified app practices 6 and 8 were classified as business apps (i.e., "business"/"commercial" apps) with emphasis on both "food" and "catering" elements and information on ease-of-access within the environment (i.e., "city walking" and "easy going" facilities). This is also in agreement with Sigala and Nilsson (2021) whose study showcases similar benefits of gamification for consumers' attitude change purposes with respect to food and catering needs.

However, some elements extracted from the gamification app practices were not grouped with others. Those were interpreted individually and placed per study group (UK and Greek) following a separate perceptual positioning (i.e., positioning based on the perceptual mapping Consensus Biplot GPA approach). For example, see application practices 7 and 9. Case 7 of the traditional lodging category is considered rather special in the UK as it includes a combination of cultural, promotional, and humanistic features in its gamified app, which are key aspects of gamification in hospitality

industry as mentioned in Parapanos and Michalopoulou (2023). Correspondingly, the Greek participants placed the app in the cognitive domain of cases 6 and 8 as a business app (i.e., "business"/ "commercial") with emphasis on "Food", "Catering" and information on "city walking" and "easy going" facilities. App practice 9, for instance, virtual cultural heritage online (i.e., 3D models) indicates the Greek participants in the study sought exploration and particular characteristics as an online application for the promotion of Roman monuments and attractions by the Leicester city council, which is in line with O'Connor et al. (2020). On the other hand, the UK study participants interpreted application 9 as a gamified app that is among the gamified apps 1 and 2, thus as an app that emphasizes the characteristics of "informative" and "fun" attributes as key characteristics regarding perceptions and gamification adoption behaviors.

Application practices 4 and 10 were interpreted differently by the two GenZ groups. Specifically, in the Greek sample, app 4 is characterized as an app that includes "exploration" at the "places" visited, and information about the "historical/cultural" features at the place of visit. Similarly, application 10 belongs to the group of applications with characteristics of app practices 1 and 2, as an application with characteristics describing the elements "informative" and "fun". The UK sample considers the case of app practice 4 as belonging to those of 1, 2, as an application with characteristics describing the elements "informative" and "fun". Similarly, gamification app practice 10 is seen as tangential since that has similar characteristics to application cases 3 and 5 because it is a gamified application that emphasizes "exploration", "places" and "historical/cultural features" in the place of visit. These conclusions demonstrate differences between the consumers' perceptual elements extracted from the same apps, which concur with previous research on cross-cultural consumer behavior as influenced by digital app platforms usage (Ahmad et al., 2021).

Conclusions

This study reveals GenZers' shared values as well as additional characteristics and preferences that are distinct and need to be treated accordingly in gamification design. Thus, the comparison between

the two samples allows for a better understanding of how selected gamified application themes may apply across different tourist populations as well as what these outputs may mean with respect to gamification effectiveness in the contemporary digital marketing environment across different service sectors. There are common perceptual elements, but also different image components extracted from this study that emerge from the responses of the UK and Greek GenZers to the ten gamified app best-practices. These distinctions have contributed to creating precise image measurement scales for GenZers, considering local characteristics of consumer markets, in this case the tourism market.

First, we have extracted sets of constructs based on primary collected data, which comprise a dimensional system per each GenZ population segment in the UK and Greece, respectively, to exemplify specific perceived characteristics of tourism services per selected gamified apps. This has been achieved by conducting two studies representing different tourism consumer markets. Second, this study has comprised GenZ-specific measurement scales based on the extracted image attributes to inform gamification design and ultimately improve the consumer experience of this growing and soon dominating generation at global level. Third, this study reveals that GenZ perceptions may not only vary due to different cultural backgrounds, but also due to the various themes and contexts of gamified apps. Therefore, an in-depth understanding and mapping of contemporary consumer images via employing RGA and GPA with PCA may support co-creating the in-design gamified app characteristics together with marketers. Lastly, the current research offers key inputs to form highly effective and successful marketing strategies by identifying those image elements that GenZers coming from two different tourism markets define and interpret as anticipated features of tourism offerings to best fulfill their personal needs.

Theoretical Implications

Theoretical contributions of this study are several and in line with Law et al. (2021), who stress the promising future of gamification but also the need for continual relevant research in tourism and

hospitality. First, new attributes of tourism as depicted in this study provide a contemporary view of measuring tourist perceptions as influenced by gamified apps usage, responding to relevant research calls. The newly proposed scales in this study offer scholars accurate and fit-to-purpose measurements of GenZer perceptions of the tourism product. The theoretical modelling and the formation of other constructs that include customer satisfaction and service engagement, as well as perception measurement tools can facilitate more successful analyses of the emotional and/or sentiment aspects of the GenZ market segment. Second, the increasing adoption of new technologies has a disproportionate influence on GenZer decision-making, and especially on shaping GenZer preferences as previously noted (Pichler et al., 2021). This research reveals differences in how new technologies, in this case gamified apps, impact perceptions and attitudes of GenZ consumers from the broader, diverse market. Third, since GenZers are increasingly utilizing new technologies in nearly every decision-making and experiential stage, research that focuses upon innovation, management and marketing of tourism products needs to reflect their distinct trends. When considered, these theoretical insights can maximize scholarly research efforts.

This research highlights the advantageous nature of the proposed type of Procrustes analysis, which combined with the RGA proved to be a highly suitable research method via provision of quantitative outputs and mapping of individual behavior, and eliciting various constructs that reflect the perceptions and behavioral characteristics of GenZ consumers in general, and with respect to tourism services specifically. Key outputs of this research are the GPA consensus biplots which provide the significant conceptual constructs as grouped under the respective dimensions of the spatial relationships constructed by the respondents. This occurred here by building on the previously reported usefulness of RGA technique (Pike and Kotsi, 2016), and further linking it with GPA. Besides, an investigation of the constructs shaping GenZ tourist perceptions and relevant behavioral mechanisms had been lacking with one recent exception (i.e. Ding et al., 2022) which did not specifically consider the influence of gamification. Hence, this research undertaking created

measurement scales for identifying and assessing tourist perceptions of GenZers from two different tourism markets.

From a marketing research viewpoint, this current research supports image attributes followed by a quantification of these qualitative elements through the combination of RGA, GPA and PCA for precise scales of respective constructs, (e.g., image perceptions). In this case, data analysis in this study reveals the ways GenZ individuals perceive specific tourism offerings as influenced by gamified apps. Precise scales can generate opportunities for a better understanding of user-perceptions and tourism related choices as well as considering the potential impact of gamified applications on individual attitudes and decision-making (Leclercq et al., 2020). The extracted constructs also add to the gamified apps in tourism literature by providing specific scales to be utilized in the design of technologically advanced tourism and hospitality services as proposed by Buhalis et al. (2023) and Law et al. (2021).

Practical implications

This study provides tourism practitioners with measurement scales of different GenZ tourist images as these are influenced by gamification. Practitioner implications derived from this study explicitly address the quintessential desire of every business manager to use “best-practices”. Regarding gamification, the effectiveness and success of marketing strategies can be much improved by employing the most relevant inputs and measurement instruments to fit the specific cases and tackle the challenges under investigation. As was done in this study, one way to achieve this is by identifying those product elements that consumers themselves define and interpret as features of product offerings that best fulfill their personal needs (Shavitt and Barnes, 2020). The combined use of RGA, GPA, and PCA in marketing research, enables marketing practitioners to identify and recognize those product characteristics that are interpreted in terms of concepts (constructs) that the customers themselves use in the process of identifying and interpreting products. Hence, this study offers suggestions for maximizing effectiveness of strategic marketing plans and managerial action.

Table I. *Gamification app modules and proposed Marketing Tactics for GenZers.*

Module	Proposed Marketing Tactics
Module 1 Case 9	**Priorities and types of applications:** Impress by emphasizing Virtual cultural heritage using the Internet. Create auxiliary time travel, simultaneously stimulate, and enhance the individual experience. Protect the cultural heritage, identified by any information points and locations presented in virtual applications. Give brief information for people with disabilities and offer related sightseeing opportunities. **Target group(s):** 1. The Greek Zers who give emphasis and recognize this gamification app as travel & touring, catering & food, and place informative oriented apps. 2. The UK Zers who recognize the cultural & historical aspects, but also the business aspect of apps. **Potential stakeholders:** DMOs; Local Museums and Archaeological Sites; Tourism Offices and Organizers.
Module 2 Cases 3,4,5	**Priorities and types of applications:** Give emphasis to app-content(s) that emphasize interactive methods of learning, particularly on the relevant cultural attractions and the historical background. This can be based on gamified apps that enhance the creation of interactive gaming experiences using AR technology and improving the visitor experience with the use of Location Sensing Technologies. **Target Group(s):** 1. The UK and Greek Gen Zers who are characteristically cultural/historical oriented, 2. Greek GenZers who perceive gamification app 4 as related to Entertainment places, and Information oriented app for the place of reference of the gamification app 3. The UK GenZ users perceive app 4 (outside of the Cultural and historical identity mentioned above in point #1) as an application related with the business sector of tourism. Gamification design content should have an engaging narrative, following clear rules and goals. **Potential stakeholders:** DMOs; Theme parks; Museums; Event managers; Local tourism businesses.
Module 3 Cases 1,2,10	**Priorities and types of applications:** Increase user awareness and combine the app with programs that could enhance: 1. user loyalty, 2. personalized travel offers based on user-customer characteristics, 3. rewarding users and customers, 4. creating online games to entertain and engage users, 5. the presentation of information for relevant geographical visualizations and applications (e.g., ease-of-route choices and for the exploration of unknown locations), 6. the possibility of using electronic guides, (e.g. using avatars) in gamification applications. **Target Group(s):** UK and Greek GenZ users perceive apps 1 and 2 as "business and commercial oriented". A discrepancy in the two study groups is observed in app 10, which the UK GenZers perceive as "Place informative" "Fun place oriented" and as "cultural/historical oriented" while the Greek GenZers perceive it as a "Business oriented "travel oriented" and "food/catering oriented" application. **Potential stakeholders:** DMOs; Travel agencies and operators; Urban planners; Car rental companies; and Catering (F&B).
Module 4 Cases 6,7, 8	**Priorities and types of application:** Content emphasis could be placed on relevant promotional events that could support: 1. charitable acts, 2. prizes for loyal guests (i.e., loyal users who prefer the hotel over time), 3. loyalty programs, related to reviews on social networks. **Target Group(s):** Greek and UK GenZ users, especially those regarding apps 6 and 8 who perceive the apps as "Fun place oriented". Regarding app 7, Greek and UK GenZers perceive it as a "business/commercial" oriented gamification app. While the English GenZers are "Global world-wide" oriented, the Greek GenZers perceive it as "Fun place oriented". A fascinating narrative, fast and open feedback, and the presence of social interactions would match app users' interests in this module. **Potential stakeholders:** Passenger Transport companies (Airlines); Accommodations (e.g., Hotels); and Catering (F&B).
***Note*:** Where "F&B": Food & Beverages; "DMOs": Destination and Management Organizations; "AR"/"VR": Augmented/Virtual Reality apps	

Gamification app modules and proposed marketing tactics approximate the “best-practices” of employing gamified applications that emerged from this study. The anticipated benefits to shaping suitable tourism marketing strategies for the potential stakeholders are provided on Table I.

Limitations and future research

Future research of GenZer perceptions of gamified characteristics and applications from culturally different populations may provide a useful basis for theoretical development as well as for in-depth study of the emotional relationships between gamified applications and users. Generalized Procrustes Analysis (GPA) proved highly beneficial for conducting sentiment analyses. Future research may also focus on developing quantitative models emerging from qualitative analysis results and add to the 96 and 100 conceptual constructs of Greek and UK GenZ consumers of gamification applications identified herein. These models offer a good start for daily ongoing assessments of gamified applications in practice. Also, future research may empirically compare the outputs of the current research with those emerging from data of different generational cohorts, such as that of Generation Y (Millennials) and/or Alphas.

The results of this research provide useful background for developing scales for constructs by using primary data from GenZers residing in the UK and Greece. However, other cultural and subcultural aspects might have affected the results and implications of this study. For instance, outputs with respect to more diverse geographical and cultural contexts, such as GenZers in Asian cultures, gamified app users living in developing countries, consumers in underdeveloped countries with limited access to current technologies, or minorities with different educational and cultural background. Each of these population segments may use other tech-applications and their related benefits might differ when compared to their GenZer counterparts interviewed in this study.

References

Aebli, A. (2019). "Tourists' motives for gamified technology use". *Annals of Tourism Research*, Vol.78, https://doi.org/10.1016/j.annals.2019.102753.

Ahmad, W., Kim, W. G., Choi, H. M., and Haq, J. U. (2021). "Modeling behavioral intention to use travel reservation apps: a cross-cultural examination between US and China". *Journal of Retailing and Consumer Services*, Vol.63, https://doi.org/10.1016/j.jretconser.2021.102689.

Buhalis, D., Lin, M. S., and Leung, D. (2023). "Metaverse as a driver for customer experience and value co-creation: implications for hospitality and tourism management and marketing", *International Journal of Contemporary Hospitality Management*, Vol.35 No.2, pp.701-716.

Cheng, X., Xue, T., Yang, B., and Ma, B. (2023). "A digital transformation approach in hospitality and tourism research", *International Journal of Contemporary Hospitality Management*, Vol.35 No. 8, pp. 2944-2967.

CTI Diophantus (2021). Escape Through Culture: gamified cultural experience. Accessed on April 4th, 2023 via: http://escape.cti.gr/en/project

Ding, L., Jiang, C., and Qu, H. (2022). "Generation Z domestic food tourists' experienced restaurant innovativeness toward destination cognitive food image and revisit intention". *International Journal of Contemporary Hospitality Management*, Vol.34 No.11, pp.4157-4177.

European Travel Commission (2020). "Study on Generation Z Travellers", *ETC Market Study*. Retrieved September 17, 2022 from https://etc-corporate.org/uploads/2020/07/2020 ETC-Study-Generation-Z-Travellers.pdf.

Grice, J. (2007). "Generalized procrustes analysis", In N. J. Salkind (Ed.), *Encyclopedia of measurement and statistics* (Vol. 1, pp. 395-397). Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781412952644.n186.

Hadley, G., and Grogan, M. (2023). "Using Repertory Grids as a Tool for Mixed Methods Research: A Critical Assessment", *Journal of Mixed Methods Research*, Vol.17 No.2, pp.209-227.

Hua, N., Li, B., and Zhang, T. (2023). "Live streaming: pushing limits of hospitality and tourism online experiences", *International Journal of Contemporary Hospitality Management*, https://doi.org/10.1108/IJCHM-07-2022-0810.

IATA (2022). "International Travel Drives May Air Traffic Recovery", *Press Release No 36, Date 7 July 2022*. Retrieved October 20, 2022, from https://www.iata.org/en/pressroom/2022-releases/2022-07-07-02/

IBISWorld (2022). "Outbound Tourism by UK Residents", *Business Environment Profiles – United Kingdom*. Retrieved September 17, 2022, from https://www.ibisworld.com/uk/bed/outbound-tourism-by-uk-residents/44060/

Jang, S., and Kim, J. (2022). "Enhancing exercise visitors' behavioral engagement through gamified experiences: A spatial approach", *Tourism Management*, Vol. 93, doi.org/10.1016/j.tourman.2022.104576

Jankowicz, D. (2005). *The easy guide to repertory grids*: Wiley & Sons, London: UK.

Jiménez-Barreto, J., Rubio, N., Mura, P., Sthapit, E., and Campo, S. (2022). "Ask Google Assistant Where to Travel" Tourists' Interactive Experiences with Smart Speakers: An Assemblage Theory Approach. *Journal of Travel Research*, https://doi.org/10.1177/00472875221094073.

Katz, R., Ogilvie, S., Shaw, J., and Woodhead, L. (2021). *Gen Z, Explained: The art of living in a digital age*. University of Chicago Press.

Kelly, George A. (1955). *The Psychology of Personal Constructs*: Vol.1, 2. New York: WW Norton; USA.

Khan, I., Melro, A., Amaro, A. C., and Oliveira, L. (2020). "Systematic review on gamification and cultural heritage dissemination", *Journal of Digital Media & Interaction*, Vol.3 No.8, pp.19-41.

Krath, J., Schürmann, L., and Von Korflesch, H. F. (2021). "Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning", *Computers in Human Behavior*, Vol. 125, https://doi.org/10.1016/j.chb.2021.106963

Law, R., Ye, H., and Chan, I. C. C. (2021). "A critical review of smart hospitality and tourism research", *International Journal of Contemporary Hospitality Management*, Vol.34 No.2, pp.623-641.

Leclercq, T., Poncin, I., and Hammedi, W. (2020). "Opening the black box of gameful experience: Implications for gamification process design", *Journal of Retailing and Consumer Services*, Vol.52, https://doi.org/10.1016/j.jretconser.2019.07.007

Lee, Y. J. (2023). "Gamification and the festival experience: the case of Taiwan". *Current Issues in Tourism*, Vol. 26 No.8, pp.1311-1326, https://doi.org/10.1080/13683500.2022.2053074

Mingoc, N. L., and Sala, E. L. R. (2019). "Design and development of learn your way out: A gamified content for basic Java computer programming", *Procedia Computer Science*, Vol.161, pp.1011-1018.

Napier, N. P., Keil, M., and Tan, F. B. (2009). "IT project managers' construction of successful project management practice: a repertory grid investigation". *Information Systems Journal*, Vol.19 No.3, pp. 255-282.

O'Connor, S., Colreavy-Donnelly, S., and Dunwell, I. (2020). "Fostering engagement with cultural heritage through immersive VR and gamification", *Visual computing for cultural heritage*, pp.301-321.

Oghanna, A. (2022). "Greece is for Tourists". *Foreign Policy*. Retrieved September 19, 2022, from https://foreignpolicy.com/2022/08/28/greece-tourism-economy-cost-of-living-crisis/

Parapanos, D., & Michopoulou, E. (2023). "Innovative mobile technology in hotels and the use of gamification", *Tourism Planning & Development*, Vol.20 No.2, pp.162-187.

Pasca, M.G., Renzi, M.F., Di Pietro, L. and Guglielmetti Mugion, R. (2021), "Gamification in tourism and hospitality research in the era of digital platforms: a systematic literature review", *Journal of Service Theory and Practice*, Vol.31 No.5, pp.691-737.

Piekkari, R., Plakoyiannaki, E., and Welch, C., (2010). "'Good' case research in industrial marketing: Insights from research practice", *Industrial Marketing Management,* Vol.39 No.1, pp.109-117.

Pike, S., and Kotsi, F. (2016). "Stopover destination image – Using the Repertory Test to identify salient attributes". *Tourism Management Perspectives,* Vol.18, pp.68-73.

Precedence Research (2022). *Gamification Market – Global Industry Analysis, Size, Share, Growth, Trends, Regional Outlook, and Forecast 2022-2030*, pp.150.

Pichler, S., Kohli, C., and Granitz, N. (2021). DITTO for Gen Z: A framework for leveraging the uniqueness of the new generation. *Business Horizons,* Vol.64 No.5, pp.599-610.

Rahimi, R. and Stylos, N. (2022). "Generation Z tourists", In D. Buhalis (ed.), *Encyclopedia of Tourism Management and Marketing*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.

Rapp, A., Hopfgartner, F., Hamari, J., Linehan, C., and Cena, F. (2019). "Strengthening gamification studies: Current trends and future opportunities of gamification research". *International Journal of Human-Computer Studies,* Vol.127, pp.1-6.

Shavitt, S. and Barnes, A. J. (2020). "Culture and the consumer journey." *Journal of Retailing,* Vol.96 No.1, pp.40-54.

Shi, S., Leung, W. K., and Munelli, F. (2022). "Gamification in OTA platforms: A mixed-methods research involving online shopping carnival", *Tourism Management*, Vol.88, https://doi.org/10.1016/j.tourman.2021.104426.

Shin, H. H., Jeong, M., So, K. K. F., and DiPietro, R. (2022). "Consumers' experience with hospitality and tourism technologies: Measurement development and validation". *International Journal of Hospitality Management*, Vol.106, https://doi.org/10.1016/j.ijhm.2022.103297.

Sigala, M. (2015a). "The application and impact of gamification funware on trip planning and experiences: the case of TripAdvisor's funware", *Electronic markets,* Vol.25, pp.189-209.

Sigala, M. (2018). "Implementing social customer relationship management: A process framework and implications in tourism and hospitality", *International Journal of Contemporary Hospitality Management*, Vol.30 No.7, pp.2698-2726.

Stylos, N., Rahimi, R., Okumus, B., and Williams, S. (2021). *Generation Z marketing and management in tourism and hospitality*. Springer International Publishing.

Tan, F. B., and Hunter, M. G. (2002). "The repertory grid technique: A method for the study of cognition in information systems." *MIS quarterly,* pp.39-57.

To, B. and Wong, K. K. Y. (2020). "Personal Construct Theory of George A. Kelly", *The Wiley Encyclopedia of Personality and Individual Differences: Models and Theories*, pp.263-267.

Weber, J. (2014). "Gaming and gamification in tourism: 10 ways to make tourism more playful. Best practice report", *Digital Tourism Think Tank.* Retrieved May 18, 2021 from https://thinkdigital.travel/wp-content/uploads/2014/05/Gamification-in-Tourism-Best-Practice.pdf

Wei, Z., Zhang, J., Huang, X., and Qiu, H. (2023). "Can gamification improve the virtual reality tourism experience? Analyzing the mediating role of tourism fatigue." *Tourism Management*, Vol. *96*, https://doi.org/10.1016/j.tourman.2022.104715.

Xu, F., Buhalis, D., and Weber, J. (2017). "Serious games and the gamification of tourism". *Tourism Management*, Vol.60, pp.244-256.

Xu, F., Tian, F., Buhalis, D., Weber, J., and Zhang, H. (2021). "Tourists as mobile gamers: Gamification for tourism marketing", In *Future of Tourism Marketing* (pp.96-114). Routledge.

Yu, C., Cheah, J. H., and Liu, Y. (2022). "To stream or not to stream? Exploring factors influencing impulsive consumption through gastronomy livestreaming", *International Journal of Contemporary Hospitality Management*, Vol.34 No.9, pp.3394-3416.

Supplement A. *Content and Qualitative Analysis of the 10 Gamification App Practices.*

Critical Factors for Content Analysis (**)	**Selected Gamified App - 10 cases (*)**	**Code # and Main Characteristics**	**Content Analysis (***) Main Results**
Compelling narrative	Gamified travel apps for tourist guides (Drallo apps) https://www.nytimes.com/video/travel/100000002252458/now-playing-in-times-square.html	2.Gamified Travel tours and Rural Environments	Urban mobile walking tour guides
	Dutch theme park "Efteling" game app: "Fairy and the Safe") https://www.youtube.com/watch?v=vuwPTGeLnpE&feature=youtu.be	3.Augmented Playful Experiences in Adventure Parks	Augmented Reality game experience with mobile app in an amusement park
Clear rules and goals	Gamified virtual travel experience (Expedia's around the world) https://aroundtheworld.expedia.com/	10.Online game for tourism application	Travel agency loyalty and awareness building program
	Location based augmented reality games (Tripventure) https://www.youtube.com/watch?v=fvZIMH0M3bA&feature=youtu.be	1.Smartphone mobile location-based game application	Mobile interaction with the place and augmented virtual reality apps
Reasonable and well-balanced challenges	Ghost game Wartburg castle. Germany (Cultural heritage Bauhaus University Weimar) https://www.uni-weimar.de/kunst-und-gestaltung/wiki/images/IFD_mobile-culture_2.01_ChristopherFalke_GhostsGames.pdf	4.Gamified Immersive Experiences in Cultural Heritage	New serious game app & methods for learning history and enhance visitor experience about cultural attractions
	Travel Plot Porto & the mission to save the Port Wine https://www.youtube.com/watch?v=lzu1Aw3Dexk&feature=youtu.be (Transmedia)	5. Gamification in Transmedia Storytelling (for DMOs)	Individual user mobile destination app and involvement of the user to the real time (port history) storytelling with the use of different means
Presence of social interaction and relationships	Application of Gamification in Hospitality (Gamified hotel experience; Hotel Prinz Luitpold-Bad. Bavaria) http://www.hotelmarketingstrategies.com/everybody-plays-hotel-guest-loyalty-and-social-good-through-game-mechanics-9132/ https://www.cintas.com/ready/the-workplace-today/hotel-marketing-trends-from-google-search-changes-to-gamification/	7.Hotel customer engagement through a Gamification application	Guest involvement in a Gamification event and hotel guest engagement

Quick and open feedback	Gamification in the aviation industry (KLM; Meat & Seat campaign) https://www.youtube.com/watch?v=eL2lWn7oup4	8.Gamified flying social media experience for airline passengers	Gamification app for social media use conversations and passenger group communication
	Virtual cultural heritage online (3D models) http://www.romanleicester.dmu.ac.uk/	9.Experiencing Virtual Cultural Heritage Online	Virtual heritage travel; creating virtual experiences to foreigners; Mass tourism heritage protection and save attractions
	Gamified restaurant experience (McDonald's Campaign; Sweden and Pick n" play game) https://www.youtube.com/watch?v=27dxs99eB7k	6. GPS mobile application to increase food product sales	Mobile game; Cross-selling & sales promotion hamburger campaign near the restaurant area and customer engagement (product story creation)

Note. *Jessika Weber, Digital Tourism Think Tank; www.THINKDIGITAL.TRAVEL *Gaming and Gamification in Tourism-10 Ways to Make Tourism More Playful; Best Practice Report.* ** Stadler D. & Bilgram V. (2016). Gamification: Best Practices in Research and Tourism. In: Roman Egger, Igor Gula and Dominik Walcher (Editors) *Open Tourism*., 363-370. Springer Verlag Berlin Heidelberg: Heidelberg. New York. Dordrecht. London. DOI 10.1007/978-3-642-54089-9. and Deterding. S. Dixon. D. Khaled. R. and Nacke. L. 2011. From games design elements to gamefulness: defining "gamification". In*: Proceedings of the 15th International Academic Mindtrek Conference*. Tampere. Finland. *** Primary results of qualitative research study; perceptions of four industry experts (Helexpo, 2021).

Supplement B.

Sample Characteristics of the Participants in Greece and UK.

Greece	Descriptive (Values)	%	Σ%
-Number of participants	26		100
-Year of birth	1997	5.6	
	1998	15.6	
	1999	78.8	100
-Gender	Feminine	56.5	
	Masculine	43.5	100
-Previous experience (control question):	I don't play	-	
	I don't play often	53.0	
	I play often	35.3	
	I play very often	11.7	100
- Education (highest level)	Less than high school	4.0	
	Complete high school	8.5	
	Technical school	10.5	
	Vocational training	9.0	
	First degree Uni (not complete yet)	5.0	
	Completed first degree university	55.5	
	Post graduate studies (complete/not)	7.5	100

UK	Descriptive (Values)	%	Σ%
-Number of participants	24	100	100
-Year of birth	1996	6.3	
	1997	12.5	
	1998	6.3	
	1999	18.7	
	2000	56.2	100
-Gender	Feminine	53.3	
	Masculine	46.7	100
-Previous experience (control question):	I don't play	-	
	I don't play often	61.1	
	I play often	27.8	
	I play very often	11.1	100
- Education (highest level)	Less than high school	6.5	

Complete high school	7.5		
Technical school	12.5		
Vocational training	15.0		
First degree Uni (not complete yet)	3.0		
Completed first degree university	50.5		
Post graduate studies (complete/not)	5.0	100	

Supplement C1

Greece: Structure Coefficients, Components, and Communalities.

Constructs	Component com 1	Component com 2	Communalities (comm) [*]: X where $x_{comm}=y^2_{com1}+z^2_{com2}$
1.Related with travel	0.34	**0.71**	0.62
2.Interactive walk	0.11	**0.84**	**0.72**
3.Cultural heritage	0.06	0.56	0.32
4.Business application	-0.41	**-0.82**	**0.84**
5.Information for the place	-0.04	**0.86**	**0.74**
6.Virtual	-0.20	-0.65	0.46
7.Business & Traveling	-0.56	**-0.77**	**0.91**
8.Treasure	0.05	0.20	0.04
9.Real heroes	-0.01	-0.02	0.00
10.Virtual	-0.47	0.18	0.25
11.Catering place	**-0.71**	-0.46	**0.72**
12.Benefit	-0.28	0.01	0.08
13.Fun	0.41	**0.76**	**0.75**
14. Live	-0.59	0.38	0.49
15. Making a trip	-0.01	-0.26	0.07
16. Augmented reality	0.38	0.37	0.28
17. Technology is necessary	0.56	0.49	0.55
18. Existence of cultural elements	0.58	0.36	0.47
19. Entertaining character	0.40	0.50	0.41
20. Experience living in your place of stay	0.33	0.06	0.11
21. Collecting information for the place you have visit	-0.14	0.55	0.32
22. Information for visitors	-0.57	-0.31	0.42
23. Adventure	0.47	0.12	0.24
24. Cultural heritage	0.65	-0.26	0.49
25. Discovering new places	-0.13	0.25	0.08
26. Historical events and cultural heritage	0.57	0.55	0.63
27. Cultural heritage elements	0.58	0.60	**0.70**
28. Attract tourists	-0.14	**0.80**	0.66
29. Entertainment and fun	0.10	0.31	0.11
30. Gamification in the environment	-0.12	0.56	0.33
31. Gamification related with the travel	-0.51	0.30	0.35
32. Gamification through digital models	0.22	0.37	0.19
33. Gamification using historical events	**0.74**	0.52	**0.82**
34. Gamification related with attractions and fun places	**0.70**	-0.54	**0.78**
35. Travel based gamification	-0.16	**0.92**	**0.87**
36. Gamification in adventure parks and sightseeing	0.37	-0.12	0.15
37. Gamification through role play	0.68	0.53	**0.74**
38. Gamification in tourism	**-0.74**	0.18	0.58
39. Gamification and culture	0.23	0.20	0.09
40. Tourism	0.25	0.66	0.50
41. Traveling in the place of interest	0.16	**0.71**	0.53
42. Cultural heritage	-0.46	-0.19	0.25
43. Active user involvement	0.01	0.20	0.04
44. Personal experience	-0.10	-0.52	0.28
45. Past	0.28	0.37	0.22
46. Direct contact with the destination	0.03	-0.36	0.13
47. Discount coupons	-0.63	0.28	0.48
48. Creation of history with my ideas; I create my experiences	-0.04	-0.21	0.05
49. Entertaining experience	0.34	0.27	0.19

50. Networking with others	-0.01	-0.55	0.30
51. History learning; the past of the place	-0.07	0.46	0.22
52. Higher mission	0.30	-0.56	0.40
53. Interactivity	-0.07	0.17	0.03
54. Fun	-0.23	0.01	0.05
55. Finding locations	-0.52	0.16	0.30
56. Dating	0.16	-0.06	0.03
57. Tour Guide	-0.57	0.41	0.49
58. Games without points	0.36	0.23	0.18
59. Hospitality in real time	-0.46	0.21	0.26
60. Knowledge game	0.62	-0.21	0.43
61. Culture	0.64	0.63	**0.81**
62. On-line	-0.18	0.16	0.06
63. Visiting the place	-0.09	-0.28	0.09
64. Contact with cultural heritage	0.44	-0.46	0.41
65. Discovery of new places in the town	0.40	**0.75**	**0.72**
66. Attract users	0.44	0.57	0.52
67. Transferring culture	0.55	0.48	0.53
68. Visual contact with the people of the past	0.55	0.67	**0.75**
69. Cultural heritage	0.47	0.60	0.58
70. Guided tour	0.38	0.65	0.57
71. Visual	-0.10	-0.23	0.06
72. Personal experience	-0.52	-0.27	0.34
73. Adventure	0.00	-0.16	0.03
74. Interactivity	-0.07	0.17	0.03
75. Typical landscape	0.55	0.56	0.62
76. Tourist guide for city's history	-0.02	0.57	0.33
77. Action	-0.11	-0.03	0.01
78. Civilization	0.27	-0.64	0.48
79. Different locations by the road	-0.29	**0.73**	0.62
80. Tourist city guide	-0.33	0.46	0.32
81. Traveling	0.46	**0.85**	**0.93**
82. Travel guidelines	0.60	0.66	**0.80**
83. Exploration	0.53	**0.78**	**0.89**
84. Culture/heritage	0.60	0.67	**0.81**
85. Gaming type	-0.02	0.41	0.17
86. Focus on the interest	-0.28	0.27	0.15
86. Application & touring in the physical environment	-0.12	0.56	0.33
87. App for traveling	-0.51	0.30	0.35
88. App digital based	0.22	0.37	0.19
89. App for historical places	**0.74**	0.52	**0.82**
90. App for entertainment places	0.69	-0.53	**0.76**
91. Road guidelines	**-0.70**	0.32	0.47
92. Travel experiences	0.36	-0.34	0.25
93. Culture	0.20	-0.01	0.04
94. Walk in the city	**-0.72**	0.16	0.59
95. Important information for the tourist	-0.06	0.25	0.07
96. Food	-0.37	-0.31	0.23

Note: *Communalities (Comm) for the *i*-th construct variable are computed by taking the sum of the squared loadings for each construct variable. The communality for a given construct variable is interpreted as the proportion of variation in that variable explained by the two factors. Example: 84% (0.84) of the variation of construct variable: "4. Business Application", is explained by the two-component factor model.

Supplement C2

United Kingdom: Structure Coefficients, Components, and Communalities.

Constructs	Component com 1	Component com 2	Communalities (comm) [*]: X where $x_{comm}=y^2_{com1}+z^2_{com2}$
1. Old	**0.70**	0.42	0.67
2. Bland	0.12	0.37	0.15
3. Online	0.47	-0.62	0.61
4. Imaginative	0.41	-0.65	0.59
5. Clear	**-0.74**	0.21	0.59
6. Childish	0.10	-0.38	0.15
7. Educating	0.35	0.31	0.22
8. Fun	-0.41	0.19	0.20
9. Realistic	0.08	0.34	0.12
10. Challenging	0.51	-0.4	0.42
11. Individualistic	0.81	-0.20	**0.70**
12. Focusing	-0.25	0.56	0.38
13. Exciting	-0.46	0.63	0.61
14. Location-based	-0.38	-0.06	0.15
15. Cultural	0.29	**0.71**	0.59
16. Nature	-0.19	0.23	0.09
17. Destination	-0.04	-0.43	0.19
18. Social	-0.59	-0.17	0.38
19. i-Phone	0.06	-0.03	0.00
20. Direct	0.46	-0.05	0.21
21. Personal Info	-0.37	0.47	0.36
22. Junk-food	0.29	-0.30	0.17
23. Auto-motive	-0.47	-0.17	0.25
24. Free	-0.46	-0.08	0.22
25. Controlled environment	0.34	-0.10	0.13
26. Depend on user participation	0.52	0.29	0.35
27. Collecting	-0.09	-0.32	0.11
28. Adventure	-0.15	-0.02	0.02
29. Augmented	-0.08	0.14	0.03
30. Outdoor	-0.25	0.22	0.11
31. Big	-0.31	0.29	0.18
32. Country/region	0.44	0.56	0.51
33. Dialogue	-0.63	0.57	**0.72**
34. Sitting down	0.00	-0.05	0.00
35. Download app	0.32	0.16	0.13
36. Historic	0.61	-0.58	**0.71**
37. Compare	-0.29	0.19	0.12
38. Easily accessible	0.56	-0.08	0.32
39. Self-gain	0.59	-0.19	0.38
40. Present in the moment	-0.05	0.39	0.15
41. Sound	-0.13	-0.48	0.25
42. Promotive	-0.46	-0.35	0.33
43. Selling	-0.61	-0.60	**0.73**
44. Explore	-0.61	-0.60	**0.73**
45. Tourist	-0.25	0.04	0.06
46. Historical	0.64	0.08	0.42
47. Fun	**0.90**	-0.13	**0.83**
48. Adventure	**0.82**	0.08	0.68
49. Guide	0.21	0.24	0.10
50. Culture-based	0.63	0.53	0.68
51. Spontaneous	0.32	-0.20	0.14
52. Informative	**0.78**	0.36	**0.74**
53. Interactive	-0.06	-0.15	0.03
54. Guidance	0.63	0.57	**0.72**
55. Non-reward	0.34	0.60	0.48
56. Individualist	0.44	-0.44	0.39
57. Non-informative	0.12	-0.36	0.14
58. Travel guidance	0.03	0.30	0.09
59. Storytelling	0.37	0.03	0.14

60. Stimulating	0.55	-0.61	0.67
61. Adventure	**0.72**	0.49	**0.76**
62. Exciting	0.10	-0.13	0.03
63. Contemporary	-0.38	0.66	0.58
64. Adventure	0.49	-0.51	0.50
65. Playful	-0.14	-0.62	0.40
66. Interactive	0.60	-0.52	0.63
67. Imaginative	0.65	0.05	0.43
68. Easy-going	**-0.72**	-0.09	0.53
69. Non-reward loyally	0.18	0.58	0.37
70. Playful	0.16	-0.23	0.08
71. Emotion based	0.12	0.00	0.01
72. Fun	0.52	-0.25	0.33
73. Promotional	**-0.72**	-0.31	0.61
74. Places	**0.97**	0.01	**0.94**
75. Authentic	**-0.74**	0.21	0.59
76. Historic	0.60	0.33	0.47
77. Adventure	**0.75**	-0.18	0.59
78. Interactive	0.59	-0.18	0.38
79. Conceptual	0.67	-0.37	0.59
80. Humanistic	**-0.78**	0.28	0.69
81. Practical	0.05	-0.69	0.48
82. Multi-functional	0.51	-0.23	0.31
83. Entertaining	0.68	-0.08	0.47
84. Architectural	**0.80**	-0.10	0.65
85. Virtual	0.27	**-0.80**	**0.71**
86. Commercial	**-0.81**	-0.44	**0.85**
87. World-wide	-0.43	**-0.76**	**0.76**
88. Behind senses	**0.77**	0.39	**0.75**
89. Cultural	**0.83**	0.09	**0.70**
90. Interesting	-0.57	-0.32	0.43
91. Adventure	**0.74**	0.36	0.68
92. Historical	0.45	0.43	0.39
93. Challenging	0.01	-0.47	0.22
94. Foody	**-0.78**	-0.01	0.61
95. Socializing	-0.68	0.02	0.46
96. Story-telling	**0.74**	0.16	0.57
97. Individualism	0.49	-0.04	0.24
98. Imaginative	0.69	-0.48	**0.71**
99. American	-0.22	-0.54	0.34
100. Mission	-0.51	0.47	0.48

***Note**:* *Communalities (Comm) for the *i*-th construct variable are computed by taking the sum of the squared loadings for each construct variable. The communality for a given construct variable is interpreted as the proportion of variation in that variable explained by the two factors. Example: 70% (0.70) of the variation in the construct variable "11. Individualistic" is explained by the two-component factor model.

Supplement D. *Generalized Procrustes Analysis (GPA), ANOVA Source Table for Matched Figures.*

	The study in Greece			*The study in the UK*		
Elements (*best gamification practices*)	Consensus	Residual	Total	Consensus	Residual	Total
1.Location based augmented reality games (Tripventure)	6.44	4.37	10.81	7.98	2.30	10.29
2.Gamified travel apps work for tourist guides (Drallo apps)	5.63	3.36	8.98	6.86	2.16	9.02
3.Augmented playful experiences in adventure parks (Efteling game app)	4.24	3.47	7.70	5.52	2.48	7.99
4.Ghost game Wartburg castle. Germany (Cultural heritage Bauhaus University Weimar)	6.12	3.93	10.05	8.68	1.78	10.46
5.Gamification in Transmedia storytelling (for DMOs)	3.09	3.63	6.72	5.25	1.93	7.18
6.Gamified restaurant experience (Campaign)	9.01	3.03	12.04	8.40	1.63	10.04

7.Application of Gamification in Hospitality (Gamified hotel experience)	7.59	4.01	11.60	8.56	1.71	10.28
8.Gamification in the aviation industry (Meat & Seat campaign)	7.65	3.54	11.19	10.91	1.88	12.79
9.Virtual cultural heritage online (3D models)	8.20	3.02	11.22	9.02	1.85	10.88
10.Gamified virtual travel experience (Experis's around the world)	4.98	4.70	9.68	8.79	2.29	11.08
Total Sum of Square:	62.94	37.06	100.00	79.98	20.02	100.00

Supplement E. *Principal Component Analysis Comparing the Positioning of the Ten Gamification App Practices.*

<table>
<tr><td></td><td colspan="4">Principal Component Analysis
(Perceptual Mapping Results-Results of Consensus Biplots of GPA)</td></tr>
<tr><td rowspan="2">G. App code Nr(*)</td><td colspan="2">Common positioned apps</td><td rowspan="2">G. App code Nr</td><td colspan="2">Non-common positioned apps</td></tr>
<tr><td>Greek study</td><td>UK study</td><td>Greek study</td><td>UK study</td></tr>
<tr><td>1</td><td rowspan="2">"Mostly interactive exploration, entertaining and place informative oriented, supporting apps"</td><td rowspan="2">"Mostly heritage or culture oriented gamified apps with focus on entertainment and informative aspects"</td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>2</td></tr>
<tr><td>3</td><td rowspan="3">"Mostly funny gamification apps for business purposes with emphasis on historical and place exploration aspects".</td><td rowspan="3">"Mostly globally available entertainment virtual based gamification apps with emphasis on informational cultural and place exploration aspects"</td></tr>
<tr><td>4</td><td>"Mostly funny gamification apps for business purposes with emphasis on historical and place exploration aspects".</td><td>"Mostly heritage or culture oriented gamified apps with focus on entertainment and informative aspects"</td></tr>
<tr><td>5</td><td></td><td></td></tr>
<tr><td>6</td><td rowspan="3">"Mostly tourism business (aviation, F&B and lodging services) oriented with emphasis also in catering services, road map apps & place exploration and city walking proposals"</td><td rowspan="3">"Mostly commercial and virtual based; world-wide oriented apps with emphasis on F&B services and easy-going facilities"</td><td>7</td><td>"Mostly tourism business (aviation, F&B and lodging services) oriented with emphasis also in catering services, road map apps & place exploration and city walking proposals"</td><td>"Mostly for commercial purposes for traditional lodgings with commercial/promotional and humanistic content and focus on facilities and emotional/entertaining experiences"</td></tr>
<tr><td>8</td><td></td><td></td></tr>
<tr><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td>9</td><td>"Mostly entertaining, place, travel and an interactive historical exploration guide"</td><td>"Mostly heritage or culture oriented gamified apps with focus on entertainment and informative aspects"</td></tr>
<tr><td>10</td><td>"Mostly interactive exploration, entertaining and place informative oriented, supporting apps"</td><td>"Mostly globally available entertainment virtual based gamification apps with emphasis on informational cultural and place exploration aspects"</td></tr>
</table>