Audience behaviors for live performances and live broadcasts

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Abstract

The use of digital technology in the performing arts industry is a popular trend and it is continuing to have an impact on the economy, innovation, and society as a whole. Thus, the purpose of this study was to examine audience behaviors in regard to attending live performances and watching live broadcasts through electronic products. Through exploratory factor analysis and confirmatory factor analysis, two models were created: a model for audience behaviors regarding live performances (i.e., the venue model); and a model for audience behaviors regarding live broadcasts through electronic media (i.e., the electronic model). In order to improve the scientific operability of this study, questionnaires were administered to a sample of performing arts workers and students (including those in music, dance, and art) as well as art fans. Based on the results, "convenience of transportation," "convenience of ticket purchase or collection," and "sound equipment of the venue" were the main factors that affected the respondents regarding live performances. Meanwhile, "watch anytime," "unrestricted movement," and "no crowding" were the main factors that affected the respondents regarding live broadcasts through electronic products. Interestingly, regardless of whether the respondents attended live performances or watched lived broadcasts through electronic media, the most important factor was "convenience." It is hoped that these findings will be used by performance venues and organizations as a reference for business management and as a tool for increasing attendance and/or viewership.

Keywords: audience behavior, live performances, digital music

1. Introduction

The development and application of digital technology in the performing arts industry and its impact on the economy, innovation, industrialization, talents, and skills has become an important issue at the global level (Executive Yuan of Taiwan, 2018). According to McKinsey Taiwan (in Liao, 2017), when a country's productivity is high, its overall industrial digitalization tends to be higher. In addition, for every 1% increase in the degree of industrialization, the industry's productivity will increase by 0.7%, as shown in the United Kingdom, Germany, the Netherlands, and France. In this regard, if we want to improve the productivity of the industry, then we must double our efforts in digitalization (Liao, 2017). However, in the performing arts industry, digital development has been slower than other industries. Art attendance is declining. A report from the National Endowment for the Art that tracked the participation of American art activities for decades pointed out that between 2002 and 2012, the rate of artistic creation and audience exposure dropped significantly. During this period, the number of theater participants dropped from 29% to 18% of the population; music participation decreased from 23% to 17%; dance participation decreased from 10% to 7%; and opera participation decreased from 3% to 2 % (NEA 2015). Although in the statistics from 2012 to 2017, the number of participants in each category has gradually increased. However, as per the Survey of Public Participation in the Arts (SPPA) statistics, audiences who consumed art through digital media increased from 25% to 41% and 14% to 16% in the music and dance categories, respectively, between 2012 and 2017. Theater productions as well (i.e., musicals or stage plays) increased from 7% to 16% (NEA 2018).

In general, traditional live music performances can only be performed in concert halls, auditoriums, and on streets, but live broadcasts through electronic media can enable musicians to perform practically anywhere. With the development of live stream, many projects explored various interaction and communication methods for real-time streaming experience to enable ease in broadcasting events live on the Internet. In addition, studies have found that providing contextual information in the video stream can increase the participation of users watching live broadcasts (Singanamalla et al., 2018; Hamilton et al., 2016; Yonezawa and Tokuda, 2012). Moreover, these broadcasts have not only diversified the performance types but also improved the quality of services to wider audiences. The main focus of this thesis is to conduct research and investigation on the watching behavior of audiences of performing arts events, such as classical music, jazz music, opera, dance performance, and ballet performance. Furthermore, the study examines audience behaviors with regard to attending live performances and watching live broadcasts through electronic media.

The rest of the article is organized as follows: The literature review includes

audience attendance and behaviors, live performance, and digital music development. In view of the literature, the hypotheses, research framework, and research design are expanded and examined. Then, empirical analysis of the data collected follows, which, in turn, is followed by the conclusion.

2. Literature review

2.1 Audience attendance and behaviors

Over the past 20 years, the performance arts industry has undergone significant changes, including new/alternative performance technologies that have affected the production of live performances altogether (Donnat, 1998). Due to the fierce competition and the rapid increase in the number of audiences, attracting target audiences and related stakeholders has been of utmost concern (Mencarelli and Pulh, 2006). Analyzing changes becomes extremely important among factors that affect consumer behavior. From this, it is possible to predict changes in the behavior of cultural consumers, understand the expectations of customers, create value for customers, and achieve their goals (Kotler, 1997; Dragićević-Sesić and Stojković, 2010; Varbanova, 2015; Wróblewski, 2018).

During performance-related activities, audiences interact with various services and products (i.e., the supply). In this regard, it is important to define market positioning based on the interactions (i.e., consumer value) between audiences and live performances (Evrard and Aurier, 1999; Holbrook, 1999). In a related study, Filser (2000) explored the interactions between audiences and performance venues based on the theory by Petty, Cacioppo, and Schumann (1983). There are also many factors that play a role in defining cultural supply, including communication and pricing policies, ticketing systems, etc. However, the interactions of audiences with various services and products depend on their interactions with the performance venues themselves (Mencarelli and Pulh, 2006).

The key psychological factor that must be considered in cultural activities is product participation. It tends to have many antecedent customer influence levels that affect each variable (Laurent and Kapferer, 1985; Berman, Sams, and Schwartz, 2015). Although consumers use various resources when searching for program/performance information, the most trusted and time-saving resources are performers, families, and friends. The information itself is also a reliable source of information. For instance, consumers can examine many different aspects, including the performers/dancers/actors, the performing group, the director/conductor/choreographer, the performance date/time, etc. All of these “ingredients” can help assure the quality of the performance and persuade consumers to attend the event. In terms of financial resources, if there are no discounts, such as those for students, senior citizens, etc., then

the ticket prices can deter some consumers in the market. In addition, some consumers might not have an enjoyable experience, either prior to or during the event. According to Andreea, (2012), a positive experience includes good communication and mutual respect between the performer(s), the performance venue, and the audience.

Finally, previous research has focused on the service-related attributes of performing arts activities. For example, Jobst and Boerner (2011) divided them into two main areas: core services (e.g., all aspects of the performance, including the technical aspects and the performers) and peripheral services (e.g., sufficient parking spaces, convenient ticket purchasing, and convenient access to the performance venue). Interestingly, Hume and Mort (2008) found that some organizations tend to only focus on core services, while ignoring peripheral services. However, consumers generally evaluate core and peripheral services according to their level of importance (Kolhede and Gomez-Arias, 2017).

2.2 Live performances

Live music, dance, and drama have been performed for thousands of years, with opera, in particular, originating in Italy during the 16th century (Phelan, 1993). However, research on audience participation dates back to the field of cultural economics in the mid-1960s. Since then, many researchers have examined the various reasons for attending live performances in order to improve art management and education (Andreea, 2012; Turrini, 2006: 44).

The definition of "audience" in the field of performing arts is complex. It can include different meanings based on various situations, performances, stakeholders, and consumers (Hill, O'Sullivan, and O'Sullivan, 2008: 36). The same study also found that individuals attend live performances according their overall experience at previous events (Hill, O'Sullivan, and O'Sullivan, 2008: 37). In a related study, the main reason why individuals attend live performances is based on their respective social needs such as interacting with friends, spending quality time, and confirming one's identity (Andreea, 2012).

From consumers' perspectives, positive experiences at live performances are based on many factors (Andreea, 2012), such as the lighting, the sound, and the performers, all of which foster various emotions. In fact, the audiences and their emotional responses are integral parts of live performances, regardless of the type of music. This is one of the main reasons by live performances are still important to the younger generation, even if the same music is available on recordings (Frith, 1996) and they have to wait in long lines to purchase tickets. However, some participants do not have such positive experiences at live performances (Booth, 2010).

Due to the economic downturn in 2008 and its adverse effect on cultural

institutions around the world (Pilkington, Davies, and McDonald, 2010), funding levels and leisure consumption have reached dangerously low levels. As a result, board members have been placing increasing pressure on arts and executive directors to develop reasonable, income-oriented business practices that attract as many consumers as possible (Filice and Young, 2011). Meanwhile, many venues lack the incentives to provide performers (and audiences) with a clean and comfortable environment, knowing that they are limited in their choice of venues (Booth, 2010).

Interestingly, the same situation occurred after the turn of the 20th century. For example, in 1916, the Balaban and Katz (B & K) movie theater chain in Chicago, Illinois, proposed five strategic factors in the operation of entertainment venues: location (i.e., place the theater in a remote area with fans); space (i.e., meet the needs of audiences); customer service (i.e., provide guidance and childcare); convergence (i.e., provide live, movie entertainment along with a gallery-like experience by decorating the theater with paintings and sculptures); and technology (i.e., launch "the world's first mechanical air-cooled theater" (Filice and Young, 2011). Overall, by providing a combination of movies, news, juggling shows, and other forms of entertainment, A. J. Balaban and Sam Katz brought the industry from the main stage to the movie theater. This business model is still relevant in today's integrated culture or in the words of Jenkins (2006), "Old and new media collide."

2.3 Digital music development

After the emergence of streaming technology, Phelan (1993) strongly opposed the commercialization of performances, stating that the recording technique would change the ontology of performances. In addition, Benjamin (1968) firmly believed that any artistic event, through mechanical reproduction, would affect artists and audiences by creating distance between them. Live streaming would also disrupt the time and space between performers and audiences (Auslander, 2012), since such an approach records and presents the performances as "live broadcasts" (Read, 2014).

In general, digital transformation has had a major impact on the behaviors of music listeners because it has forced them to change from the social and collective orientation of the "tangible age" to the private and personal orientation of the "digital age." In other words, digital streaming has influenced traditional concepts, in which albums have been replaced by digital music playlists (Tronvoll, 2019). In fact, in 2005, digital music revenue exceeded physical music format revenue for the first time in history (IFPI 2016). Meanwhile, the rapid technological changes in the music industry have greatly adapted to the stream of digital music listeners through channels such as Spotify, Apple Music, and YouTube, with Spotify and YouTube becoming the main means of mass music consumption (Marshall, 2015). As Belk (2013) pointed out, part of the value of

digital goods is related to the time and effort required to obtain them. In this sense, it is easier than ever to play music on streaming media platforms. Thus, under the visit-based model, listeners' music playlists may be more valuable than the actual digital songs contained in them (i.e., intangible property) and the ability to share such lists online. Moreover, these changing consumer preferences have been alleviated through technological innovations, including the digitization of music, the popularity of the Internet, the diversification of content streaming platforms, and the emergence of social networks.

In the performing arts industry, in order to maintain existing audiences and to develop new ones, live broadcasts have gradually emerged. For example, there is The Met: Live in HD, National Theater (NT) Live, and the Digital Concert Hall of the Berlin Philharmonic. NT Live, in particular, was launched in 2009, as a series of national live broadcasts of programs produced by the British performing arts venue. NT Live has proven to be successful, with its first-quarter viewership at 935,000, North American sales of $13.3 million, and overseas revenue of $5 million. Naturally, NT Live's development became one of the hottest topics in the market (Barker, 2013). As for the Digital Concert Hall of the Berlin Philharmonic, compact disc (CD) sales had significantly declined, and the orchestra had to develop a different platform that could create new audiences through different markets (Jones, 2000). According to official news reports, this platform was also successful, with roughly 200,000 visitors during the first six months and more than 14,000 paid users. By April 2010, there were more than 500,000 visitors and 25,000 paid users, of which 34% were from Germany, 14% were from Japan, 11% were from the United States, 5% were from Spain, and 4% were from Italy (Stöber, 2011). In other words, through the creation of this platform, the number of new audiences increased to more than 9,000.

3. Hypothesis and research framework

Consumers use various resources when searching for program/performance information, with the most trusted and time-saving resources being performers, family, and friends. These factors can help assure the quality of performance and persuade consumers to attend events. Berman et al. (2015) indicated the key psychological factor that must be considered in cultural activities is product participation. Following these, Hypothesis 1 was formulated as follows:

H1a: Program quality affects audience behavior regarding live performance.
H1b: Program quality affects audience behavior regarding live broadcasts through electronic products.

When consumers are in the process of consuming and participating in activities, convenience affects their consumption behavior. Jobst and Boerner (2011) proposed that sufficient parking spaces, convenient ticket purchasing, and convenient access to the performance venue are all factors that affect consumers going to venues to watch performances. Thus, Hypothesis 2 is proposed as follows:

H2a: Convenience affects audience behavior regarding live performance.
H2b: Convenience affects audience behavior regarding live broadcasts through electronic products.

The environment and comfort levels of performance venues is a factor that affects consumers who attend live performances. Booth (2010) mentioned that many venues lack the incentives to provide performers (and audiences) with a clean and comfortable environment. The B&K theater launched "the world's first mechanical air-cooled theater" in line with this observation. Hypothesis 3 is rendered as follows:

H3a: Environment affects audience behavior regarding live performance.
H3b: Environment affects audience behavior regarding live broadcasts through electronic products.

Live performances give audiences a change of their range of emotional experiences. Andree (2012) proposed that consumers attend live performance on the basis of many factors, such as the lighting, the sound, and the performers, all of which foster various emotions. In fact, the audiences and their emotional responses are integral parts of live performances, regardless of the type of music. Thus, Hypothesis 4 of this study is formulated as follows:

H4a: Facility affects audience behavior regarding live performance.
H4b: Equipment affects audience behavior regarding live broadcasts through electronic products.

4. Research design

Based on previous research and B&K's five aspects of theater management, the present study proposed five items Facility, Equipment, Environment, Convenience, and Program, with two dependent variables Service (i.e., venue services) and Sensor i.e., electronic products. Moreover, through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), two models were created: a model for audience behaviors regarding live performances (i.e., the venue model); and a model for audience

behaviors regarding live broadcasts through electronic media (i.e., the electronic model).

4.1 Questionnaire design

This study developed a questionnaire based on relevant literature, the five aforementioned items, and the two dependent variables. Overall, each questionnaire was divided into three parts. The first part focused on basic personal information, while the second part investigated the respondent's behavior regarding live performances. Finally, the third part focused on the respondent's behavior regarding live broadcasts through electronic products. The answers were based on a five-point Likert scale, where: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

4.2 Data collection

To enhance the scientific operability of this study, questionnaires were administered to 181 performing arts workers and students (including those in music, dance, and art) as well as art fans, after with 181 questionnaires were deemed valid.

The samples were mainly sent to learners and workers in performing arts as these audiences tend to participate in live performances more frequently. The results of sample collection mostly constitute those from students of and workers in the performing arts. According to the statistics of the National Theater and Concert Hall (NTCH) artsticket system from 2014 to 2016, the number of ticket buyers aged less than 30 years is increasing on a yearly basis, especially students aged 19 to 25 years, with a growth rate of 45%. The gradual increase in these student audiences also influences the trend of future consumer behavior. In addition, in the report of the NTCH artsticket system in 2020, 65% of the members only buy tickets once a year. The results of the sample collection of the study were analyzed to examine the watching behavior of audiences who participate in one or more live events per year.

4.3 Statistical analysis

The basic data and research variables of the sample in this study were "sex," "age," "monthly income," and "occupation." In terms of gender distribution, 33.1% of the respondents were males and 66.8% were females, while the age distribution was 20-25 years (38.6%), 26-35 years (26.5%), and 36-45 years (25.9%). Regarding the annual income of the respondents, those earning less than USD 10,000 (39.7%) comprised the largest proportion. As for their occupation, 34.2% of the interviewees were students, 16.5% worked in the service industry, and 15.4% were performing arts workers.

Moreover, 78% of the respondents attended live performances more than twice a year (on average), while approximately 69% of the respondents had watched live

broadcasts through electronic products (see Table 1)

5. Empirical analysis

In this study, SPSS 25.0 statistical software was used to analyze the sample through EFA. The purpose was two-fold: (1) to determine the structural effects at this preliminary level; and (2) to ensure that only the variables with high factor loads are retained. This study also used varimax orthogonal rotation to maximize the variance of the squared loadings in each factor, after which EFA was conducted to analyze the behaviors of the respondents who attended live performances and those who watched live broadcasts through electronic products. Finally, after extracting the factors from the EFA, AMOS 22.0 software was used to perform CFA and construct a structural equation model of the respondents' behaviors regarding live performances.

5.1 The KMO test and Bartlett's test of sphericity

This study used the KMO test (i.e., the Kaiser-Meyer-Olkin measure of sampling adequacy) and Bartlett's test of sphericity to determine whether the observation data was suitable for EFA. First, the reliability of the measurement items in which the audiences attended live performances (i.e., the venue model) and watched live broadcasts through electronic products (i.e., the electronic model) was tested. As shown in Table 2, Cronbach's α for the venue model and the electronic model were 0.747 and 0.831, respectively. According to Cuieford (1965), Cronbach's α of greater than 0.7 indicates high reliability, a value between 0.7 and 0.35 indicates acceptable reliability, and a value of less than 0.35 indicates low reliability. Thus, the reliability of the sample data in this study was high.

Second, this study tested the validity of the measurement items by using the KMO test and Bartlett's test of sphericity. In this regard, the larger the KMO value, the more likely the factors represent the variables. More specifically, KMO > 0.8 indicates high validity, KMO > 0.7 indicates moderate validity, KMO > 0.6 indicates acceptable validity, and KMO < 0.5 indicates low validity. In this study, the venue model and the electronic model included KMO values of 0.696 (indicating acceptable validity) and 0.826 (indicating high validity), respectively. Moreover, Bartlett's p-values had significance levels of less than .01. Based on these findings, the observation data was appropriate and suitable for EFA.

5.2 Exploratory factor analysis

In this study, EFA was used to extract the factors, to explain/name them, to highlight the relationship between various service items and latent factors, and to extract the factors with common eigenvalues greater than 1. As for the factor load values,

Joseph et al. (1987) stated the following: any factor load value of greater than 0.3 is significant; any factor load value of greater than 0.4 is more important; and any factor load value of greater than 0.5 is very significant. Thus, in the venue model, items Q15 and Q19 were deleted since their factor load values were less than 0.5. Regarding the electronic model, all of the items were retained. In addition, according to Zaltman and Burger (1975), if the cumulative explanatory variance is more than 40%, then it can effectively explain the significance of each factor. Since the cumulative explanatory variances of the two models in the present study were 60.211% (see Table 3) and 72.276% (see Table 5), respectively, each factor had representative and interpretable significance.

As shown in Table 2, the KMO measurement data was 0.696 for the venue model (indicating suitability for factor analysis), while the p-value of Bartlett's sphericity test was close to 0 (indicating significance, thus rejecting the null hypothesis and accepting the alternative hypothesis). Overall, four factors were extracted using varimax orthogonal rotation, all the eigenvalues were greater than 1, and the cumulative explanatory variance was 60.211% (see Table 3), which exceeded the minimum standard of 60%.

Regarding the electronic model, the KMO measurement data was 0.826 (indicating suitability for factor analysis), while the p -value of Bartlett's sphericity test was close to 0 (indicating significance, thus rejecting the null hypothesis and accepting the alternative hypothesis) (see Table 2). In this case, five factors were extracted using varimax orthogonal rotation, all of the eigenvalues were greater than 1, and the cumulative explanatory variance was 72.276% (see Table 5), which exceeded the minimum standard of 60%.

The factor analysis results of the venue model are shown in Tables 3 and 4, while such results of the electronic model are presented in Tables 5 and 6. The following explains the structure of the factors for both models.

In the preliminary analysis of the venue model, there were four factors with eigenvalues greater than 1 and a cumulative explanatory variance of 60.211% (see Table 4). In addition, the following factors were extracted. First, Component 1 (with an eigenvalue of 2.575) explains 19.801% of the common variation. Since Q11 and Q13have higher loads, they fall under "Program." Second, Component 2 (with an eigenvalue of 1.850) explains 14.228% of the common variation. Since Q4 and Q5 have higher loads, they fall under "Convenience." Third, Component 3 (with an eigenvalue of 1.849) explains 14.226% of the common variation. Since Q17 and Q18 have higher loads, they fall under "Environment." Finally, Component 4 (with an eigenvalue of 1.553) explains 11.947% of the common variation. Since Q8 and Q7 have higher loads, they fall under "Facility."

In the preliminary analysis of the electronic model, there were five factors with eigenvalues greater than 1 and a cumulative explanatory variance of 72.276% (see Table 5). Moreover, the following factors were extracted. First, Component 1 (with an eigenvalue of 3.407) explains 26.209% of the common variation. Since Q25, Q27, and Q26 have higher loads, they fall under "Convenience." Second, Component 2 (with an eigenvalue of 2.668) explains 20.520% of the common variation. Since Q31, Q29 and Q30 have higher loads, they fall under "Program." Third, Component 3 (with an eigenvalue of 1.936) explains 14.890% of the common variation. Since Q33 has a higher load, it falls under "Equipment." Finally, Component 4 (with an eigenvalue of 1.385) explains 10.657% of the common variation. However, since two of the items did not have a correlation between the facets, Component 4 was deleted. It is important to note that the cumulative explanatory variance was 61.619% (which still exceeded the minimum standard of 60%), proving that it was acceptable to extract three factors.

5.3 Confirmatory factor analysis

In this study, CFA was suitable for testing whether a known specific structure functions in the expected manner. First, as in the EFA, AMOS 22.0 software was used to verify the venue model and the electronic model and their corresponding measurement indices. Then, another sample data model was modified to calculate its adaptation indices, after which the estimated value and significance of each path coefficient was determined.

According to the convergence validity standard suggested by Fornell and Lacker (1981), a composite reliability (CR) value of greater than 0.7 indicates high consistency and a CR value of greater than 0.6 indicates acceptable consistency. In addition, an average variance extracted (AVE) of greater than 0.5 has high explanatory power, while an AVE of greater than 0.36 indicates acceptable explanatory power. In the venue model, the CR value and AVE of the latent variables were both greater than 0.6 and 0.4, thus meeting the standard (see Table 7) and indicating that the model was acceptable. In the electronic model, the CR value and AVE of the latent variables were both greater than 0.6 and 0.5. Although the AVE for "Environment" was 0.44, it was still above 0.36 (see Table 8), thus meeting the standard and indicating that the model was acceptable.

In regard to the overall fitness of the venue model, the root mean squared residual (RMR), the goodness-of-fit (GFI), and the root mean square error of approximation (RMSEA) were 0.075, 0.846, and 0.092, respectively. Although the GFI was not greater than 0.9, it was higher than 0.8, which was within the acceptable range. In addition, the value-added fitness indices NFI (normed fit index), RFI (relative fit index), IFI (incremental fit index), and CFI (comparative fit index) were 0.668, 0.608, 0.769, and 0.763 respectively, while the simple fit indices PNFI (parsimony comparative fit index),

PCFI (parsimony comparative-of-fit index), AGFI (adjusted global fit index), and PGFI (parsimony goodness-of-fit index) were 0,565, 0,645, 0.795, and 0.636, which were all greater than 0.5, thus meeting the simple fit standard.

As for the overall fitness of the electronic model, the RMR, GFI, and RMSEA were 0.204, 0.799, and 0.132, respectively. Although the GFI was not greater than 0.9, it was higher than 0.8, which was within the acceptable range. Moreover, value-added fitness indices NFI, RFI, IFI, and CFI were 0.842, 0.809, 0.875, and 0.874, respectively, while the simple fit indices PNFI, PCFI, AGFI, and PGFI were 0,698, 0,725, 0.723, and 0.579, respectively, which were all greater than 0.5, thus meeting the simple fit standard. Although both models did not achieve high overall fit, they were within the acceptable range in terms of simple fit.

Regarding the structural equation modeling (SEM) of the venue model, two facets (i.e., "Convenience" and "Facility") had a significant impact on the respondents that attended live performances, whereas two facets (i.e., "Program" and "Environment") did not have such an impact (see Figure 1). As for the SEM of the electronic model, one facet (i.e., "Convenience") had a significant impact on the respondents that watched live broadcasts through electronic products (see Figure 2).

Based on the findings, the main factors that influenced the respondents to attend live performances were good sound equipment at the venue and the convenience of transportation. As for the main factors that influenced the respondents to watch live broadcasts through electronic products, they were convenience, no need to purchase a ticket, and less travel time.

6. Conclusion

The purpose of this study was to examine audience behaviors in regard to attending live performances and watching live broadcasts through electronic products. Based on the empirical analyses of the venue model and the electronic model as well as the results of the questionnaires, the conclusions are as follows.

First, the main factors that influenced the respondents to attend live performances were "convenience of transportation," "convenience of ticket purchase and collection," "sound equipment of the venue," and "acoustics of the venue." In regard to the last two factors, the respondents stated that their electronic products at home were of no comparison to such equipment at the venue. Second, there were various factors that influenced the respondents to watch live broadcasts through electronic products, including "watch anytime," "unrestricted movement," "no crowding," and "network speed." In regard to the latter, even if the electronic product was good, the connection speed was still the primary concern for watching live broadcasts. As added values, two factors are only available during the viewing of live broadcasts through electronic

products: “subtitles and descriptions” and “behind-the-scenes programs and interviews.”

Interestingly, the results of this study showed that regardless of whether the respondents attended live performances or watched lived broadcasts through electronic products, the most important factor was “convenience.” In sum, it is hoped that the findings of this study will be used by various performance venues and organizations as a reference for business management and as a tool for increasing attendance and/or viewership in the future.

Live performance activities have been nearly suspended due to the recent occurrence of COVD-19, which substantially impacted the global performing arts industry. In turn, the scenario exerted a direct impact on audience behavior during performances. The audience can only watch live performances indirectly through digital media as they cannot go to the venue. Worldwide, many performances have been cancelled can only be performed through live webcasts (Billboard Staff, 2020). According to a report by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and ICOM, 95% of the approximately 60,000 museums worldwide were closed down due to the impact of the COVID-19 pandemic. Many exhibitions and sports events have also been postponed, such as the opening of the Venice Biennale of Architecture with a shortened exhibition period and the Tokyo Olympics. In April 2020, Spotify’s statistics found that listening habits of the audience changed during the COVID-19 pandemic. People listened more at home, further improving listening choices. Social activities and connections have reduced, and the psychological aspect of individuals has been indirectly affected due to the restriction on outside ventures. Thus, the alone time afforded by COVID-19 is spent on listening to music, experiencing art and literature, or staying in touch with others via social media. In addition, although music leisure may be limited to private residences, the development of music communities in such private spaces have continued, as evidenced by the success of virtual concerts (Lehman, 2020).

A recent study by comScore (Nasdaq: SCOR) points out that due to the COVID-19 pandemic, thousands of Americans have adapted to working from home and practicing distance learning. In May 2020, participation in streaming media, use of services, and household data have surged (comScore, 2020). The COVID-19 pandemic has caused large economic losses to on-site activities in the performing arts industry. However, it has led to a new trend in the development of the cultural industry in combination with technology. The pandemic has caused the rise of remote work and contactless economy. In the post-epidemic era, mixed reality, augmented reality, virtual reality (VR), digital publication, 3D, AI, and 5G will become the new normal. Many museums have combined digital technology for application to the cultural industry. For example, the Metropolitan Museum of New York, Getty Museum, and Ashmolean

Museum have added online collection galleries to open collections via the sharing function of the switch's "Animal Crossing." The Beijing Palace Museum use 5G technology combined with digital technology and communications, which has promoted not only the e-commerce industry but also the cultural and creative industry and created huge business opportunities (Wu, 2020).

People have been forcibly isolated at home and unable to attend live performances (i.e., classical music, drama, dance, or even pop music concerts). All activities can only be viewed through digital media, which, at the same time, has changed the watching behavior of viewers. This viewing mode cannot be disregarded. From the perspective of cultural integration and technological development, using the existing digital collections for large-scale sharing is a future trend. Moreover, combined with 5G technology, watching performances through the VR technology is the goal of future development. Whether such a change will influence the viewing behavior of live events in the future due to the impact of the current general environment will be an upcoming challenge for performance groups and performance venues.

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Table 1: The demographics and audience behavior in this study

Item	Category	N	Percentage%
Gender	Male	60	33.1%
	Female	121	66.8%
Age	20–25 years	70	38.6%
	26–35 years	48	26.5%
	36–45 years	47	25.9%
	46–55 years	13	7.1%
	Over 56 years	3	1.6%
Annual income	Less than USD 10,000	72	39.7%
	USD 10,001–USD 14,000	39	21.5%
	USD 14,001–USD 18,000	31	17.1%
	USD 18,001–USD 22,000	26	14.3%
	More than USD 22,001	13	7.1%
Occupation	Student	62	34.2%
	Service	30	16.5%
	Performance	28	15.4%
	Other	26	14.3%
	Education	18	9.9%
	Freelance	9	4.9%
	Technological	8	4.4%
Attended live performances	More than four times	80	44.1%
	3 times	40	22.0%
	Twice	31	17.1%
	Once	22	12.1%
	Never	8	4.4%
Watched live broadcasts through electronic products	More than four times	54	29.8%
	3 times	7	3.8%
	Twice	31	17.1%
	Once	33	18.2%
	Never	56	30.9%

Table 2: Results of reliability statistics, KMO test, and Bartlett's test of sphericity

	Reliability statistics			KMO test and Bartlett's test of sphericity			
	Cronbach's α	Standardize Cronbach's α	N	KMO measure of sampling adequacy	Approx. Chi-Square	df	Sig.
Venue model	0.747	0.764	19	0.696	628.948	105	0.000
Electronic model	0.831	0.844	20	0.826	1171.481	78	0.000

Table 3: Total variance of the venue model

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.069	23.606	23.606	2.575	19.810	19.810
2	2.196	16.892	40.498	1.850	14.228	34.038
3	1.432	11.016	51.515	1.849	14.226	48.264
4	1.131	8.697	60.211	1.553	11.947	60.211

Table 4: Rotated component matrix of the venue model

	Component			
	1	2	3	4
Q11 Attending an autograph session	0.822			
Q13 Having an exchange with the performer	0.783			
Q10 Being close to the performer	0.681			
Q12 Meeting with the aficionado	0.648			
Q9 Receiving guidance before the concert	0.590			
Q4 Convenience of transportation		0.843		
Q5 Convenience of ticket purchase or collection		0.741		
Q16 The location of the venue is too far		0.659		
Q17 Ticket price is too expensive			0.826	
Q18 Unable to match the show time			0.717	
Q14 Stage is too far in the auditorium			0.580	
Q8 Sound equipment of the venue				0.788
Q7 Acoustics of the venue				0.710

Table 5: Total variance of the electronic model

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.035	38.728	38.728	3.407	26.209	26.209
2	2.279	17.533	56.261	2.668	20.520	46.729
3	1.079	8.298	64.559	1.936	14.890	61.619
4	1.003	7.717	72.276	1.385	10.657	72.276

Table 6: Rotated component matrix of the electronic model

	Component			
	1	2	3	4
Q25 You do not have to purchase a ticket	0.891			
Q27 No crowding	0.845			
Q26 Unrestricted movement	0.770			
Q24 Saving travel time	0.758			
Q28 Watch anytime	0.661			
Q31 Includes subtitles and descriptions		0.841		
Q29 Behind-the-scenes programs and interviews		0.767		
Q30 Commentator		0.724		
Q33 The electronic production screen and sound is poor			0.807	
Q35 Live surroundings			0.774	
Q34 Network speed			0.606	
Q32 Not good at using electronic products				0.823
Q36 Cannot see the performer				0.666

Table 7: Convergent validity of the venue model

	Cronbach's α	CR	AVE	√AVE
Program	0.76	0.76	0.4	0.63
Convenience	0.68	0.69	0.44	0.66
Environment	0.58	0.65	0.43	0.65
Facility	0.56	0.65	0.51	0.71
Service	0.62	0.66	0.4	0.63

Table 8: Convergent validity of the electronic model

	Cronbach's α	CR	AVE	√AVE
Convenience	0.885	0.9	0.64	0.8
Program	0.833	0.84	0.63	0.8
Environment	0.644	0.66	0.44	0.63
Sensor	0.974	0.97	0.9	0.95

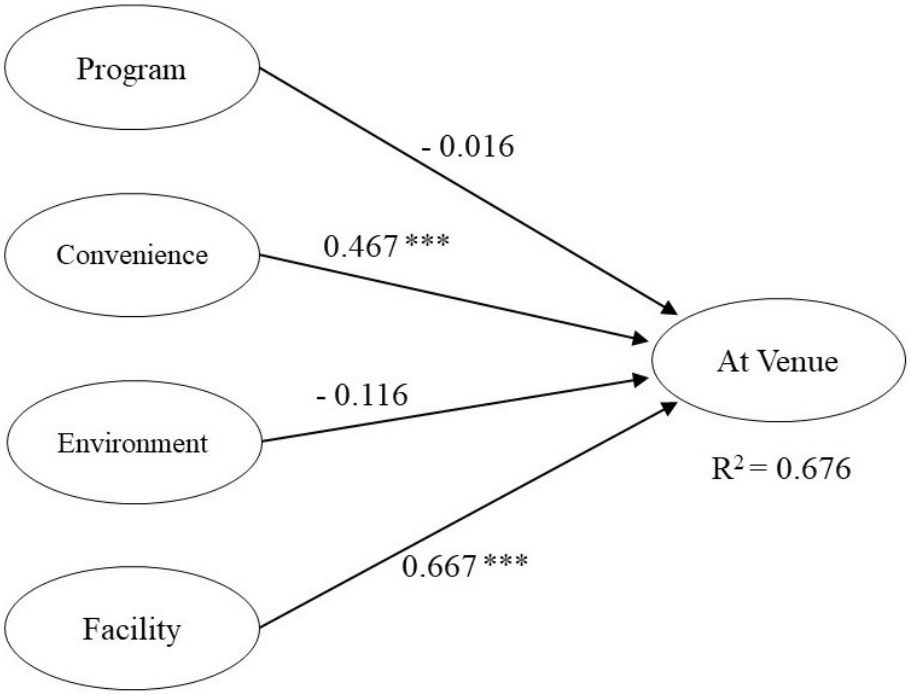

Figure 1: SEM results of the venue model

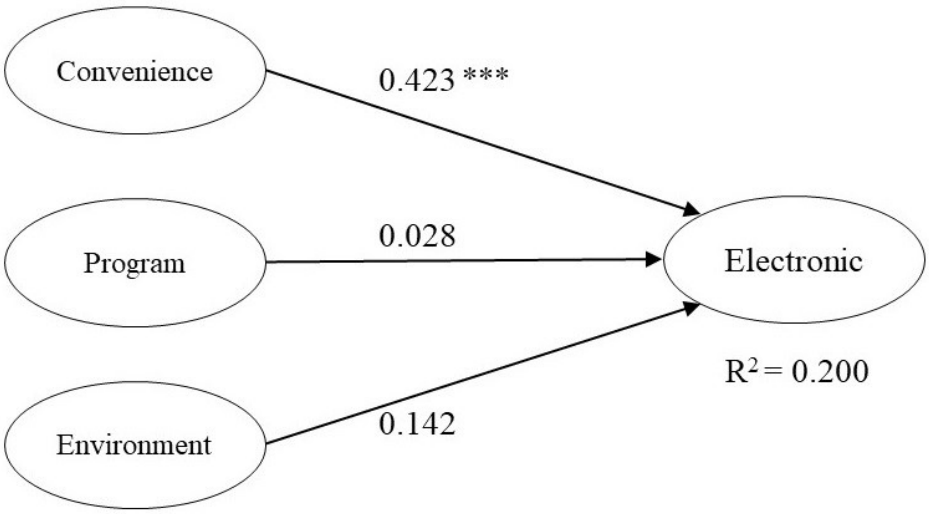

Figure 2: SEM results of the electronic model