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The show must go on: The mediating role of self-assessment in the relationship between performers’ technology acceptance and satisfaction level with remote performances in Korea during the COVID-19 pandemic

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ABSTRACT

To cope with the COVID-19 pandemic, the performing arts industry created new formats for delivering content via digital technology in the form of remote performances. This study examined the effect of remote performances on performers’ satisfaction through the lens of the technology adoption model. Additionally, it investigated whether the performers’ self-assessment of performance quality mediates the relationship between their technology acceptance and satisfaction. To this end, we collected the data from performers (N = 124) who experienced remote performances in Korea. Results showed that their satisfaction was a function of perceived usefulness and ease of use of the technology. However, the mediation effect by self-assessment was detected only on the relationship between the perceived ease of use and satisfaction. The results of the study suggest that event organizers offer an easy-to-operate technology allowing performers to better engage in remote performances. This also enables performers to self-assess their performances, which will enhance performance quality.

1. Introduction

The performing arts industry is one of the most affected sectors by the COVID-19 pandemic [1]. Most live musical and theatrical performances were postponed or canceled because of sanitary restrictions designed to limit the spread of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) As a result, stakeholders engaged in the performing arts industry, from performers to event planners and venue owners, experienced not only financial difficulties but also psychological instability, particularly once the pandemic began to last longer than expected [2-6]. In Korea, for example, over 6500 performances, including theater, musical, classic/opera, ballet, and traditional folk-dance concerts, were either canceled or postponed during the first half of 2020, resulting in an estimated $210 million loss to the industry; subsequently, 100,000 people became unemployed [7].

The audience is a crucial aspect of live performances because performers heavily depend on audience reactions; the interactions between these two groups occur in real-time. Heim [8] emphasized the importance of audiences in live performances, explaining that audiences are not merely spectators but rather offstage performers who interact with onstage performers via their verbal, non-verbal, and kinetic reactions. In theater, audience responses are monitored by performers—Heim [8] calls performers the “audience’s audience” (p. 22)—and audiences play the role of providing feedback to performers during performances. During live performances, all reactions of the audience—applauding, laughing, crying, and even walking out of the theater—help performers shape their performance, which significantly improves performance quality. Heim [8] concluded that the relationship between performers and their audiences is highly interdependent, such that they co-create the theatrical experience. In other words, performers do not perform alone. Contemporary live performance heavily depends on psychological and emotional interactions between performers and the audience, which are achieved by being physically present together. Without the physical presence of audiences and their responses, performance quality and the theatrical experiences of performers onstage may not be fully achieved.

In the contemporary performing arts, audiences play a role not only as consumers and critics but also, most importantly, as performers. However, to overcome the pandemic restrictions precluding face-to-face interactions between performers and audiences during live performances...
performances, alternative methods were conceived to deliver performances using online communication technology: remote/contactless performances, virtual concerts, and live streaming performances [9,10].

These new content delivery methods via digital technology became survival tools for performers to reach audiences. Although several digital elements were added to the virtual space to foster connection between the audience and performers, such as internet accessibility, online streaming, and audio and video technology, the level of interaction between performers and the audience was not satisfying to either party [11]. Everyone in the industry hopes face-to-face interactions will return, but remote performances may outlast the pandemic because they are an efficient means of delivering content—not only during a public health crisis [9,10,12].

All kinds of performers—from classical and pop musicians to dance and theater artists—were expected to familiarize themselves with the digitalized performing environment, particularly the lack of a live audience, which typically fosters or motivates strong performances. The technology should be easy to operate to maximize performance ability using digital technology, whether live or pre-recorded, to allow performers to focus on their performance as though an audience were physically present. In addition, performers should feel comfortable in using the technology. The degree to which performers accept the technology is critical for maximizing performance quality in a virtual environment without a physical audience. If performers can easily operate the performance delivery system, they will perceive the system as useful and perform better in performances facilitated by the system [13].

Digital communication technology via various online platforms, such as Zoom and YouTube, and social media platforms, such as Facebook, played a pivotal role in creating virtual spaces for contactless live interactions in not only the performing arts industry but also other sectors such as education, business, and tourism [11,14–16]. Google recently created enhanced 3D communication technology—Project Starline—to increase the level of intimacy during virtual communications [17].

The academic literature covering the pandemic has addressed how digital communication technology helped the most critically impacted sectors bounce back, as well as facilitated corporate business model changes [18], remote teaching [19–21], face-to-face relationship changes among key stakeholders in the sports and music industry [15], virtual reality as alternatives to tourism [22,23], wearable technology in healthcare [24], and excessive mobile phone use [25]. Although some studies have identified the role of digital technology in the performing arts industry, most are based on qualitative evidence [10] or on the perspective of audience members [6]. There is a lack of literature exploring the role of digital communication technology and its influence on performance quality during a pandemic from the perspective of performers, as online technology could become a new way of communicating with audiences even after the pandemic [26].

To fill this gap, we identified the role of remote performances using digital communication technology and its influence on performance quality from performers’ perspectives, particularly during the early stage of the pandemic, where all face-to-face performances were prohibited. Specifically, we used the technology acceptance model (TAM) to develop our hypothesized model to examine the relationship between the level of acceptance of online digital performance delivery technology (DPDT) and performers’ satisfaction level, as performance satisfaction is one of the key indicators to evaluate performance [27]. Individual performers judge their performance by applying specific evaluation criteria [28]. Therefore, performers’ self-assessment was used to assess their performance quality as a mediating variable; in other words, we examined how behavioral outcomes were influenced by the acceptance of DPDT through a self-assessment process. The theoretical contributions derived from this study provide insights for future researchers and practitioners in the performing arts industry on coping with the current pandemic, by helping performers achieve their goals without any difficulties in using digital technology.

2. Literature review

2.1. The COVID-19 pandemic’s impact on the performing arts industry

When SARS-CoV-2 first started spreading worldwide in early 2020, no appropriate medical treatment or vaccine was available. Physical distancing was the only option to prevent infection in the early stage of the pandemic. The sanitary measures implemented in response to it had severe impacts on many industries [22,29], especially the performing arts’ industry. Almost all live performances, including concerts, music and dance performances, festivals, and theater productions, were postponed or canceled. In Korea, for example, all national theaters, museums, and art exhibitions were forced to close, and pop music concerts such as the BTS tour (a famous Korean pop group) were canceled [9,30]. As a result, ticket sales plummeted, which caused a loss of revenue and unemployment for performers, event organizers, promoters, and venue owners. It also produced psychological challenges caused by job insecurity and the lack of creative practice [4,5,10].

As the duration and intensity of the pandemic increased, individuals had to cope with new daily routines (such as wearing personal protective equipment like masks when in public) in a new environment (such as lockdown and self-isolation). Indeed, the term “new normal” was employed to describe the global pandemic phenomenon [11,31]. This term has been used several times throughout history when people facing unprecedented crises or pandemics could not forecast the future. During the pandemic, the structure of society was altered at almost all levels—economically, socially, and culturally—to deal with the ubiquitous threat of SARS-CoV-2 [32,33].

2.2. Technology acceptance model

When a new technology is launched, particularly for commercial use targeting general consumers, users’ decision-making process to accept or adopt the technology depends on specific psychological determinants. Davis [13] suggested that the critical determinants of actual usage or usage intention are users’ perceived usefulness and perceived ease of use. Perceived usefulness is how beneficial the technology is for users to achieve their goals. Perceived ease of use is how easy it is to operate or manipulate the technology for users.

Since Davis [13] articulated TAM, scholars have identified determinants that affect individuals’ acceptance of technology under different circumstances, further expanding the research scope of what motivates individuals to use or individuals’ intention of using new technology [34,35]. The research has expanded to cover a wide variety of products and services based on network, digital, and communication technology, which have been released for business and lifestyle purposes [34,35].

TAM was first created in the context of technology-driven workplace innovation designed to improve the performance of employees and thus was a performance-oriented model geared toward the corporate environment. However, the scope of technology development has been expanded to other domains such as lifestyle, entertainment, and social media. As a result, other psychological and behavioral constructs, such as social influence and hedonic motivation, have been incorporated into the model to identify the determinants of technology adoption accurately, such as UTAUT or UTAUT2 [22,36–40].

Although there is wide variation in TAM, we used the original TAM as the theoretical framework for the study—perceived usefulness and perceived ease of use—for several reasons. First, the research aims to identify how performers responded to an unexpected abnormal situation

1 Drawing on Wen and Cheng [44]’s categorization, the performing arts consists of traditional performances, local contemporary performances, and western classical performances, including all types of traditional theatre, contemporary drama, dance, and music.
used approaches to assessment often conflict with each other [45]. The performing arts.

procedure drawing on pre-determined evaluation criteria, such as contrast, the second approach is a specific and criteria-based assessment much more than a sum of skills and interpretation quality of performance, drawing on the notion that

first approach is a holistic one based on the overall impression of the environment, such as where to look (i.e., make eye contact with the camera) and how to position themselves to deliver their performances as intended. In sum, given the external pandemic environment, the different situations of individual performers, and the multiple stakeholders involved in implementing remote performances, examining the most critical factors of TAM to test the acceptance level of remote performances might provide a better understanding of the effectiveness of new technology. Therefore, we focused only on perceived usefulness and perceived ease of use as our study’s exogenous variables to examine the relationship between the acceptance of the DPDT and behavioral outcomes such as performers’ satisfaction with the DPDT.

When we examined the endogenous variables, we incorporated satisfaction into our hypothesized model as our outcome variable because satisfaction is widely used as a key predictor of behavioral responses such as the continuous use and achievement of technology adoption [41,42]. In the current study, satisfaction was operationalized as a latent construct to include the following three components: (1) performers’ level of satisfaction with their recent remote performances via the DPDT, (2) performers’ level of satisfaction with their recent remote performances via the DPDT compared with pre-pandemic face-to-face performances and (3) performers’ level of concentration. Based on TAM and previous findings, the following hypotheses were proposed:

**H1.1.** The perceived usefulness of the DPDT has a positive effect on performers’ level of satisfaction under the COVID-19 pandemic situation.

**H1.2.** The perceived ease of use of the DPDT has a positive effect on performers’ level of satisfaction under the COVID-19 pandemic situation.

### 2.3. Self-assessment of performance quality

The assessment protocols in the performing arts domain have multiple criteria due to the wide variety of art forms—such as music, opera, and dance, ranging from traditional “high arts” to popular arts—and the existence of live arts performed in various types of venues [43,44]. As a result, each performance type prioritizes technical and artistic requirements differently for performance assessments [45]. For example, the assessment criterion for musical performances is different from that for dance performances because the former prioritizes vocal and instrumental skills while the latter prioritizes body movements. Thus, it is difficult to apply a universal criterion to evaluate all forms of the performing arts.

Another issue in evaluating performances is that the two most widely used approaches to assessment often conflict with each other [45]. The first approach is a holistic one based on the overall impression of the quality of performance, drawing on the notion that “a performance is much more than a sum of skills and interpretation” [46] (p. 175). By contrast, the second approach is a specific and criteria-based assessment procedure drawing on pre-determined evaluation criteria, such as articulation, intonation, and rhythm. These two approaches are seemingly incompatible given that the former is qualitative and comprehensive, and the latter is quantitative and specific. However, Mills [46] emphasized that if the balance between these two approaches is maintained, more reliable feedback can be provided, which will give the performers better assessment tools.

Performance assessments are commonly implemented by external agents, such as teachers in educational institutions. External feedback draws on assessors’ interpretation and plays a significant role in developing performers’ skills. These methods are traditionally based on specific criteria assessments established by assessors’ pre-listed and selected performance dimensions. However, self-assessment is an essential tool for encouraging performers to develop skills to prepare for future performances independently [28]. With video and audio technology such as recording devices, internal assessments—independent and self-directed—are possible for performance evaluation.

Because self-assessment is an effective way of providing productive feedback to performers, guidelines should be developed to avoid assessments that are affected by performers’ bias and subjectivity. For instance, Daniel [28] specified self-assessment protocols for music performance, which draw on self-reflection and include the following specific criteria: personal presentation, such as how performers enter and exit the space and physical presence; musical skill such as accuracy and stylistic appropriateness; overall impression, such as personal and audience response; reflection on actual performance, such as an evaluation based on comparing recorded media with perceived performance; reflection on progress, such as improvements; and future directions, such as plans to improve and enhance performance quality in the future. Consequently, self-assessments provide benefits for performers, incorporating criteria-based and holistic assessments into performance evaluation. Throughout the self-assessment process, the level of satisfaction with and preparation for future performances can be systematically evaluated. Once a performance is completed, performers evaluate their performances via self-assessment protocols employing comprehensive and specific approaches to determine whether the performance was satisfactory to them and whether they are ready to perform in the future. Thus, we posited the following hypotheses:

**H1.3.** The perceived usefulness of the DPDT positively influences the self-assessment of performance quality of the remote performance.

**H1.4.** The perceived ease of use of the DPDT positively influences the self-assessment of performance quality of the remote performance.

**H1.5.** The self-assessment of performance quality of the remote performance positively affects the performers’ level of satisfaction under the COVID-19 pandemic.

One of the objectives the current study was to examine the relationship between acceptance of the DPDT and behavioral outcomes under the COVID-19 pandemic. However, to determine how individuals perceive the acceptance of new technology and what feedback mechanism activates the performance evaluation process, we believe that self-assessment protocols play a significant role in this process. As researchers in the performing arts domain have suggested, performers always seek to develop and upgrade the quality of their performances—whether due to internal motivation or outer stimuli, or economic or aesthetic reasons—via an evaluation process. Audience responses at venues are one of the most critical feedback mechanisms [8]. Audience responses include standing ovations, catcalls, eye contact, and even the energy wave delivered by an audience. However, in the context of the pandemic, performers had limited options for assessing their remote performances given the lack of audience responses, and thus relied on self-assessments.

Considering the influence of this new but ad-hoc way of performing, we also aimed to determine how each variable in our TAM is related to performers’ self-assessment of performance quality and how it affects performers’ satisfaction levels. Throughout the study, we examined which dimensions of technology acceptance—the perceived ease of use and/or the perceived usefulness—were more relevant to performers’...
satisfaction level under the remote performance setting and should be emphasized strategically to generate positive self-assessment.

We believed that self-assessments conducted by performers after remote performances would provide meaningful insights into how to increase performers’ satisfaction and that our findings would be meaningful for both performers and event organizers/venue owners. Thus, we integrated self-assessment of performance quality into the process of evaluating the acceptance of the DPDT to measure the perceived level of satisfaction of remote performances. Therefore, we propose the following hypotheses:

H2.1. Self-assessment of performance quality mediates the relationship between the perceived usefulness of the DPDT and performers’ satisfaction under the COVID-19 pandemic.

H2.2. Self-assessment of performance quality mediates the relationship between the perceived ease of use of the DPDT and performers’ satisfaction under the COVID-19 pandemic.

Our research model is shown in Fig. 1.

3. Methods

3.1. Data collection and participants

The current study employed a quantitative method using a survey questionnaire. Data were collected from 124 participants in South Korea (50% were professionals from various forms of the performing arts, such as musical, classic, dance, and chorus, and 47% were non-professionals, such as amateurs participating as a hobby) who recently completed remote performances as performers facilitated by the DPDT, such as live streaming on YouTube or Zoom. The remote performances that respondents participated in were organized professionally in specific venues where the DPDT was available (casually organized performances at home were not included in the present study). These performances were organized by event management companies supported by local municipal governments in Korea to help individuals in the performing arts industry who could not perform during the semi-lockdown during the pandemic (See Appendix A).

This study targeted performers in South Korea, specifically those who had face-to-face and remote experiences during the COVID-19 pandemic. The sample size was somewhat small because of resource constraints; not many performers were using DPDT at the time either. However, the value of the data was believed to be significant because of the rarity of the sample. The survey questionnaires were distributed and collected via Google Surveys between September 2020 and May 2021. This period coincided with the time when remote performances were actively supported by several municipal governments in South Korea to help the performing arts industry rebound. At the same time, the awareness of the new format of delivering content began to increase [47]. Table 1 shows the demographic information of the survey respondents, including gender, age, profession, work experience, and the performing arts in which the respondents specialized.

3.2. Measures

3.2.1. Acceptance of the DPDT

Acceptance of the DPDT was measured using a 6-item scale adapted from TAM [13]. The measure was comprised of two latent variables: perceived usefulness (3 items) and perceived ease of use (3 items). Usefulness is operationalized as a determination that a newly introduced technology is useful because it helps the user perform a task better or provides benefits; ease of use is defined as a determination that new technology is not difficult to maneuver and is worth trying. A 7-point Likert type scale was used, ranging from 1 (strongly disagree) to 7 (strongly agree).

3.2.2. Self-assessment of performance quality

Self-assessment of performance quality, the study’s mediating variable, was measured using a 6-item scale based on a comprehensive assessment protocol (2 items) assessing overall evaluation and presentation and a criteria-based assessment protocol (4 items) focusing on individuality, accuracy, style, and ensemble. We adopted Daniel’s [28] and Stanley et al. [45]’s conceptualization of self-assessment of performance to operationalize the construct for the current study. We then adapted it to the Korean context with the help of two experts who were enrolled in Ph.D. studies and had a professional background in the arts industry who could not perform during the semi-lockdown during the pandemic (See Appendix A).

Table 1: Respondents’ demographics.

| Variable                        | Frequency | %    |
|---------------------------------|-----------|------|
| Sex                             |           |      |
| Male                            | 86        | 69.4 |
| Female                          | 38        | 30.6 |
| Age group                       |           |      |
| 10–19                           | 19        | 15.3 |
| 20–29                           | 9         | 7.3  |
| 30–39                           | 27        | 21.8 |
| 40–49                           | 29        | 23.4 |
| 50 years and older              | 40        | 32.3 |
| Occupation                      |           |      |
| Professional performer          | 62        | 50.0 |
| Non-professional performer      | 58        | 46.8 |
| Student                         | 4         | 3.2  |
| Experience in performing arts   |           |      |
| Less than 1 year                | 5         | 4.0  |
| 1–2 years                       | 20        | 16.1 |
| 3–4 years                       | 23        | 18.5 |
| 5–9 years                       | 25        | 20.2 |
| More than 10 years              | 51        | 41.1 |
| Type of performance             |           |      |
| Musical                         | 9         | 7.3  |
| Korean traditional performance  | 4         | 3.2  |
| Pop concert                     | 13        | 10.5 |
| Dance                           | 2         | 1.6  |
| Choir/Chorus/Ensemble           | 36        | 29.0 |
| Orchestra                       | 8         | 6.5  |
| Vocal (classic)                 | 30        | 24.2 |
| Theater                         | 12        | 9.7  |
| Other classic performance       | 3         | 2.4  |
| Others                          | 7         | 5.6  |

2 When WHO officially declared that COVID-19 was a global pandemic in early 2020, the Korean government did not announce a full-scale lockdown because the government was confident in its ability to control and suppress the spread of the disease. Instead, it imposed less strict measures such as recommending social distancing; limiting the number of individuals in social gatherings, especially in public places such as restaurants; and encouraging individuals to use personal protective equipment such as masks.
performing arts industry. Because the original conceptualization of self-assessment in performance developed by Daniel [28] and Stanley et al. [45] was specifically focused on music students, we conducted in-depth interviews with five Korean performers—one professional musician, three professional dancers, and one professional classical musician—to modify the scale for application to other areas of the performing arts. We used a 7-point Likert type scale, ranging from 1 (strongly disagree) to 7 (strongly agree), to indicate respondents’ self-assessment of remote performances. Finally, behavioral outcomes—the dependent variable—were measured using a 3-item scale ("The DPDT satisfies me," “I am more satisfied with the remote performance than live performances,” and “I could concentrate on my performance”). Responses were also indicated on a 7-point Likert type scale, ranging from 1 (strongly disagree) to 7 (strongly agree).

As the scales adapted in this study were written in English, a back-translation was conducted by two Korean scholars who were both fluent in English and Korean and whose research expertise was closely related to performing arts and technology adoption. First, the original survey items were translated into Korean by one of the scholars. Next, to ensure accuracy, the translated version was back-translated into English by the second scholar. This procedure revealed no differences between the two versions. Table 2 lists the measurement items.

3.3. Data analysis

Partial least squares structural equation modeling (PLS-SEM) was applied to test our hypotheses using Smart PLS 3 software. PLS-SEM estimates a path model by combining principal components analysis with ordinary least squares regression [48]. Unlike covariance-based structural equation modeling (CB-SEM), PLS-SEM uses total variance to estimate the model parameters wherein complex models with many constructs and observed variables in a hypothesized path are involved in prediction [49,50]. With its statistical flexibility, PLS-SEM is commonly used as an effective tool for testing models, especially when the research objectives are theory testing rather than confirming it.

Further, according to Hair et al. [51], compared to CB-SEM, PLS-SEM is more efficient especially when “sample size is small and model structures are complex” (p. 41). It also does not require distributional assumption and most importantly, applies ordinary least squares (OLS) regressions to estimate the model’s partial regression relationship instead of computing all relationship in the structural model at the same time [50–52]. As for the suggested minimum sample requirement in PLS-SEM, the 10 times rule has been widely adopted where sample size should at least be 10 times larger than the total number of paths in a proposed structural model [51]. In the current study, the total number of paths in our hypothesized model were nine. Thus, the minimum sample size per rule of thumb is 90 (see Table 4).

4. Results

4.1. Measurement model analysis

Concerning measurement evaluation, we evaluated the reliability and validity of the constructs. Table 2 shows that all of the outer loadings were above or near the threshold of 0.70, indicating that all observed variables were reliable. All Cronbach’s alpha and composite reliability values were well above the recommended threshold of 0.70, suggesting a sufficient level of indicator reliability [53]. Further, all the average variance extracted (AVE) values were above 0.50, confirming convergent validity (see Table 2). As the last step in evaluating the measurement model, discriminant validity was assessed. Three ways of testing discriminant validity were applied: (a) cross-loadings of the indicator, (b) the Fornell-Larcker criterion, and (c) the heterotrait-monotrait (HTMT) ratio of correlations [54]. First, the indicator’s loadings on its assigned constructs were higher than its cross-loadings with other constructs (see Appendix B). Second, the

| Construct | M | SD | OL | α | CR | AVE |
|-----------|---|----|----|---|----|-----|
| Perceived Usefulness (PUF) | | | | | | |
| PUF1 | 3.952 | 1.694 | .941 | .718 | .833 | .624 |
| PUF2 | 4.258 | 1.645 | .949 | | | |
| PUF3 | 4.121 | 1.644 | .932 | | | |
| Perceived ease of use (PEU) | | | | | | |
| PEU1 | 5.234 | 1.503 | .814 | .888 | .915 | .643 |
| PEU2 | 5.242 | 1.472 | .800 | | | |
| PEU3 | 3.621 | 1.856 | .755 | | | |
| Self-assessment (SAS) | | | | | | |
| SAS1 | 5.137 | 1.358 | .883 | .935 | .958 | .885 |
| SAS2 | 5.387 | 1.312 | .844 | | | |
| SAS3 | 4.476 | 1.542 | .693 | | | |
| SAS4 | 4.984 | 1.301 | .699 | | | |
| SAS5 | 4.992 | 1.428 | .841 | | | |
| SAS6 | 5.387 | 1.268 | .830 | | | |
| Satisfaction Level (SFL) | | | | | | |
| SFL1 | 2.847 | 1.943 | .882 | .765 | .866 | .686 |
| SFL2 | 3.065 | 1.786 | .879 | | | |

(continued on next page)
valid.

properties, we concluded that the measurement model was reliable and confirmed (see Table 3). Considering the results of the psychometric below the threshold of .85, indicating that discriminant validity was

\[ R^2 \]

identifies a collinearity issue in the structural model to make sure it does not bias the regression result [49]. We assessed the variance inflation factor (VIF) value of all latent variables. Table 4 shows that all VIF values were below the recommended threshold of 3.30, suggesting that collinearity among constructs was not a concern in our structural model

\[ Q^2 \]

square root of each construct’s AVE showed a higher value than its correlation with other constructs. Finally, all of the HTMT values were below the threshold of .9, indicating that discriminant validity was confirmed (see Table 3). Considering the results of the psychometric properties, we concluded that the measurement model was reliable and valid.

4.2. Structural model analysis

4.2.1. Predictive relevance analysis

The first step for assessing the structural model analysis was to identify a collinearity issue in the structural model to make sure it does not bias the regression result [49]. We assessed the variance inflation factor (VIF) value of all latent variables. Table 4 shows that all VIF values were below the recommended threshold of 3.30, suggesting that collinearity among constructs was not a concern in our structural model [49,55]. The second step was to assess the predictive capability of the endogenous variables by testing the coefficient of determination \( R^2 \), also referred to as in-sample predictive power [49]. The \( R^2 \) values of satisfaction level (SFL) and self-assessment (SAS) were 0.573 (substantial) and 0.161 (weak), respectively, based on the generally accepted

\[ Q^2 \]

combines aspects of out-of-sample prediction and in-sample explanatory power [49]. As shown in Table 3, the values of \( Q^2 \) were greater than zero (SFL: 0.359 and SEV 0.084), suggesting that the model has predictive relevance. As a rule of thumb, \( Q^2 \) values above 0, 0.25, and 0.50 are, respectively, considered to have small, medium, and large predictive relevance of the path model [49,57].

4.2.2. Path model analysis

Table 4 summarizes the direct and indirect effects of the hypothesized model obtained through bootstrap analysis using 5000 samples with a 95% confidence interval [54]. With respect to direct effects, all paths were significant positively, except for the path from perceived usefulness (PUF) to SAS (\( \beta = 0.110, p > .01 \)). Thus, the following four hypotheses were supported, \( H_1.1 (\beta = 0.340, p < .005), H_1.2 (\beta = 0.261, p < .01), H_1.4 (\beta = 0.319, p < .01), \) and \( H_1.5 (\beta = 0.349, p < .001) \). By analyzing indirect effects, we examined the mediating effects of the SAS between the relationship of perceived ease of use (PEU) and SFL and PUF and SFL [51,52]. As shown in Table 4, the findings suggested that SAS positively and significantly mediated the relationship between PEU and SFL, thus supporting \( H_2.2 \) as a partial mediating effect (\( \beta = 0.111, p < .01 \)) because all paths relevant to \( H_2.2 \)—such as the path between PEU and SAS, SAS and SFL, and PEU and SFL—were positively significant. Meanwhile, SAS did not affect the relationship between PUF and SFL (\( \beta = 0.038, p > .01 \)) because the path between PUF and SEV was not statistically significant, thus not supporting \( H_2.1 \).

5. Discussion

This study aimed to explore the effect of remote performances, which used the DPDT, on performers’ satisfaction during the COVID-19 pandemic. Specifically, it examined performers’ technology acceptance and clarified the role of self-assessment on the relationship between technology acceptance and performers’ satisfaction level.

As Davis [13] suggested, new technology is commonly adopted by users when they perceive that the technology is useful in providing benefits (perceived usefulness) and easy to use (perceived ease of use). Our findings support Davis’s [13] theory; perceived usefulness and ease of use significantly influenced performers’ satisfaction level when performers could not have face-to-face contact with the audience, which is a

Table 3

| Variable | 1 | 2 | 3 | 4 | \( Q^2 \) | \( R^2 \) |
|----------|---|---|---|---|---------|---------|
| 1. PUF   | .941 |  |  |  |  |  |
| 2. PEU   | .670 | [.776] | .790 |  |  |  |
| 3. SFL   | .628 | [.742] | .626 | [.761] | .828 |  |  |
| 4. SAS   | .324 | [.334] | .393 | [.456] | .562 | [.644] | .802 | .359 | .573 |

Note. The numbers on the diagonal in bold are the square roots of AVE (average variance extracted); the off-diagonal numbers are the latent variable correlations; the numbers in square brackets represent Heterotrait-Monotrait ratio; PUF = Perceived usefulness; PEU = Perceived ease of use; SFL = Satisfaction level; SAS = Self-assessment.

Table 4

| Structural model | Hypothesis | Exogenous Construct | Endogenous Construct | Path Coefficient | 95% CI | (Inner) VIF Value |
|------------------|------------|---------------------|---------------------|-----------------|-------|------------------|
| Direct effect    | \( H_1.1 \) | PUF                 | SFL                 | .340**          | [.107] | .555            | 1.829 |
| \( H_1.2 \)     | PUF        | SAS                 |                      | .110 (ns)       | [-.157] | .351            | 1.815 |
| \( H_1.3 \)     | PEU        | SFL                 |                      | .261*           | [.067] | .487            | 1.936 |
| \( H_1.4 \)     | PEU        | SAS                 |                      | .319*           | [.051] | .594            | 1.815 |
| \( H_1.5 \)     | SAS        | SFL                 |                      | .349***         | [.196] | .481            | 1.192 |
| Indirect effect  | \( H_2.1 \) | PUF → SAS → SFL     |                      | .038 (ns)       | [-.057] | .127            |  |
| \( H_2.2 \)     | PEU → SAS  | PEU → SFL           |                      | .111*           | [.018] | .227            |  |

Note. PUF = Perceived usefulness; PEU = Perceived ease of use; SFL = Satisfaction level; SAS = Self-assessment.
defining element of performance quality [8]. The more the performers found that the DPDT technology was useful and easy to use, the higher their satisfaction level.

From the performers’ perspective, the contactless virtual environment was typically regarded as unfamiliar and ad-hoc, given that they had rarely utilized the virtual space to showcase their talents. However, once performers were well informed about the benefits of using the technology and were familiar enough with the virtual environment to utilize it easily, the performing arts industry could continue with remote performances during the pandemic. In other words, performers embraced the adage that “the show must go on.”

Interestingly, the performers’ self-assessment of recent live streaming shows was significantly influenced by perceived ease of use, not by perceived usefulness. This finding may be attributed to the limited scope of self-assessment. As Stanley et al. [45] suggested, the purpose of self-assessment for performances is to promote future skill and career development for performers. The perceived benefits from self-assessment are obtained when a comprehensive approach, such as an evaluation of the whole performance and a criteria-specific approach, such as an evaluation of the performance’s components, are used [28]. Thus, in self-assessment, performers evaluate only their artistic technicality directly related to the performance, such as interpretation, individuality, accuracy, ensemble, and overall presentation. In our study, there was no significant relationship between the technical environment and its benefits to performers; in other words, the usefulness of the DPDT did not influence performers’ satisfaction. This result is an unexpected, yet explicable outcome given the pandemic circumstance. Live streaming technology has become popular in the performing arts industries as an alternative way to deliver content during the COVID-19 pandemic. Virtual performances not only offered the industry continuity and sustainability [9] but also transformed the meaning of “live performance” [6]. The finding stresses performers’ desire to perform in front of audiences. However, the results could be reversed if the pandemic prolongs, forcing performers to continue to adopt the technology to deliver their content to their audiences. As Heim [8] mentioned, the environment or atmosphere wherein a performance occurs critically affects performance quality from the performers’ perspective. Furthermore, the audience controls the environment because the energy or electric vibe created by the audience becomes part of the venue, which critically affects performers onstage. However, remote performances without a physical audience did not generate as much energy as face-to-face performances. As a result, the performers’ perceived usefulness of the technical environment was not significantly related to the performers’ self-assessment of performance quality.

This result also supported H1.4: when performers perceive that it is easy to operate the DPDT, their self-assessment on the remote performance is more positive. This suggests that when performers can focus on their artistic technicality, they are more satisfied with their performance quality. Subsequently, perceived ease of use was significantly related to self-assessment. As Davis [13] has suggested, within the context of technology usage, whether it is consumer- or manufacturer-oriented products, when individuals can easily interact with newly introduced technology, less effort is required to manipulate it, and more effort can be devoted to other activities. Consequently, job performance can be realized. In line with Davis [13], our study suggests that usability is the key determinant for performers to achieve performance quality in an online live streaming environment.

5.1. Practical implications

In the current study self-assessment mediated the relationship between perceived ease of use and satisfaction. This finding has several implications for event organizers or venue owners eager to harness digital communication technology for delivering performances as an active response to the pandemic. Given the role self-assessment played in the relationship between perceived ease of use and satisfaction level, event organizers or venue owners should focus on creating a digital performing environment that performers find easy to use to provide more satisfaction. Further, the criteria in the self-assessment protocol, such as presentation, accuracy, individuality, and ensemble, should be focal features of remote performances. For example, when performers find the DPDT easy to use, especially in developing the accuracy or individuality of their performances, their satisfaction will be enhanced and, in turn, performance quality will be higher even in a virtual space. Therefore, when existing digital technology is applied to help performers develop the items they value the most based on their self-assessment criteria, performance quality can be ensured, thus promoting sustainable growth in the performing arts industry.

6. Limitations and suggestions for future study

This study has several limitations that should be addressed in future research. Our sample size was relatively small (N = 124), which could limit the generalizability of the study’s findings and implications, especially under different cultural backgrounds in terms of the way performing arts are produced and consumed. When the survey was being conducted in South Korea, remote performances as an alternative option for delivering content in the performing arts industry was in the nascent stage, and it was not easy for authors to find performers who gave both face-to-face and online live streaming performances. Although the study was small and limited to South Korea, we believe that the quality of the data from actual performers has a high enough value to provide a foundation for future research on the effect of remote performances from performers’ perspectives.

Second, this study examined the relationship between variables from the performers’ perspective, such as the effect of the technology adoption on performers’ satisfaction level and the role of performance assessment. However, the effect of audience reactions on performance quality was not measured. Therefore, the influence of various types of audience reactions on performances in the context of remote performances should be incorporated in the measure of performers’ satisfaction level as an independent factor, which could be included in future studies to fully assess the holistic effects of the DPDT. Additionally, from a statistical perspective, a small sample size might not be a critical issue when PLS-SEM is applied [51]. However, taking a different approach such as CB-SEM might be able to provide alternative insights into the effect of live streaming technology on the performers’ satisfaction. Furthermore, it can help identify the role of self-assessment of performance quality in the relationship between acceptance of remote performance technology and performers’ satisfaction.

7. Conclusion

Although digital live streaming performances cannot fully replicate the look and feel of a live performance, or the satisfaction experienced by audience members in a physical venue, watching live streaming performances has become a new normal propelled by the progress of audio, video, and streaming technology, and has provided an acceptable level of digital leisure activities during the pandemic [3,9-11]. However, from the performers’ perspective, digital communication technology could not overcome a major issue in remote performances, that is, the lack of contact with audiences [14]. The physical proximity between performers and the audience in the same place creates a shared experience, which is considered the most critical factor for performance quality [8]. This study posited that performance quality, as judged by performers, is driven by emotional traits such as satisfaction, and used self-assessment protocols to measure performance quality that included both comprehensive and criteria-specific measures. In delivering digital content, we found that performers who found the technology easy to use reported a higher performance quality even though an audience was not physically present.
Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.techsoc.2021.101855.

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