Investigating the Determinants of Students’ Intention to Use Business Simulation Games

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Abstract

Business simulation games (BSGs) are educational tools that help students develop business management knowledge and skills. However, to date, relatively little research has investigated the factors that influence students’ BSG usage intention. Grounded on the extended unified theory of acceptance and use of technology, this study helped to fill this gap by exploring intention to use BSGs. Specifically, this study investigated the influence of performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, and price value on behavioral intention to use BSGs. Data collected from 141 useful respondents were tested against the research model using partial least square approach. The results of this study indicated that behavioral intention to use BSGs was influenced by facilitating conditions, hedonic motivation, and price value. Unexpectedly, performance expectancy, effort expectancy, and social influence were not predictive of students’ behavioral intention to use BSGs. These findings enhanced our understanding of students’ BSG usage behavior and provided several important theoretical and practical implications for the application of BSG in the context of business and management education.

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business simulation game (BSG), system dynamics, systems thinking, extended unified theory of acceptance and use of technology (UTAUT2), use intention, game-based learning, business and management education

Introduction
Within the game-based learning context, research on business simulation games (BSGs) has become more popular, especially for higher education and employee training in companies (Buil, Catalán, & Martínez, 2018; Faria, 1998; Faria, Hutchinson, Wellington, & Gold, 2009; Faria & Wellington, 2004; Khan & Pearce, 2015; Sitzmann, 2011). BSGs refer to instructions provided by personal computers to immerse trainees in a manual business environment for decision-making and management knowledge to understand the consequences of their decisions without having to experiment in a real business environment (Sitzmann, 2011). Taking the most well-known Beer Distribusion Game as an example, the role-playing simulation exercise of simple production and distribution system has been used in countless business education courses and widely studied in the literature because it was first developed at MIT Sloan School of Management (Costas, Ponte, de la Fuente, Lozano, & Parreño, 2017; Kaminsky & Simchi-Levi, 1998). This simple game has proven to be very effective in helping trainees to understand the causal relationship between decision-making and supply chain behavior (Goodwin & Franklin, 1994). Apart from the term BSGs itself, many other terms of game-based learning are in existence such as business (simulation) game, action plan game, (learning) simulation game, educational game, management game, simulation exercise, and planning game (cf., Anderson & Lawton, 2008; Chang, Lee, Ng, & Moon, 2003; Jensen, 2003; Karl, 2014; Sitzmann, 2011; van Daalen, Schaffernicht, & Mayer, 2014). The learning style has a strong relationship with experiential learning, as it allows learners to develop business management knowledge and skills by testing their business ideas in a trial and error method and to manage companies in a risk-free environment (Aldrich, 2003; Zantow, Knowlton, & Sharp, 2005). BSGs are widespread instructional tools that allow instructors to offer a bridge between business theories and practice through problem-solving-based learning (Geithner & Menzel, 2016; Loon, Evans, & Kerridge, 2015). BSGs led instructors to explore the feasibility of using a simulation game format to supplement or replace lecture-style teaching in the field of business education (Randel, Morris, Wetzel, & Whitehill, 1992). Cognitive complexity theory (Kiers & Polson, 1985), as a formal method for analyzing the complexity of interactive applications, proposes that BSGs are more effective than other traditional modes at helping learners develop effective decision-making capabilities to
deal with dynamic and complex problems presented to them, thereby increasing learning and knowledge acquisition (Cordova & Lepper, 1996; Garris, Ahlers, & Driskell, 2002; Leemkuil & de Jong, 2012).

When compared with simulation games from other contexts (e.g., surgery, flight, and military), prior research on BSGs has primarily focused on the development of specific managerial competencies and exploration of trainees’ responses to these instructional tools (Buil et al., 2018; Pasin & Giroux, 2011). Learners perceive that BSGs assist them to improve a range of key competencies that are especially important in a business environment, including decision-making skills, ability to adapt to new situations, teamwork skills, communication skills, problem-solving skills, and information analysis skills (Borrajo et al., 2010; Fitó-Bertran, Hernández-Lara, & López, 2014; Loon et al., 2015; Pasin & Giroux, 2011). In addition to developing specific managerial competencies, learners note that BSGs offer many advantages such as the opportunity to draw up business strategies, assist in reaching business goals, managing a business, and understanding the basic principles of business management and the correlation between the organizational structure and management control (Borrajo et al., 2010; Fitó-Bertran et al., 2014). In general, scholars have confirmed that instruction supplemented by various relevant fantasy contexts raises both learners’ curiosity and learning effectiveness (Cordova & Lepper, 1996; Parker & Lepper, 1992). There appears to be a positive correlation between a learner’s academic motivation levels and academic performance (Terrell & Rendulic, 1996). Nevertheless, to date, the adoption intention of such approaches has not been well documented, and the factors that influence a learner’s behavioral intention to use BSGs remain unknown.

Understanding the predictors of students’ behavioral intention to use BSGs is critical to enabling instructors to develop effective ways to strengthen business and management education techniques. Although previous studies recognized that BSGs have numerous benefits such as providing opportunities for students to improve their work-related business management knowledge and skills, and showed that BSGs usage has grown continuously (Faria, 1998; Faria & Wellington, 2004; Sitzmann, 2011; Wellington, Hutchinson, & Faria, 2017), little is known about why BSGs are adopted in education and what factors contribute to students’ adoption behavior (Faria & Wellington, 2004; Gunawan, Fiarni, & Lawalata, 2015). In the information system (IS) literature, scholars have developed and validated a number of models such as the technology acceptance model (TAM; Davis, Bagozzi, & Warshaw, 1989) and the theory of planned behavior (TPB; Fishbein & Ajzen, 1975) to investigate user acceptance and information technology (IT) usage. Venkatesh, Morris, Davis, and Davis (2003) later synthesized these proposed models into the unified theory of acceptance and use of technology (UTAUT). The UTAUT proposes that four key elements (i.e., performance expectancy [PE], effort expectancy [EE], social influence [SI], and facilitating conditions [FCs]) and four moderators
(i.e., gender, age, experience, and voluntariness of use) predict behavioral intention to use a system/technology and actual use behavior. The theory was later extended (UTAUT2; Venkatesh, Thong, & Xu, 2012) by incorporating three new key variables (i.e., hedonic motivation [HM], price value [PV], and habit [HB]). Within the specific context of the use of BSGs, little research has explored how UTAUT2 applies to and accounts for students’ behavioral intentions. Therefore, drawing on UTAUT2 (Venkatesh et al., 2012), the aim of this article is to investigate how these constructs explain the use of BSGs.

**Theoretical Background**

**System Dynamics-Based BSGs**

Systems thinking is defined as a capacity to view the real world as a complex system, in which one cannot do just one thing without affecting other things (Sterman, 2000). Closely associated to the notion of systems thinking is system dynamics (SD), which is a method of using systemic modeling and simulation based on causality to operate systems thinking and understand the behavior of dynamic complex systems in different fields (Miettinen et al., 2016). SD models contain stock and flow charts with feedback loops and delays. They are suitable for studying the complexity, nonlinearity, and feedback loop structures that are inherent in social technology systems that include interrelationships between technical elements (e.g., project task structures and priority relationships) and human factors, decision-making, and strategy choices (e.g., the impact of prolonged overtime work on project cost and quality and labor decision rules; Forrester, 1994; Miettinen et al., 2016). They can facilitate a more holistic understanding of some real-world systems as well as strategic decision-making.

SD-based games are interactive simulations with game features; unlike traditional games, SD-based games are primarily used for purposes other than entertainment (Miettinen et al., 2016; van Daalen et al., 2014). Most SD-based games are found to be effective for learning because they allow the creation of virtual worlds in which participants can experiment with different decisions and strategies (Miettinen et al., 2016). More specifically, Sterman (1994) noted three advantages of interacting with SD-based games as opposed to the real world. First, SD-based games provide a safe and risk-free environment for testing different operational strategies without fear of making mistakes, which can be costly in real-world contexts. Second, the effects of feedback pertaining to long-term consequences of decisions made can be seen almost immediately. Third, the relationship between decisions and the respective effects is much clearer and easier to verify. Accordingly, learning through SD-based games is more cost-effective and efficient.

A BSG-based SD approach incorporates valuable tools that facilitate the absorption of management knowledge and an understanding of how to improve business performance. They can be used as a management training tool or as a
way to explore new strategic opportunities (Jensen, 2003). BSGs are created to be as realistic as possible, even though the described business environment is based solely on assumptions. The assumptions and the virtual world provide conflict and problem settings that allow students to prove themselves by achieving specific goals (Karl, 2014). Based on the preceding discussion, this study uses BSGs as target systems to investigate students’ management knowledge learning and adoption behavior.

**UTAUT2**

The original UTAUT (Venkatesh et al., 2003) explained behavioral intention to use or adopt IT based on perceptions reminiscent of many IS theories/models such as the theory of reasoned action (Fishbein & Ajzen, 1975), TAM/extended TAM (TAM/TAM2; Davis, 1989; Venkatesh & Davis, 2000), TPB/decomposed TPBs/combined TAM and TPB (TPB/DTPB/C-TAM-TPB; Ajzen, 1985, 1991; Taylor & Todd, 1995a, 1995b, 1995c), model of personal computer utilization (MPCU; Thompson, Higgins, & Howell, 1991), social cognitive theory (Bandura, 1986), motivational model (Davis, Bagozzi, & Warshaw, 1992), and innovation diffusion theory (IDT; Rogers, 2003). The model recognized four direct determinants of behavioral intentions and IT use behaviors: PE, EE, SI, and FCs, as well as several moderators (i.e., gender, age, experience, and voluntariness of use). Venkatesh et al. (2012) extended UTAUT to develop UTAUT2 (depicted in Figure 1) by incorporating three new variables focused on user acceptance and use: HM, PV, and HB; they also proposed age, gender, and experience as moderator variables. One key difference between UTAUT2 and UTAUT is that the relationship between behavioral intentions and IT use behavior is controlled by experience with IT. Also, personal characteristics mitigate the influence of HB on behavioral intentions and IT use behaviors. Compared with UTAUT, UTAUT2 produced a significant improvement in the variance explained in the case of behavioral intentions (56% to 74%) and IT usage behavior (40% to 52%). As such, UTAUT2 provides a broad theoretical framework that enjoys considerable prestige and empirical verification in a wide range of research areas and mission environments (e.g., Alalwan, Dwivedi, & Rana, 2017; Arenas-Gaitán, Peral-Peral, & Ramón-Jerónimo, 2015; Baptista & Oliveira, 2015; Escobar-Rodríguez & Carvajal-Trujillo, 2013; Herrero, San Martín, & García de los Salmones, 2017).

UTAUT2 is used as the theoretical basis for presenting the conceptual model utilized in current research due to the fact that it covers almost all constructs that determine students’ behavioral intention to use BSGs. The key factors of UTAUT2 are PE, EE, SI, FC, HM, and PV, which are the direct determinants of students’ behavioral intention to use BSGs. Despite the recommendations made by Venkatesh et al. (2012), this study does not take into account the effects of HB because participants require a wealth of experience using BSGs in order to test the effects of HB; however, respondents in this study had not previously used BSGs.
Hypotheses Development and Research Model

Figure 2 shows the research model of this study based on UTAUT2 and the proposed relationship among the research variables (PE, EE, SI, FC, HM, and PV) that influence their behavioral intention to use BSGs. On this basis, this study provides theoretical arguments followed by the proposed hypotheses.

Behavioral Intention to Use BSGs

Behavioral intentions refer to the perceived likelihood or subjective probability that an individual will perform some specified future behavior (Warshaw & Davis, 1985). Within the existing IS literature, behavioral intentions play an important role in determining the actual use and adoption of a system/technology (Ajzen, 1991; Venkatesh et al., 2003, 2012). Consistent with all IS models derived from psychological theories that individuals’ behavior is predictable and influenced by behavioral intentions, many IS theories/models have argued and demonstrated that behavioral intention to use has a major impact on system use (Chen & Chan, 2014; Foon & Fah, 2011; Im, Hong, & Kang, 2011; Martins,
Oliveira, & Popović, 2014; Venkatesh et al., 2003, 2012; Venkatesh & Zhang, 2010; Yu, 2012). In line with this assumption, this study assumes that the practical application of BSGs can be largely predicted by students who are willing to use such systems. The research framework does not attempt to explain actual usage behavior. Instead, it attempts to explain the behavioral intention to use, which is used as a reliable predictor of future behavior.

Figure 2. Research model.
BSGs = business simulation games.

Performance Expectancy
PE refers to the extent to which an individual believes that a system/technology assists in task completion (Venkatesh et al., 2003, 2012). The concept of PE represents the utilitarian value of system usage, emphasizes the utilitarian benefits provided to users by using the system, and is similar to other IS theories/models such as perceived usefulness in TAM/TAM2 (Davis, 1989; Venkatesh & Davis, 2000),

Performance Expectancy
relative advantage in IDT (Rogers, 2003), and extrinsic motivation in motivational model (Davis et al., 1992). Generally speaking, a person seems to be more motivated to use or adopt a system if he or she perceives that the system is advantageous and beneficial to their work or learning performance (Alalwan, Dwivedi, & Williams, 2016; Davis et al., 1989; Venkatesh et al., 2003, 2012). The utilitarian benefits from using BSGs include surfacing new business strategic options and allowing these to be tested in a risk-free environment, challenging conventional business wisdom, surfacing other managers’ thinking about business strategic issues, team building at the management level, communicating the importance of the dynamical aspects of business strategic planning, and allowing managers to think of themselves in the roles of other players, for example, competitors (Jensen, 2003). These benefits can increase students’ motivation and behavioral intention to use BSGs. Similarly, prior research argued that PE was an important predictor of behavioral intentions (Foon & Fah, 2011; Venkatesh et al., 2003). Thus, this study hypothesizes the following:

H1. PE is positively associated with behavioral intention to use BSGs.

Effort Expectancy

Learning from other IS theories/models, Venkatesh et al. (2003) adopted the ideas of perceived ease of use (TAM/TAM2; Davis, 1989; Venkatesh & Davis, 2000), ease of use (IDT; Rogers, 2003), and complexity (MPCU; Thompson et al., 1991) to define EE as the degree of ease associated with system usage. Consistent with previous research, the users’ behavioral intention to use a system/technology can be predicted not only by the positive value of the system but also by the extent to which the system is easily used. BSGs are designed to teach generic management skills (e.g., dissemination of business strategies and establishment of new practices and values throughout an organization). Hence, according to the special natures of BSGs, which must have management knowledge and skill, EE plays a vital part in shaping and developing students’ behavioral intentions. Also, EE is widely recognized as an important premise of behavioral intentions (Foon & Fah, 2011; Martins et al., 2014; Nistor et al., 2014; Oechslein, Fleischmann, & Hess, 2014; Venkatesh et al., 2003, 2012; Zhou, Lu, & Wang, 2010). Therefore, this study hypothesizes the following:

H2. EE is positively associated with behavioral intention to use BSGs.

Social Influence

SI refers to the degree to which a person perceives that important referents approve of a particular behavior (Venkatesh et al., 2003, 2012). The construct
is used to characterize subjective norms in theory of reasoned action (Fishbein & Ajzen, 1975), TAM2 (Venkatesh & Davis, 2000), TPB/DTPB (Ajzen, 1985, 1991; Taylor & Todd, 1995b, 1995c), C-TAM-TPB (Taylor & Todd, 1995a), social factors in MPCU (Thompson et al., 1991), and image in IDT (Rogers, 2003). As for the adoption of BSGs, SI can be conceptualized as the impact of the social environment on students’ behavioral intention to use BSGs; for instance, families, peers, classmates, and friends as reference groups. In other words, SI assumes that these people will create a positive influence on students’ awareness and behavioral intention to use BSGs (Alalwan, Rana, Dwivedi, Lal, & Williams, 2015; Alalwan et al., 2016). The choice of SI as a crucial determinant of behavioral intentions is based on previous studies that support the impact of SI on individuals’ propensity to use a particular technology (Alalwan et al., 2016; Foon & Fah, 2011; Martins et al., 2014; Moore & Benbasat, 1991; Riquelme & Rios, 2010; Thompson et al., 1991; Venkatesh et al., 2003, 2012; Yu, 2012; Zhou et al., 2010). Therefore, this study hypothesizes the following:

H3. SI is positively associated with behavioral intention to use BSGs.

Facilitating Conditions

By adopting the notions of perceived behavioral control in TPB/DTPB/C-TAM-TPB (Ajzen, 1985, 1991; Taylor & Todd, 1995a, 1995b, 1995c), compatibility, such as work style, in IDT (Rogers, 2003), and facilitating conditions in MPCU (Thompson et al., 1991), Venkatesh et al. (2012) defined FC as the extent to which a person perceives that resources exist for facilitating specific task completion. FC is interpreted as environmental elements that either promote or hinder system adoption and include various aspects that directly affect adoption behavior, such as training or knowledge acquired. Compared with other systems, some BSGs may require related knowledge or resource support; as such, these also affect students’ willingness to use. Students who have a better understanding of how to use BSGs are more willing to use them. Previous research has supported the view that FC has a positive impact on behavioral intention to use (Chen & Chan, 2014; Foon & Fah, 2011; Im et al., 2011; Martins et al., 2014; Mutlu & Der, 2017; Yu, 2012). Thus, this study hypothesizes the following:

H4. FC is positively associated with behavioral intention to use BSGs.

Hedonic Motivation

HM refers to the extent to which individuals believe that entertainment is derived from using a system/technology (Venkatesh et al., 2012). HM is a kind of
enjoyment, playfulness, or happiness that comes from using a system, and it plays a critical role in determining system adoption (Brown & Venkatesh, 2005; Davis et al., 1992; Venkatesh & Davis, 2000; Webster & Martocchio, 1992). As far as BSGs are concerned, although they are not specifically designed with HM in mind, many of them also contain some interesting features that allow participants to get involved and be engaged. Some BSGs are designed to be gamified: They adopt game characteristics or game mechanics to make the user interface more engaging and fun. One of the advantages of BSGs is that they have an intrinsic stimulating effect associated with challenge, curiosity, and fantasy (Malone, 1981). There is a close connection among participants' enjoyment of BSGs, motivation for participation, and performance feedback (Garris et al., 2002). In the IS literature, scholars strongly believe that intrinsic utility (e.g., happiness, fun, playfulness, entertainment, and enjoyment) can play a role in accelerating individuals' behavioral intention to adopt a system (e.g., Brown & Venkatesh, 2005; van der Heijden, 2004; Venkatesh et al., 2012). Thus, this study hypothesizes the following:

H5. HM is positively associated with behavioral intention to use BSGs.

Price Value
PV (or price utility) represents individuals' cognitive trade-off between the perceived benefits of the IT applications and the monetary costs or value benefits associated with using them (Dodds, Monroe, & Grewal, 1991; Venkatesh et al., 2012). PV refers to the effective use of money by individuals and the rationality of price. In the context of BSGs, PV is a vital consideration for most adopters. There are various approaches to setting prices including free, paid, and freemium. Free versions can be downloaded for free; paid versions require payment to download; and freemium versions can be downloaded for free but require payment to unlock additional features. Individuals expect high-quality products or service if they pay more for BSGs (Zeithaml, 1988). Put another way, as the PV rises, individuals will be more willing to adopt BSGs (Venkatesh et al., 2012; Yu, 2012). Therefore, this study hypothesizes the following:

H6. PV is positively associated with behavioral intention to use BSGs.

Method
Convenience sampling was employed in this study to recruit participants. To validate the hypotheses, data were collected from an online survey conducted in Taiwan from January 2018 to April 2018. The questionnaire was uploaded to a survey portal and opened to Internet users.
Measures of the Constructs

The questionnaire was made up of two parts: The first collected demographic information, while the second collected information on the selected constructs. In order to confirm the content validity, survey items should describe the notion of valid generalizations (Bohmstedt, 1970); as such, all measures of the focal constructs were taken from existing research and then slightly modified to accommodate the context of BSGs adoption behavior. A total of 24 indicators adapted from Venkatesh et al. (2012) were included to measure behavioral intention to use BSGs and the selected constructs, namely PE, EE, SI, FC, HM, and PV. For each statement, respondents were asked to respond on 7-point Likert scales to indicate their agreement or disagreement. To enhance the questionnaire item wording, a panel of information management academics and professionals were consulted. All measurement items are shown in Appendix.

Data Collection

Because the aim of this study was to explore the factors that influence students’ behavioral intention to use BSGs, respondents include both experienced and inexperienced students. Convenience sampling approach was used in collecting the sample data. Furthermore, respondents were asked whether they were university students; if their answer was yes, they were invited to participate in the survey. A total of 141 usable responses were collected through self-reported questionnaires and a valid response rate of 98.60%. Unusable responses were simply due to missing data. The respondents’ basic demographic information is shown in Table 1: More than half of the respondents were male (54.61%), approximately 93% were undergraduate students, and approximately 35% studied in the college of management.

Results

The collected data were analyzed using SmartPLS software (Ringle, Wende, & Will, 2005) with a two-step approach. First, the measurement model was tested to evaluate the correlation between each construct and its observed indicators. The next step focused on the analysis of the structural model to test the structural relationships among latent constructs.

Measurement Model

The evaluation of measurement models includes assessments of scale reliabilities, as well as convergent and discriminant validities. Table 2 shows the factor loadings of the measurement items, which all surpassed the recommended
level of 0.50, demonstrating satisfactory reliability (Chin, Monroe, & Fiscella, 2000; Hair, Black, Babin, & Anderson, 2010). Further, 0.60 is considered acceptable for Cronbach’s $\alpha$ and composite reliability values (Henseler, Ringle, & Sinkovics, 2009). As shown in Table 3, all relevant construct values exceeded 0.70, denoting adequate reliability at the construct level (Fornell & Larcker, 1981; Hair, Black, Babin, Anderson, & Tatham, 2006; Nunnally, 1978).

Table 3 further shows that all the measurement items loaded considerably more strongly on their respective factor than on the other constructs, in support of convergent and discriminant validity. In addition, convergent validity was evaluated using average variance extracted (AVE), and the values range from 0.622 to 0.868 exceeded the recommended level of 0.50 (Fornell & Larcker, 1981). Table 4 shows the interconstruct correlations and reliability measures. Comparisons of the correlations with the square roots of AVE show that all correlations between two corresponding constructs were smaller than the square root of AVE of the single constructs, thus confirming discriminant validity. These results demonstrate reasonable reliability, convergent validity, and discriminant validity for the measured items.

**Structural Model**

To test the hypotheses, based on the structural model, this study investigated the path significance using a bootstrapping resampling technique based on 500 subsamples, as recommended by Chin (1998). Figure 3 illustrates the normalized path coefficients and their significance on the structural model.
Hypotheses 1 to 6 state that PE (H1), EE (H2), SI (H3), FC (H4), HM (H5), and PV (H6) are positively related to behavioral intention to use BSGs. As indicated in Figure 3, the findings support H4, H5, and H6: FC, HM, and PV had significant positive relationships with behavioral intention to use BSGs ($\beta = .290, p < .01; \beta = .263, p < .01; \beta = .241, p < .01$, respectively). That is to say, higher perceived FC, HM, and PV were associated with higher behavioral intention to use BSGs. However, PE, EE, and SI were not significantly related to behavioral intention to use BSGs ($\beta = -.034, p > .05$).

Table 2. Descriptive Statistics and Factor Loadings.

| Constructs                  | Items | $M$   | $SD$   | Factor loading | $t$ statistics |
|-----------------------------|-------|-------|--------|----------------|----------------|
| Performance expectancy      | PE1   | 5.121 | 0.974  | 0.849          | 62.395         |
|                            | PE2   | 5.184 | 1.004  | 0.895          | 61.298         |
|                            | PE3   | 5.149 | 1.035  | 0.905          | 59.092         |
|                            | PE4   | 5.149 | 1.177  | 0.819          | 51.956         |
| Effort expectancy           | EE1   | 5.028 | 1.270  | 0.851          | 47.006         |
|                            | EE2   | 5.163 | 1.291  | 0.923          | 47.498         |
|                            | EE3   | 5.121 | 1.210  | 0.912          | 50.254         |
|                            | EE4   | 5.085 | 1.239  | 0.917          | 48.728         |
| Social influence            | SI1   | 4.745 | 1.180  | 0.930          | 47.761         |
|                            | SI2   | 4.759 | 1.177  | 0.905          | 48.028         |
|                            | SI3   | 4.652 | 1.219  | 0.911          | 45.327         |
| Facilitating conditions     | FC1   | 4.837 | 1.467  | 0.774          | 39.154         |
|                            | FC2   | 4.894 | 1.280  | 0.853          | 45.394         |
|                            | FC3   | 4.780 | 1.225  | 0.791          | 46.325         |
|                            | FC4   | 5.021 | 1.251  | 0.731          | 47.679         |
| Hedonic motivation          | HM1   | 5.284 | 1.167  | 0.864          | 53.764         |
|                            | HM2   | 5.355 | 1.153  | 0.936          | 55.123         |
|                            | HM3   | 5.454 | 1.143  | 0.913          | 56.652         |
| Price value                 | PV1   | 5.135 | 1.160  | 0.809          | 52.554         |
|                            | PV2   | 5.121 | 0.960  | 0.925          | 63.355         |
|                            | PV3   | 5.057 | 1.087  | 0.833          | 55.218         |
| Behavioral intention to use | BITU1 | 4.787 | 1.194  | 0.913          | 47.606         |
|                            | BITU2 | 4.901 | 1.272  | 0.947          | 45.740         |
|                            | BITU3 | 4.851 | 1.265  | 0.934          | 45.552         |

Note. Ratings are on a 7-point Likert scale: 1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = undecided, 5 = slightly agree, 6 = agree, 7 = strongly agree.
PE = performance expectancy; EE = effort expectancy; SI = social influence; FC = facilitating conditions; HM = hedonic motivation; PV = price value; BITU = behavioral intention to use.
Therefore, H1, H2, and H3 are unsupported.

The results show that UTAUT2 was somewhat suitable for students’ BSGs adoption behavior. Altogether, about 36.9% of the variance of the behavioral intention to use BSGs was explained by FC, HM, and PV, with FC making the greatest contribution.

Table 3. Reliability Analysis and Cross-Loadings.

| Items | PE   | EE   | SI   | FC   | HM   | PV   | BITU |
|-------|------|------|------|------|------|------|------|
| PE1   | 0.849| 0.437| 0.515| 0.473| 0.507| 0.573| 0.307|
| PE2   | 0.895| 0.403| 0.561| 0.545| 0.594| 0.639| 0.401|
| PE3   | 0.905| 0.464| 0.527| 0.504| 0.519| 0.524| 0.367|
| PE4   | 0.819| 0.470| 0.488| 0.381| 0.482| 0.479| 0.337|
| EE1   | 0.398| 0.851| 0.310| 0.494| 0.442| 0.238| 0.234|
| EE2   | 0.502| 0.923| 0.447| 0.572| 0.481| 0.343| 0.291|
| EE3   | 0.426| 0.912| 0.437| 0.464| 0.468| 0.290| 0.303|
| EE4   | 0.497| 0.917| 0.499| 0.541| 0.488| 0.301| 0.327|
| SI1   | 0.558| 0.433| 0.930| 0.546| 0.523| 0.561| 0.402|
| SI2   | 0.579| 0.416| 0.905| 0.579| 0.524| 0.547| 0.376|
| SI3   | 0.519| 0.462| 0.911| 0.632| 0.484| 0.539| 0.364|
| FC1   | 0.348| 0.369| 0.440| 0.774| 0.338| 0.356| 0.368|
| FC2   | 0.435| 0.527| 0.506| 0.853| 0.386| 0.386| 0.421|
| FC3   | 0.444| 0.493| 0.558| 0.791| 0.361| 0.470| 0.418|
| FC4   | 0.508| 0.409| 0.503| 0.731| 0.561| 0.516| 0.389|
| HM1   | 0.623| 0.516| 0.541| 0.515| 0.864| 0.506| 0.434|
| HM2   | 0.533| 0.466| 0.511| 0.470| 0.936| 0.583| 0.465|
| HM3   | 0.502| 0.440| 0.468| 0.435| 0.913| 0.507| 0.472|
| PV1   | 0.389| 0.214| 0.431| 0.431| 0.460| 0.809| 0.413|
| PV2   | 0.619| 0.337| 0.560| 0.517| 0.585| 0.925| 0.480|
| PV3   | 0.632| 0.284| 0.549| 0.459| 0.459| 0.833| 0.410|
| BITU1 | 0.405| 0.286| 0.383| 0.510| 0.470| 0.476| 0.913|
| BITU2 | 0.341| 0.320| 0.380| 0.437| 0.449| 0.458| 0.947|
| BITU3 | 0.397| 0.299| 0.400| 0.466| 0.492| 0.484| 0.934|
| CR    | 0.924| 0.945| 0.939| 0.868| 0.931| 0.892| 0.952|
| Cronbach’s $\alpha$ | .891 | .923 | .903 | .796 | .889 | .818 | .924

Note. The boldfaced numbers indicate the corresponding constructs; the other numbers indicate the cross-loadings.

PE = performance expectancy; EE = effort expectancy; SI = social influence; FC = facilitating conditions; HM = hedonic motivation; PV = price value; BITU = behavioral intention to use; CR = composite reliability.

$\beta = .030, p > .05; \beta = -.026, p > .05$, respectively. Therefore, H1, H2, and H3 are unsupported.

The results show that UTAUT2 was somewhat suitable for students’ BSGs adoption behavior. Altogether, about 36.9% of the variance of the behavioral intention to use BSGs was explained by FC, HM, and PV, with FC making the greatest contribution.
Table 4. Interconstruct Correlations and Reliability Measures.

| Constructs | PE  | EE  | SI  | FC  | HM  | PV  | BITU |
|------------|-----|-----|-----|-----|-----|-----|------|
| PE         | 0.868 |     |     |     |     |     |      |
| EE         | 0.508 | 0.901 |     |     |     |     |      |
| SI         | 0.478 | 0.477 | 0.915 |     |     |     |      |
| FC         | 0.552 | 0.574 | 0.638 | 0.789 |     |     |      |
| HM         | 0.608 | 0.522 | 0.558 | 0.521 | 0.905 |     |      |
| PV         | 0.640 | 0.327 | 0.600 | 0.548 | 0.588 | 0.857 |      |
| BITU       | 0.410 | 0.324 | 0.416 | 0.507 | 0.506 | 0.508 | 0.932 |

Note. Diagonal values are square root of AVE; the others are correlation coefficient between constructs. PE = performance expectancy; EE = effort expectancy; SI = social influence; FC = facilitating conditions; HM = hedonic motivation; PV = price value; BITU = behavioral intention to use.

Figure 3. Standardized path coefficients.
BSGs = business simulation games.
Discussion

The purpose of the present study was to apply the UTAUT2 (Venkatesh et al., 2012) as a theoretical framework to gauge determinants of students’ behavioral intention to use BSGs. The results show that three of the six UTAUT2 constructs (i.e., FC, HM, and PV) predicted students’ behavioral intention to use BSGs, while the other factors (i.e., PE, EE, and SI) did not. Consistent with prior IS studies, this study suggests that UTAUT2 is a useful framework for understanding engagement with BSGs usage behaviors. Some insightful results can be drawn from the research framework, as described later.

First, as expected, it has been empirically demonstrated that FC is a key factor influencing students’ behavioral intention to use BSGs. This study focused on university students with no experience using BSGs. Within the UTAUT2 context, Venkatesh et al. (2012) argued that individuals with no experience depend more on external support. This suggests that these types of individuals require resources and support facilities to successfully and efficiently use BSGs. The FC result is similar to those found in previous studies that examined the positive correlation between FC and behavioral intentions (e.g., Alalwan et al., 2017; Foon & Fah, 2011; Morosan & DeFranco, 2016; Raman & Don, 2013).

Second, HM demonstrated a statistically significant positive effect on acceptance intention to use BSGs. This result in the context of students’ BSGs adoption intention is also consistent with previous findings (e.g., Alalwan et al., 2017; Morosan & DeFranco, 2016; Raman & Don, 2013; Yang, 2013; Yuan et al., 2015). University student respondents in the current study noted the importance of HM. This result suggests that even though BSGs are mainly used for utilitarian purposes (i.e., learning management knowledge), in the initial use case, intrinsic utility (e.g., happiness, fun, playfulness, entertainment, and enjoyment) are vital to encourage individuals’ behavioral intention to use.

Third, the price utility of BSGs is realized as a practical value that plays an important part in students’ decision to use them. The result is consistent with prior studies (e.g., Alalwan et al., 2017; Arenas-Gaitán et al., 2015; Yang, 2013; Yuan et al., 2015) that indicate that PV had a significant positive impact on individuals’ behavioral intention to use a system/technology. While numerous BSGs are free, this does not mean that students are willing to use them, especially if doing so is not perceived as having value. In other words, if individuals can get value from using BSGs, they may be willing to pay for them.

Fourth, unexpectedly, PE, EE, and SI were not significantly related to students’ behavioral intention to use BSGs. These findings are inconsistent with literature from the system/technology acceptance environment, such as TAM (Davis et al., 1989), TAM2 (Davis et al., 1992), and IDT (Rogers, 2003). A possible reason for the lack of support for PE is that although BSGs may provide learning tools for students to develop specific skills (i.e., learn management
knowledge), the lack of usage experience may constrain the impact of utilitarian benefits on usage intention.

Moreover, while EE, or the amount of effort a user desires to use a specific system, has been proven to have a positive impact on an individual’s behavioral intention to use a system (Venkatesh et al., 2012), it did not play a sufficiently important part in facilitating students’ behavioral intention to use BSGs. This finding matches those obtained by Yang (2013), Baptista and Oliveira (2015), Lian (2015), Yuan et al. (2015), and Morosan and DeFranco (2016) and may be due to advances in usability of computer-aided learning, which reduces the number of effort students must expend to use these types of systems.

Finally, although referents’ SI seems to be a critical factor in determining an individuals’ adoption intention, SI had no significant relationship with students’ behavioral intention to use BSGs. However, lack of significance seen in the results may be indicative of descriptive norms (Cialdini, Kallgren, & Reno, 1991), and their use of BSGs may depend on the actual norms that students believe (Yuan et al., 2015).

Implications

Theoretical Implications

Despite the popularity of BSGs, little research has investigated factors that influence students’ usage behaviors. The current study proposes and validates a theoretical model to better understand the key factors affecting students’ BSGs usage intentions and behaviors. Although a variety of studies (e.g., Doyle & Brown, 2000; Fitó-Bertran et al., 2014, 2015; Pasin & Giroux, 2011) have analyzed the impact of BSGs on students’ learning effectiveness, little is known about the impact of specific factors on their usage intention. Also, in terms of theory building, none have integrated the UTAUT2 (Venkatesh et al., 2012) or considered which factors influence students’ usage judgment and decision-making. The inclusion of UTAUT2 in the current study led to a deeper understanding of the behavioral decision-making process regarding BSGs usage.

Based on UTAUT2, the research model investigated students’ PE, EE, SI, FC, HM, PV, and behavioral intention to use BSGs. The results suggest that FC, HM, and PV are salient indicators of behavioral intention to use BSGs. Unexpectedly, PE, EE, and SI did not significantly affect students’ behavioral intention to use BSGs. Even so, the findings contribute to the system/technology adoption literature by showing that one’s intrinsic motivation (i.e., HM) and extrinsic motivation (i.e., FC and PV) are crucial motivators of usage intention in this specific context. These findings have greatly facilitated the existing understanding of BSGs usage behavior.
Practical Implications

The results provide several practical implications to help instructors with respect to designing business courses that promote learner engagement through BSGs usage. First, learning institutions or instructors should consider how to facilitate learners’ behavioral intention to use BSGs for business management knowledge learning by focusing on extrinsic motivation related to FC and PV. Because previous research (e.g., Wu & Lederer, 2009) has pointed out that the effects of extrinsic motivation might be decreased by mandatory participation, BSGs should be incorporated into courses on a voluntary basis. When learners perceive BSGs use to be nonmandatory, their willingness to complete the learning tasks is likely to increase. Also, learning institutions or instructors can provide rich and engaging learning channels that show how to use BSGs (e.g., inform students about their performance and their progress in the activity), as well as the benefits of BSGs (e.g., tangible rewards and available support structures). Moreover, reasonably priced BSGs increase learners’ BSGs usage intention: Even BSGs that cost money, but are perceived as valuable, can be acceptable. Also, BSGs developers can employ a variety of pricing strategies when promoting a simulation product or service.

Further, this result has implications for BSGs instructors, researchers, and developers who are designing or implementing BSGs for their players/trainees—the elements associated with intrinsic motivation such as challenge, curiosity, and fantasy should not be overlooked. HM is seen as an underlying mechanism that encourages learners to concentrate and helps them absorb material (Lucardie, 2014). Instructors must consider the underlying dimensions of HM (e.g., fun, enjoyment, and entertainment), as these dimensions contribute to facilitating BSGs usage intention that is valuable in terms of the learning of business management knowledge or skills. Thus, BSGs used in business courses should include elements associated with playfulness, enjoyment, and entertainment value and be designed to ensure easy learner absorption.

Conclusions and Future Research

Overall, this study helps to more fully understand students’ behavioral intention to use BSGs, especially in terms of the impact of FC, HM, and PV. The contributions of this study to the theoretical development of students’ behavioral intention to use BSGs are twofold. First, based on UTAUT2, the results of this study provide a deeper understanding of the context of BSGs adoption. Instructors and developers can use this information to learn more about the factors that influence an individual’s decision to use BSGs. Focusing on the important factors found in the current research, they can develop and utilize BSGs that are perceived of as fun while ensuring that users have the resources and support they need, as well as good PV. Second, the findings can help
academics and practitioners better understand how to use BSGs in a business and management education environment to enhance management knowledge learning.

Although these findings provide meaningful insights for researchers and practitioners, there are some limitations that should be noted. First, self-reported responses were obtained from a convenience sample of university student volunteers who had no experience using BSGs. Accordingly, the findings may not represent the general public. It would be useful to replicate this study using many different groups from a wider population so that the robustness of the results can be established. Second, a cross-sectional design was used; thus, the behavioral intention to use BSGs to predict future actual use behaviors cannot be established. Parsing how the predictive factors of behavioral intention to use BSGs affect actual use in a continual manner would be an interesting direction for future research. Finally, this study considered only the direct factors of UTAUT2 in examining students’ behavioral intention to use BSGs. In future research, the moderators such as age, gender, and experience can be used to extend the proposed research model.

Appendix. Measurement Items Used in This Study.

**Performance expectancy**
- PE1: I find BSGs useful in learning management knowledge.
- PE2: Using BSGs increases my chances of achieving learning management knowledge.
- PE3: Using BSGs helps me accomplish learning management knowledge more quickly.
- PE4: Using BSGs increases my productivity.

**Effort expectancy**
- EE1: Learning how to use BSGs is easy for me.
- EE2: My interaction with BSGs is clear and understandable.
- EE3: I find BSGs easy to use.
- EE4: It is easy for me to become skillful at using BSGs.

**Social influence**
- SI1: People who are important to me think that I should use BSGs.
- SI2: People who influence my behavior think that I should use BSGs.
- SI3: People whose opinions I value prefer that I use BSGs.

**Facilitating conditions**
- FC1: I have the resources necessary to use BSGs.
- FC2: I have the knowledge necessary to use BSGs.
FC3: BSGs are compatible with other technologies I use.
FC4: I can get help from others when I have difficulties using BSGs.

**Hedonic motivation**

HM1: Using BSGs is fun.
HM2: Using BSGs is enjoyable.
HM3: Using BSGs is very entertaining.

**Price value**

PV1: BSGs are reasonably priced.
PV2: BSGs are a good value for the money.
PV3: At the current price, BSGs provide a good value.

**Behavioral intention to use**

BITU1: I intend to use BSGs in the future.
BITU2: I will always try to use BSGs in my daily life.
BITU3: I plan to use BSGs frequently.

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**References**

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action-control: From cognition to behavior* (pp. 11–39). Berlin, Germany: Springer-Verlag.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Alalwan, A. A., Dwivedi, Y. K., & Rana, N. P. (2017). Factors influencing adoption of mobile banking by Jordanian bank customers: Extending UTAUT2 with trust. *International Journal of Information Management, 37*(3), 99–110.

Alalwan, A. A., Dwivedi, Y. K., & Williams, M. D. (2016). Customers’ intention and adoption of telebanking in Jordan. *Information Systems Management, 33*(2), 154–178.

Alalwan, A. A., Rana, N. P., Dwivedi, Y. K., Lal, B., & Williams, M. D. (2015, October). *Adoption of mobile banking in Jordan: Exploring demographic differences on customers’
perceptions. Paper presented at the 14th IFIP Conference on e-Business, e-Services and e-Society, Delft, the Netherlands.

Aldrich, C. (2003). *Simulations and the future of learning: An innovative (and perhaps revolutionary) approach to e-learning*. New York, NY: John Wiley & Sons.

Anderson, P. H., & Lawton, L. (2008). Business simulations and cognitive learning: Developments, desires, and future directions. *Simulation & Gaming*, 40(2), 193–216.

Arenas-Gaitán, J., Peral-Peral, B., & Ramón-Jerónimo, M. A. (2015). Elderly and internet banking: An application of UTAUT2. *Journal of Internet Banking and Commerce*, 20(1), 1–23.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Baptista, G., & Oliveira, T. (2015). Understanding mobile banking: The unified theory of acceptance and use of technology combined with cultural moderators. *Computers in Human Behavior*, 50, 418–430.

Bohmstedt, G. W. (1970). Reliability and validity assessment in attitude measurement. In G. F. Summers (Ed.), *Attitude measurement* (pp. 80–99). Chicago, IL: Rand–McNally.

Borrajero, F., Bueno, Y., De Pablo, I., Santos, B., Fernández, F., García, J., & Sagredo, I. (2010). SIMBA: A simulator for business education and research. *Decision Support Systems*, 48(3), 498–506.

Brown, S. A., & Venkatesh, V. (2005). A model of adoption of technology in the household: A baseline model test and extension incorporating household life cycle. *MIS Quarterly*, 29(3), 11.

Buil, I., Catalán, S., & Martínez, E. (2018). Exploring students’ flow experiences in business simulation games. *Journal of Computer Assisted Learning*, 34(2), 1–10.

Chang, J., Lee, M., Ng, K. L., & Moon, K. L. (2003). Business simulation games: The Hong Kong experience. *Simulation & Gaming*, 34(3), 367–376.

Chen, K., & Chan, A. H. (2014). Predictors of gerontechnology acceptance by older Hong Kong Chinese. *Technovation*, 34(2), 126–135.

Chin, N. P., Monroe, A., & Fiscella, K. (2000). Social determinants of (un)healthy behaviors. *Education for Health: Change in Learning & Practice*, 13(3), 317–328.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In G. A. Marcoulides (Ed.), *Modern methods for business research* (pp. 295–336). Mahwah, NJ: Lawrence Erlbaum Associates.

Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. *Advances in Experimental Social Psychology*, 24, 201–234.

Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. *Journal of Educational Psychology*, 88(4), 715–730.

Costas, J., Ponte, B., de la Fuente, D., Lozano, J., & Parreño, J. (2017). Agents playing the Beer Distribution Game: Solving the dilemma through the drum-buffer-rope methodology. In M. Amorim, C. Ferreira, M. Vieira Junior & C. Prado (Eds.), *Engineering systems and networks* (pp. 337–345). Cham, Switzerland: Springer.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982–1003.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology, 22*(14), 1111–1132.

Dodds, W. B., Monroe, K. B., & Grewal, D. (1991). Effects of price, brand, and store information on buyers’ product evaluations. *Journal of Marketing Research, 28*(3), 307–319.

Doyle, D., & Brown, F. W. (2000). Using a business simulation to teach applied skills – The benefits and the challenges of using student teams from multiple countries. *Journal of European Industrial Training, 24*(6), 330–336.

Escobar-Rodrı´guez, T., & Carvajal-Trujillo, E. (2013). Online drivers of consumer purchase of website airline tickets. *Journal of Air Transport Management, 32*, 58–64.

Faria, A. J. (1998). Business simulation games: Current usage levels—An update. *Simulation & Gaming, 29*(3), 295–308.

Faria, A. J., Hutchinson, D., Wellington, W. J., & Gold, S. (2009). Developments in business gaming: A review of the past 40 years. *Simulation & Gaming, 40*(4), 464–487.

Faria, A. J., & Wellington, W. J. (2004). A survey of simulation game users, former-users, and never-users. *Simulation & Gaming, 35*(2), 178–207.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison Wesley Publishing Company.

Fitó-Bertran, A., Hernández-Lara, A. B., & López, E. S. (2014). Comparing student competences in a face-to-face and online business game. *Computers in Human Behavior, 30*, 452–459.

Fitó-Bertran, Á., Hernández-Lara, A. B., & López, E. S. (2015). The effect of competencies on learning results an educational experience with a business simulator. *Computers in Human Behavior, 51*(Part B), 910–914.

Foon, Y. S., & Fah, B. C. Y. (2011). Internet banking adoption in Kuala Lumpur: An application of UTAUT model. *International Journal of Business and Management, 6*(4), 161–167.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50.

Forrester, J. W. (1994). System dynamics, systems thinking, and soft OR. *System Dynamics Review, 10*(2–3), 245–256.

Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming, 33*(4), 441–467.

Geithner, S., & Menzel, D. (2016). Effectiveness of learning through experience and reflection in a project management simulation. *Simulation & Gaming, 47*(2), 228–256.

Goodwin, J. S., & Franklin, S. G. (1994). The beer distribution game: Using simulation to teach systems thinking. *Journal of Management Development, 13*(8), 7–15.

Gunawan, A., Fiarni, C., & Lawalata, G. (2015, June). *Business process learning system with real-time simulation approach*. Paper presented at the 2nd International Conference on Human Capital and Knowledge Management (ICHCKM 2015), Indonesia, Bandung.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: A global perspective* (7th ed.). Upper Saddle River, NJ: Pearson Education.
Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis* (6th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing, 20*, 277–319.

Herrero, A., San Martí, H., & García de los Salmones, M. D. M. (2017). Explaining the adoption of social networks sites to share user-generated content: A revision of the UTAUT2. *Computers in Human Behavior, 71*, 209–217.

Im, I., Hong, S., & Kang, M. S. (2011). An international comparison of technology adoption: Testing the UTAUT model. *Information & Management, 48*(1), 1–8.

Jensen, K. O. (2003). Business games as strategic team-learning environments in telecommunications. *BT Technology Journal, 21*(2), 133–144.

Kaminsky, P., & Simchi-Levi, D. (1998). A new computerized beer game: A tool for teaching the value of integrated supply chain management. *Global Supply Chain and Technology Management, 1*(1), 216–225.

Karl, C. K. (2014). *Simulation and gaming in construction business: Design of a module-oriented modeling approach based on system dynamics and its prototypical implementation in research and education* (Unpublished doctoral dissertation). University of Duisburg-Essen, Essen, Germany.

Khan, A., & Pearce, G. (2015). A study into the effects of a board game on flow in undergraduate business students. *The International Journal of Management Education, 13*(3), 193–201.

Kiers, D. E., & Polson, P. G. (1985). An approach to the formal analysis of user complexity. *International Journal of Man-Machine Studies, 22*(4), 365–394.

Leemkuil, H., & de Jong, T. O. N. (2012). Adaptive advice in learning with a computer-based knowledge management simulation game. *Academy of Management Learning & Education, 11*(4), 653–665.

Lian, J. W. (2015). Critical factors for cloud based e-invoice service adoption in Taiwan: An empirical study. *International Journal of Information Management, 35*(1), 98–109.

Loon, M., Evans, J., & Kerridge, C. (2015). Learning with a strategic management simulation game: A case study. *The International Journal of Management Education, 13*(3), 227–236.

Lucardie, D. (2014). The impact of fun and enjoyment on adult's learning. *Procedia - Social and Behavioral Sciences, 142*, 439–446.

Malone, T. W. (1981). Toward a theory of intrinsically motivating instruction. *Cognitive Science, 5*(4), 333–369.

Martins, C., Oliveira, T., & Popović, A. (2014). Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. *International Journal of Information Management, 34*(1), 1–13.

Miettinen, T., Salmi, J., Gupta, K., Koskela, J., Kauttio, J., Karhela, T., & Ruutu, S. (2016). Applying modelica tools to system dynamics based learning games: Project management game. *Modelling and Simulation in Engineering, 3*, 1–13.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research, 2*(3), 192–222.
Morosan, C., & DeFranco, A. (2016). It’s about time: Revisiting UTAUT2 to examine consumers’ intentions to use NFC mobile payments in hotels. *International Journal of Hospitality Management, 53*, 17–29.

Mutlu, H. M., & Der, A. (2017). Unified theory of acceptance and use of technology: The adoption of mobile messaging application. *Megatrend revija ~ Megatrend Review, 14*(1), 169–186.

Nistor, N., Baltes, B., Dascălu, M., Mihăilă, D., Smeaton, G., & Trăuşan-Matu, Ş. (2014). Participation in virtual academic communities of practice under the influence of technology acceptance and community factors, a learning analytics application. *Computers in Human Behavior, 34*, 339–344.

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York, NY: McGraw-Hill.

Oechslein, O., Fleischmann, M., & Hess, T. (2014, January). An application of UTAUT2 on social recommender systems: Incorporating social information for performance expectancy. Paper presented at the 47th Hawaii International Conference on System Sciences (HICSS), Waikoloa, Hawaii, USA.

Parker, L. E., & Lepper, M. R. (1992). Effects of fantasy contexts on children’s learning and motivation: Making learning more fun. *Journal of Personality and Social Psychology, 62*(4), 625–633.

Pasin, F., & Giroux, H. (2011). The impact of a simulation game on operations management education. *Computers & Education, 57*(1), 1240–1254.

Raman, A., & Don, Y. (2013). Preservice teachers’ acceptance of learning management software: An application of the UTAUT2 model. *International Education Studies, 6*(7), 157–164.

Randel, J. M., Morris, B. A., Wetzel, C. D., & Whitehill, B. V. (1992). The effectiveness of games for educational purposes: A review of recent research. *Simulation & Gaming, 23*(3), 261–276.

Ringle, C. M., Wende, S., & Will, A. (2005). *SmartPLS 2.0 M3*. Retrieved from https://www.smartpls.com/

Riquelme, H. E., & Rios, R. E. (2010). The moderating effect of gender in the adoption of mobile banking. *International Journal of Bank Marketing, 28*(5), 328–341.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York, NY: Free Press.

Sitzmann, T. (2011). A meta-analytic examination of the instructional effectiveness of computer-based simulation games. *Personnel Psychology, 64*(2), 489–528.

Sterman, J. D. (1994). Learning in and about complex systems. *System Dynamics Review, 10*(2–3), 291–330.

Sterman, J. D. (2000). *Business dynamics: Systems thinking and modeling for a complex world*. Boston, MA: Irwin McGraw-Hill.

Taylor, S., & Todd, P. (1995a). Assessing IT usage: The role of prior experience. *MIS Quarterly, 19*(4), 561–570.

Taylor, S., & Todd, P. (1995b). Understanding information technology usage: A test of competing models. *Information Systems Research, 6*(2), 144–176.

Taylor, S., & Todd, P. (1995c). Decomposition and crossover effects in the theory of planned behavior: A study of consumer adoption intentions. *International Journal of Research in Marketing, 12*(2), 137–155.

Terrell, S., & Rendulic, P. (1996). Using computer-managed instructional software to increase motivation and achievement in elementary school children. *Journal of Research on Computing in Education, 28*(3), 403–414.
Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: Toward a conceptual model of utilization. *MIS Quarterly, 15*(1), 125–143.

Van Daalen, C., Schaffernicht, M., & Mayer, I. (2014, July). System dynamics and serious games. Paper presented at the 32nd International Conference of the System Dynamics Society, Delft, the Netherlands.

Van der Heijden, H. (2004). User acceptance of hedonic information systems. *MIS Quarterly, 28*(4), 695–704.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186–204.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Toward a unified view. *MIS Quarterly, 27*(3), 425–478.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly, 36*(1), 157–178.

Venkatesh, V., & Zhang, X. (2010). Unified theory of acceptance and use of technology: US vs. China. *Journal of Global Information Technology Management, 13*(1), 5–27.

Warshaw, P. R., & Davis, F. D. (1985). Disentangling behavioral intention and behavioral expectation. *Journal of Experimental Social Psychology, 21*(3), 213–228.

Webster, J., & Martocchio, J. J. (1992). Microcomputer playfulness: Development of a measure with workplace implications. *MIS Quarterly, 16*(2), 201–226.

Wellington, W. J., Hutchinson, D. B., & Faria, A. J. (2017). Measuring the impact of a marketing simulation game: Experience on perceived indecisiveness. *Simulation & Gaming, 48*(1), 56–80.

Wu, J., & Lederer, A. (2009). A meta-analysis of the role of environment-based voluntariness in information technology acceptance. *MIS Quarterly, 33*(2), 419–432.

Yang, S. (2013). Understanding undergraduate students’ adoption of mobile learning model: A perspective of the extended UTAUT2. *Journal of Convergence Information Technology, 8*(10), 969–979.

Yu, C. S. (2012). Factors affecting individuals to adopt mobile banking: Empirical evidence from the UTAUT model. *Journal of Electronic Commerce Research, 13*(2), 104–121.

Yuan, S., Ma, W., Kanthawala, S., & Peng, W. (2015). Keep using my health apps: Discover users’ perception of health and fitness apps with the UTAUT2 model. *Telemedicine and e-Health, 21*(9), 735–741.

Zantow, K., Knowlton, D. S., & Sharp, D. C. (2005). More than fun and games: Reconsidering the virtues of strategic management simulations. *Academy of Management Learning & Education, 4*(4), 451–458.

Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *The Journal of Marketing, 52*(3), 2–22.

Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. *Computers in Human Behavior, 26*(4), 760–767.

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