## PAPER DETAILS

TITLE: CONTINUOUS INTENTION TO USE ONLINE LEARNING DURING COVID-19 PANDEMIC BASED ON THREE DIFEERENT THEORITICAL MODELS (TAM, SVT, TOE) AUTHORS: Shaden MASADEH,Rabab ABUMALLOH,Noha LABANI PAGES: 284-307

ORIGINAL PDF URL: https://dergipark.org.tr/tr/download/article-file/2278649

## CONTINUOUS INTENTION TO USE ONLINE LEARNING DURING COVID-19 PANDEMIC BASED ON THREE DIFEERENT THEORITICAL MODELS (TAM, SVT, TOE)

#### Shaden MASADEH

ORCID: 0000-0002-9256-5900 Computer Department in Applied College Imam Abdulrahman Bin Faisal University Dammam, SAUDI ARABIA

#### Dr. Rabab ABUMALLOH

ORCID: 0000-0003-2805-3764 Computer Department, Applied College Imam Abdulrahman Bin Faisal University Dammam, SAUDI ARABIA

#### **Noha LABANI**

ORCID: 0009-0006-7283-0195 English Department Imam Abdulrahman Bin Faisal University Dammam, SAUDI ARABIA

Received: 24/02/2022 Accepted: 16/06/2022

### ABSTRACT

The novel COVID-19 pandemic has impacted educational systems in almost all countries worldwide. Traditional classes have been canceled or shifted to online mode through the affected countries. Resuming traditional face-to-face instruction might be delayed. This unexpectedly fast and mandatory shifting to online education, along with the significant challenges that face learners and instructors, has led to uncertainty regarding its future. This study aims to inspect students' continuous intention (CI) towards online education during COVID-19, by incorporating different constructs from three theoretical models: first, conservation values( Security(SEC), Conformity(CON)) of Schwartz Value Theory(SVT), organizational support factors (Training(TR), Top management support(TS)) in Technology-Organizational-Environmental (TOE) , and the Technology acceptance model(TAM ) main factors (perceived usefulness(PU), perceived ease of use(PEU)). To achieve the research goal, a research model was developed referring to previous strong literature. The data was gathered from 310 students from Imam Abdulrahman Bin Faisal university (IAU) in Saudi Arabia, and analyzed with Structural Equation Modelling SEM-PLS. Findings show that TAM factors (PU, PEU), conservation values factors (SEC, CON), and organizational support factors (TR, TS) are important determinants for online learning adoption during COVID19 pandemic . The study provides directions for designers and developers to establish a more effective online learning environment, which is more suited for the new digitized generation during unexpected conditions.

Keywords: Online learning, Schwartz's Value Theory, COVID-19, technology-organizationalenvironmental, TAM, continuous intention.

### **INTRODUCTION**

A report from the World Health Organization (WHO) about pneumonia cases in China specifically in Wuhan City, Hubei Province was published to the global society (Gao et al., 2020) . The disease spread swiftly worldwide since December 2019 (Rashid & Yadav, 2020). The Chinese government announced that this spreading pneumonia is a new type of coronavirus (Goyal et al., 2019). The primary reason for this rapid spread of the disease is a zoonotic beta-coronavirus, and it is called the 2019 novel coronavirus (2019-nCoV) (Khachfe et al., 2020).

The aftermath of COVID-19 has led to an immense public health crisis, the catastrophic collapse of medical care systems, and a dramatic decline in the wellbeing levels of the world's populations (Khachfe et al., 2020). Since January 2020, many economics, businesses, schools, and higher education institutions (HEIs) have been affected by Covid-19 ('Coronavirus'). It has become a pandemic that poses enormous challenges to the global economy and people's livelihoods in many countries (Agasisti & Soncin, 2021; Rizun & Strzelecki, 2020). Lost revenues, disrupted supply chains, and school closures are some examples of such formidable challenges (Khachfe et al., 2020; Rashid & Yadav, 2020). In response to the high infection rate of Covid-19, many governments adopted strict regulations and took drastic measures to stop its spread to give ample time for health care systems to work more effectively.

Initially, restrictions have been put in place to lower people's social contact by enforced social distancing (Rashid & Yadav, 2020). This means keeping a distance between each other more than one meter according to WHO instructions. The most effective preventive measures according to Agency France Press (AFP) are to remain confined at home and to keep travel and social contact to a minimum which will eventually control the spread of the virus (Khachfe et al., 2020). Also, many governments release daily reports to their citizens to make them aware of the biological nature of (coronavirus), which helps to clarify the controlling instructions and reach good decisions (Xie & Chen, 2020). Consequently, many HEIs and schools across nations have been closed as precautionary steps to save students' and staff's lives. Different HEIs have adopted online education implementing a wide array of models and tools. Some HEIs offer synchronous and asynchronous classes where students can log on to virtual platforms and attend live or recorded classes (Agasisti & Soncin, 2021). Other HEIs use self-paced instruction models. It entails sending different activity worksheets and assignments designed by instructors to students to facilitate self-learning. Relying on remote learning and adopting even more advanced modalities is foreseeable. Hence, shifts in the education landscape are inevitable to prepare the new generations for the upcoming challenges and opportunities. Remote learning will remain an integral part of the educational process around the world even in the post-COVID-19 (Marinoni et al., 2020).

Continuous adaptation of online education is based on the fact that there have been noticeable advancements in the last ten years in the field of online learning resources (Aldikanji & Ajami, 2016; Price et al., 2007; Weltman et al., 2019; Yilmaz, 2015). There is a growing demand for e-learning tools in educational and industrial institutes, which allows the e-learning market to flourish (Alves et al., 2017; van de Heyde & Siebrits, 2019). By 2023, the evolving market of virtual learning is anticipated to reach 65.41 billion USD expanding at a cumulative average increase rate of 7.07% (Panigrahi et al., 2018). Moreover, it is predicted that the global learning management system (LMS) will witness massive growth by 2025 (Panigrahi et al., 2018). There will be a rise from 5.05 billion dollars in 2016 to 18.44 billion increasing at a rate of 15.52% (Panigrahi et al., 2018). This rise has led to an increase in learners' habitual use of the internet in education (Yilmaz, 2015).

Online learning can help educators in enhancing the quality of education by making the learning process more personal and interactive (Saqr et al., 2018; Yilmaz, 2015). Engaging in an interactive learning environment, along with becoming more involved in the learning process, empower students' self-learning abilities, and improve their intrinsic motivation towards learning (Eseroghene & Ahmad, 2018; Weltman et al., 2019). Also, education has become more accessible for students with exceptional circumstances and tight schedules (Marinoni et al., 2020). Online learning has offered them customized learning experiences and access to quality education (Babu et al., 2013). In contrast to traditional classroom teaching, online learning has extended learning beyond the walls of classrooms, reaching a global community of learners via the internet. Shifting from direct instruction to online education has been paved by moving from paper-based to electronic materials (Price et al., 2007), which boasts several advantages over traditional learning (Molnar et al., 2019).

Previous literature has focused on evaluating factors influencing e-learning satisfaction performances and adoption from a descriptive perspective (Asoodar et al., 2016). However, the present study aims at determining key elements affecting the continuous intention to adopt e-learning modality during the current crisis to offer appropriate guidelines for e-learning organizations, decision-makers, academics, and educators. The results can help to overcome hurdles and to lower the risks of e-learning adoption failure. Academics and decision-makers can employ the findings of this research to adopt and implement an effective e-learning system as a safe path during periods of health crises, epidemics, environmental and economic crises.

This study has a contribution of combining Schwartz's value theory (SVT), Technology Acceptance Model (TAM), along withTechnology-organizational-environmental to investigate learners' continuous intention for adoption of e-learning during COVID-19 crisis. Additionally, this study considers four factors that can overcome learners' attitudinal ambivalence in adopting online learning as a safe tool during a period of crises: (1) security, (2) conformity, (3) Top management support, and (4) training. Our model provides a useful model for examining learners' intentions for using e-learning continuously. The next section starts with reviewing the literature and then manifesting the research model with hypotheses. After that, we demonstrate the methodology and empirical results. The paper ends with a discussion of the results.

### **THEORETICAL BACKGROUND**

### **Technology Acceptance Model (TAM)**

TAM was suggested by Davis to explore the influence of innovations on individuals' actions (Liu et al., 2010). TAM is one of the most wildly applied and dominant models (King & He, 2006). TAM indicates that the Use Intention (UI) can be anticipated using two basic constructs: Perceived Usefulness (PU) and Perceived Ease of Use (PEU). PU refers to the enhancement in user performance through using the innovation, while PEU indicates that using the innovation is effort-free (Davis, 1989). Venkatesh & Davis(2000) indicated that several constructs can be adopted to enhance PU and PEU. TAM model was used in the online learning context to explain individuals' acceptance, UI, and CI (Binyamin et al., 2019; Liaw, 2008). Still, the adoption of the TAM model to explain the online learning adoption, particularly in a crisis, is novel. The power of TAM to evaluate the UI and CI of innovations in several environments has motivated us to adopt TAM as a theoretical ground of this research (Cheng et al., 2011; Gefen et al., 2003; Liaw, 2008; Liu et al., 2010)

### Schwartz's Value Theory (SVT)

Previous literature has indicated how cultural factors influence technology adoption and acceptance (Baptista & Oliveira, 2015; Kummer et al., 2017; Srite & Karahanna, 2006; Udo et al., 2012). Srite & Karahanna(2006) investigated the impact of culture-related values on the acceptance of innovation. The authors indicated that individuals' cultural values are affected by national culture, and this consequently affects technology acceptance. Similarly, Baptista & Oliveira (2015) explained how mobile banking acceptance is affected by cultural factors. Besides, Udo et al. (2012) examined the impact of cultural ethos on the acceptance of e-services. These studies indicated that culture is regarded as a critical factor that impacts UI. Referring to Tarhini et al. (2017) research, which focused on e-learning in Lebanon, the social environment was considered as a significant factor, in which the culture influences the behavior of individuals. Also, Salehan et al.(2018) indicated that cultural changes are more associated with individualism and it is affected by technology. Nevertheless, according to Smith(2002) study, culture is usually formed by members of a particular society and constitutes a set of basic common values. Bagchi et al. (2015) indicated the difference between culture and values. While the values distinguish between the individuals, the culture distinguishes between the groups of individuals. Values act as the main standard by which people choose and explain behaviors. Values are internally held beliefs that represent favorable goals that drive the action of behavior ( Schwartz et al., 2012).

Values constitute the motivational bases of attitude along with the behavior of a person. Whereas at a group level, the prioritization of value structures helps to frame the culture (Boer & Fischer, 2013; Schwartz, 1994). UI of technology might be influenced by the cultural or personal values that form the user's attitude. Therefore, values act as the primary principles and indicators by which users adopt and justify actions.

At the individual level, Schwartz developed a theory that relates basic values that people recognize in every culture (Schwartz, 2012). Schwartz's theory is one of the common implemented and verified cross-cultural theories in the field of behavioral research(Garay, 2019). Schwartz (1992) highlighted10 motivationally different groups of values as follows: (1) achievement, (2) self-direction, (3) tradition, (4) stimulation, (5) security, (6) hedonism, (7) benevolence (8) power, (9) conformity, and (10) universalism. These groups were categorized into four high-level values: self-transcendence, self-enhancement, openness to change, and conservation. Combining SVT with decision models was implemented by several studies (Ahmad & Sun, 2018; Diddi & Niehm, 2017; Goncalves et al., 2018; Grigoryan et al., 2018a, 2018b; Pahnila et al., 2011; Seddig & Davidov, 2018). These studies revealed that individual-level values and values dimensions can affect users' attitude (ATT). Moreover, as indicated by these studies, the approach adopted by researchers who apply Hofstede's dimensions as moderators of attitude-behavior relationships differs from the procedure carried out by studies that utilize Schwartz's values as predictors of ATT or UI (Diddi & Niehm, 2017; Grigoryan et al., 2018b).

The values theory has been utilized to explore political choices and human rights (Davidov et al., 2008). Still, few papers deployed this theory in the adoption of innovation (Mehta et al., 2019). For example, in research about the most prominent experiences of effective and ineffective innovation adoption, Partala & Saari (2015) indicated that most of the values are tied to effective innovation adoption. Bagchi et al. (2015) proposed a model using the Schwartz values theory to explore Internet use. They indicated that most of the individual values impact the usage of the Internet.

#### Technology-organizational-environmental (TOE)

TOE framework has been broadly implemented in organizational context studies to investigate firm adoption of IT products and services (Tornatzky et al., 1990; Zhu, 2004). According to the TOE, which is an organizational-level theory, compared to other technological acceptance models like TAM, TPB, and RBV, studies should concentrate not only on technical respects yet, they should also take into consideration the organizational and environmental contexts of the IT adoption(Borgman et al., 2013; Gangwar et al., 2015). Flexibility of the TOE framework allows it to be more advantageous over other IT adoption models (Oliveira & Martins, 2009). Moreover, TOE offers a comprehensive consideration for user adoption of innovations by incorporating factors affecting decisions of the adoption of business innovation, to enhance organizational abilities in utilizing technology (Salwani et al., 2009; Shahzad et al., 2020; Y. M. Wang et al., 2010). Besides, several studies have implemented the TOE framework to understand the adoption of IT-based systems with an environmental, organizational, and technological base (Alqahtani, 2016; Awa et al., 2015; Boateng et al., 2016; Friedrich-Baasner et al., 2018; Lian et al., 2014; Liang et al., 2017; Mohd Sharif et al., 2017; Mtingwi, 2015; Senyo et al., 2016).

#### Extended TAM with SVT, and TOE Framework

This paper employs three theoretical grounds: the TAM model, SVT and TOE framework. Although the significance of the TAM and the TOE models in technological adoption have been justified by a broad range of empirical and conceptual research, these models have several limitations. For example, the extrinsic variables in the extended models of TAM are not plainly defined. Also, its two main constructs (PU and PEU) elucidate less than 50% of the system's use (Legris et al., 2003). On the other side, Riyadh et al. (2009) described the TOE framework as a too generic model that has vague major constructs (S. Wang & Noe, 2010). According to Gangwar et al. (2015) it is not simple to combine both models, but it is important to improve the TOE structure by combining it with a model with clear constructs. Hence, previous studies have advocated the need to combine TAM and TOE to boost the predictive capacity of the resulting outcomes and address some of its limitations. Moreover, each of the TOE or TAM models does not concentrate on how personal values affect the adoption of innovations in any context. Based on Goncalves et al. (2018) few studies applied SVT in technology adoption and few studies have integrated it with the TAM model. Consequently, the research approach implemented in this paper is based on integrating the TAM with the TOE framework, which is broadly acknowledged, and it reckons institutional adoption variables rather

than individual variables (Borgman et al., 2013; Chau & Tam, 1997; Low et al., 2011; Tweel, 2012). Also, the paper integrates TAM with SVT theory that focuses on personal values in evaluating personal and institutional decision-making concerning the adoption of e-learning during the COVID-19 crisis.

### **RESEARCH MODEL AND HYPOTHESIS DEVELOPMENT**

This study involves developing and testing an extended TAM model with SVT, and TOE framework. Hence, several hypotheses have been developed in the hypothesized model as illustrated in Figure 1, also see table 1. The hypotheses depict the relationships between variables that have been supported by previous literature.

According to Schwartz (1992) study, conservation values refer to meeting the expectations of key influencers in their environment, considering both peers as well as organizational levels. The adoption of new technology is often influenced by formal and informal communication and control between inter-organizational mechanisms over organizational resources (Salwani et al., 2009; R. K. Singh, 2013). Consequently, this study discusses the related organizational factors that influence online learning adoption in HEIs.

### Hypothesis 1: Security (SEC) and Perceived Usefulness (PU)

The SEC values contain two subtypes, the first is personal SEC like values of sense of belonging, personal health, wellbeing, and safety, while the second is societal SEC like the value of national SEC, safe from enemies, and firm social order (Schwartz et al., 2012). In this research, we define security as individuals' emphasis on safety, sympathy, and firm social links. Referring to Mehta et al. (2019) study, employees will perceive job-related e-learning program, which is endorsed by top managers in the organizational hierarchy, as necessary to their career objectives, and worth their effort and time to deploy them. Moreover, the study projected that workers finish basic training programs through e-learning tools to protect their future employment against the threat of peer competition. Consequently, a secured environment is essential to all users, students who give significant importance to SEC value will perceive online learning technology to be helpful to their learning performance during COVID-19. So, by incorporating conservation-type values (SEC) as a predictor of PU, the following hypothesis is proposed H1: SEC has a significant positive impact on the PU of online learning.

### Hypothesis 2: Conformity (CON) and Perceived Usefulness (PU)

Schwartz, (1994) defined CON as "control of behaviors, inclinations, and momentum likely to disturb others and defile social prospects or norms." Schwartz et al.(2012) suggested two potential CON subtypes, the first is interpersonal that is related to values like avoiding upsetting others, and showing respect, while the second is complying with expectations, meeting obligations, following rules, and avoiding doing anything people say is wrong. Conforming persons show obedience to follow rules, structures, and instructions designed by the organization in terms of obligatory choice (Bagchi et al., 2015; Mehta et al., 2019). Moreover, they are abiding by the rules and conforming to agreed laws. In this study, students who give significant importance to CON to authority instructions, like social distancing to avoid the threat of COVID-19, will perceive online learning technology to be helpful to their learning performance during COVID-19. Hence, we add the conservation-type values (CON) as a predictor of PU so, H2: CON has a significant positive impact on the PU of online learning.

### Hypothesis 3: Training TR and Perceived Ease of Use (PEU)

Schillewaert et al. (2005) described TR as a degree to which organizations instruct and educate their staff in using innovation in terms of quality and quantity. Several studies indicated that TR's goal is to reduce ambiguity and to develop knowledge for future effective usage (Davis, 1989; Gangwar et al., 2015; Igbaria & Angele, 1997). TR should reflect the usefulness of the innovation and provide users with the necessary knowledge and capability to operate it. Since online learning is a complicated information system, HEIs need to train and educate its students before adopting it. This helps to lower students' anxiety about the usage of online learning. Also, based on Schillewaert et al. (2005) study, TR helps to achieve the goals of the organization, increases students' understanding of online learning benefits, and raises the motivation to adopt the technology. (Arpaci, 2017) indicated that if students believe that they are capable of using an online learning system through the TR time, they will be mindful of the unfavorable learning curve impacts. So, the following hypothesis is proposed H3: TR has a significant and positive impact on PEU of online learning.

### Hypothesis 4: Top Management Support (TS) and Perceived Ease of Use (PEU)

Innovation adoption literature has also determined how TS affects the adoption of innovations (Salwani et al., 2009; Teo et al., 2009). Previous literature explained that TS is higher-level officials' actions and perceptions toward using innovation, to create values for the organization (Gangwar et al., 2015; Salwani et al., 2009). Top managements have various roles that are necessary to ensure the commitment of resources, cultivation of organizational climate, reinforcement of values, and ensuring long-term vision. Furthermore, continuous TS is necessary for overcoming barriers and to handle possible resistance towards technological innovation (Gangwar et al., 2015; Jeyaraj et al., 2006; Ramdani et al., 2009; R. K. Singh, 2013; Teo et al., 2009; Y. M. Wang et al., 2010). TS is positively related to PEU and is considered a critical factor in the adoption of information technologies. Unfortunately, according to G. Singh & Hardaker(2014), in the academic field, TS is often absent and has a low priority. Managers might not support online Learning, due to many reasons like competing priorities and lack of resources (Freitas et al., 2006; Lisewski, 2004). In the current study, TS is necessary to reinforce the value of using online learning services due to the very fast shift to online learning caused by the crisis. So, the following hypothesis is proposed H4: TS has a significant and positive impact on PEU of online learning.

### Hypothesis 5: Perceived Usefulness (PU) and Attitude (ATT)

PU is defined as the degree to which person can utilize a particular innovation to increase users' job achievement (Davis, 1989). This construct is identical to other constructs, like "relative advantage" in the DOI (Rogers, 2010), and "effort expectancy" in the UTAUT (Venkatesh et al., 2003). Focusing on the current crisis, PU refers to the extent to which students believe that the utilization of online learning will enhance their learning process and will boost their learning performance. So, the following hypothesis is proposed H5: PU has a significant and positive impact on learners' ATTs.

### Hypothesis 6: Perceived Ease of Use PEU and Attitude (ATT)

PEU's is the degree to which users presume that understanding and learning innovation is easy and effortless (Davis, 1989). This construct is the same as the effort expectancy in the UTAUT (Venkatesh et al., 2003) and to "complexity" in the DOI Theory (Rogers, 2010). The complexity of online learning systems depends on how easy it is to perform the key learning functionalities. The easier it is to perform these functionalities, the lower the level of complexity, and the easier the perception of system advantages. In this study, PEU is learners' perceptions that the use of online learning is possible without physical and mental effort. Accordingly, if the learners feel that using an online learning platform requires less mental and physical effort and can be simply and easily used, their ATT towards using online learning are greater; hence, we suggest H6: PEU has a positive impact on students' ATT towards online learning adoption.

### Hypothesis 7: Attitude (ATT ) and Contious Intention (CI)

Davis et al. (1989) defined ATT as "an individual's overall affective reaction to using innovation". However, continued use intentions can be defined as "the level of users' belief that he or she will keep using the innovation (Venkatesh et al., 2003). Icek (1991) proposed that the more favorable students' ATT towards using an online learning system, the greater their CI would be. The TAM presumes that PU and PEU positively influence the ATT, which refers to a user's assessments and evaluation regarding system usage. According to Shih( 2004), ATT describes general users' feelings of favor or disfavor toward a specific behavior. Consequently, we suggest the following H7: ATTs toward online learning services are significant and positively associated with CI.

Number	Hypothesis details
H1	SEC has a significant positive impact on the PU of online learning.
H2	CON has a significant positive impact on the PU of online learning.
H3	TR has a significant and positive impact on PEU of online learning.
H4	TS has a significant and positive impact on PEU of online learning
H5	PU has a significant and positive impact on learners' ATTs
H6	PEU has a positive impact on students' ATTs towards online learning adoption.
H7	ATTs toward online learning services are significant and positively associated with CI.

#### Table 1. Summary of the Hypothesis



Figure 1. The Research Model

### **RESEARCH METHODOLOGY**

For data gathering, we utilized a questionnaire tool to assess the eight basic variables in the research model (SEC, CON, TR, PU, TS, PEU, ATT & CI). We adopted a five-point Likert scale (1 to represent: strongly disagree and 5 to represent: strongly agree) for the basic factors in the research model. To assure the credibility of the utilized questionnaire, the questions were adapted from previous studies. Following that, survey questions were evaluated by five experts in the education and information system fields. The research was performed with the involvement of 310 participants (IAU). As the participants of the survey are students in a higher education institution, we did not need to translate the questionnaire to the Arabic language . The questionnaire was sent to students through their emails and they were encouraged to fill it by their instructors. The questionnaire contains two parts. In the first part, demographic information was needed to segment the data and classify the respondents. This part gathered information regarding age, gender, education level, see table 2. The purpose of the second part was to assess the factors affecting continuous intention to use online learning based on the conceptual model factors, see table 7 in Appendix 1. The validity and reliability of the results were evaluated using partial least square (PLS) software, by considering the values of Composite Reliability(CR) (0.7), Cronbach's Alpha(CA) (0.7), Average Variance Extracted (AVE) (0.5), and Loading Factor (0.7) (Hair et al., 2013).

	ltem	Frequency	Percent
Condor	Female	150	48.3
Gender	Male	160	51.6
Age	18-20	70	22.5
	21-30	190	61.2
	>30	50	16.1
Academic level	undergraduate	220	70.9
	Postgraduate	90	29.0

#### Table 2. Demographic Results of the Participants (N=310)

#### EMPIRICAL RESULTS

#### **Measurement Model Analysis**

Referring to Hair et al. (2013) all research variables, SEC, CON, TR, TS, ATT, PU, PEU, and CI, were examined in terms of CA, and AVE tests. CA measure was used to evaluate the reliability of the multiindicator variables. The resulted outcomes of the CA test varied between 0.734 to 0.929, presenting sufficient reliability for each research variable Hair et al., (2013). As presented in Table 5, the CR test result was more than 0.7 for all research variables, supporting the internal consistency of the variable items. Assessing the convergent validity of research variables was established using AVE and outer loading measures. The AVE was higher than 0.5, affirming the latent variables' explanatory power of the presented variables. The indicator loadings were inspected to assess the reliability of the variable for research measurement. The loading of each indicator needs to achieve a result of at least 0.70 to fulfill the indicator reliability condition (Hair et al., 2013). In the resulted outcome, only one item (CON 5) did not achieve the outer loading condition. Still, following Hair et al. (2013) suggestions, we decided to keep the item for further analysis, as deleting this item will not impact the result of CA and CR tests. The Discriminant validity was inspected by two main tests: the Fornel-Larker criterion and cross-loadings tests. In the Fornel-Larker criterion, the outcomes of the square roots for each factor's AVE need to be higher than the correlation with other variables. In the crossloadings evaluation of the indicators, the loading of each index in any variable needs to load more highly than the cross-loadings on other variables. The above-mentioned indicators supported that the research model of this research can be utilized to inspect the collected data (Table 6).

### **Structural Model Analysis**

After affirming the validity and reliability of the variables model, the paths model should be analyzed carefully. A bootstrapping method was applied to obtain the t-values and p-values (Hair et al. 2015). These measures can aid the researcher to check the degree of the impact of the coefficients. The path test outcomes are displayed in Table 3. All the paths in the research model are statistically accepted. Additionally, the predictive power of the research model is identified using the coefficients of the determination test (R2). R2 defines the ratio of contrast in an endogenous variable, which can be reflected by its exogenous variables (Hair et al. 2015). The R2 measures for the endogenous variables have values in the 0-1 range. The findings of the coefficients of the determination test are demonstrated in Table 4. The measures of R2 fall between 0.434 to 0.662, highlighting more predictive accuracy with increasing measures (Hair et al. 2015).

The effect size test inspects each exogenous variable, by the means of the power of its share to explain a specific endogenous factor using the R2 indicator. Cohen (1988) recommended that if the f 2 result is within the 0.02-0.15 range, the influence is little. The effect is moderate if the result of the effect size is within the 0.15-0.35 interval. On the other hand, if the f 2 outcome is more than 0.35, the impact is high. Table 4 presents the effect sizes.



Figure 2. The Final Research Model

Table 3.	Path	Analysis	Output
----------	------	----------	--------

Hypotheses	Original Sample (O)	Sample Mean (M)	STDEV	T-Values	P-Values			
ATT -> CI	0.813	0.813	0.024	33.279	0.000	Accepted **		
CON -> PU	0.386	0.384	0.073	5.302	0.000	Accepted **		
PEU -> ATT	0.185	0.192	0.046	4.051	0.000	Accepted **		
PU -> ATT	0.551	0.548	0.046	12.068	0.000	Accepted **		
SEC -> PU	0.403	0.409	0.076	5.315	0.000	Accepted **		
TS-> PEU	0.225	0.224	0.053	4.204	0.000	Accepted **		
TR -> PEU	0.546	0.553	0.052	10.513	0.000	Accepted **		
Significant at Degree= * <0.05, ** <0.01								

Table 4. F-Squares and R-Squares Results

	ATT	CI	PEU	PU	R Square	R Square Adjusted
ATT		1.956			0.434	0.430
CI					0.662	0.661
CON				0.155	0.438	0.434
PEU	0.047				0.535	0.532
PU	0.417					
SEC				0.168		
TS			0.078			
TR			0.461			

#### DISCUSSION

The goal of this research is to present a new research model that integrates SVT, TOE with the TAM model to investigate the variables that affect students' behavioral continous intentions to use online learning systems during the COVID-19 pandemic. Based on the proposed model, we investigated the relationships among research factors as follows: conservation values (SEC, CON and the PU, organizational support (TS, TR) and the PEU, and the relationship between PU, PEU, and students' CI through the mediation of students' ATT. In general, the outcomes supported the suggested hypotheses. The major results of this research are as follows: First, the measurement model result shows an immense and positive effect of the SEC on the PU. The results ( $\beta = 0.403$ , t-value = 5.315, p < 0.05) provided proof to reinforce this hypothesis. Therefore, the PU of online learning is profoundly influenced by SEC, and H1 is supported. It could be inferred that students appreciate the online learning system that meets their SEC needs. SEC is a key factor to promote students' perception of the system's usefulness during COVID-19. This study confirms prior studies' outcomes that indicate the significant role of online learning during a political crisis (Aldikanji & Ajami, 2016; Rhema & Miliszewska, 2012). On the other hand, during COVID-19, students consider the online learning system as being better and safer than the traditional learning approaches, which can enhance their perception of the usefulness of the system (Chang & Tung, 2008; Lee et al., 2011; Wu & Wang, 2005). Our finding contradicts Mehta et al. (2019) study, in which the influence of CON and SEC was insignificant, when learners recognize e-learning as an optional choice, but not obligatory, and there is no clear compensation nor disciplinary measures, SEC and CON may not be important in job environment. Furthermore, if the accomplishment obtained through e-learning has no direct reward related to job professional advancement, CON and SEC will not be essential in deciding e-learning adoption. A similar argument was presented by Liu et al.(2010) study, in which no proof was acknowledged to reinforce the correlation between SEC and ICT acceptance, indicating SEC might not be regarded as vital in some contexts. Moreover, this outcome agrees with Bagchi et al. (2015) study, in which the authors indicated that the most related type of Schwartz values is SEC. Considering the use of the Internet, SEC is considered to be steering the behavior of individuals.

The assessment model result demonstrates a considerable and positive effect of CON on PU. The result ( $\beta$ = 0.386, t value = 5.302, p < 0.05) provides the proof to support Hypothesis 2. So, CON has a positive and considerable influence on PU. CON has a favorable effect on PU because following organizational policy and confirming its instructions, in the situation of the mandatory usage of the e-learning program in the educational institution, can improve the PU of the e-learning. Learners who use e-learning to achieve their learning objectives, endorsed by decision-makers support in their organizations, will utilize the required time and effort to achieve their tasks by using the system. The result of this study demonstrates that the strength of the impact of conforming to authority rules and public safety policies is impacted by the government rules followed by most institutions in the country, including HEIs, to avoid students' exposure to the COVID-19 risk. The COVID-19 pandemic has a huge impact on increasing the importance of using online learning as a tool for public safety. The influence of CON can be developed if students believe in the necessity and importance of using online learning in compliance with the HEIs/government's instructions, which include quarantine rules for a long period.

The measurement model result shows a remarkable impact of the TR on PEU. The results ( $\beta = 0.546$ , t-value = 10.513, p < 0.05) provided the evidence to support hypothesis 3. Therefore, the PEU of online learning is significantly shaped by the presented TR. The result runs consistently with previous studies' outcomes (Amoako-Gyampah & Salam, 2004; C et al., 2015; Kerimoglu et al., 2008). TR of users allows them to comprehend the technical and functional perspectives of an online learning system and allows them to gain the required information and experience. By supporting students to be well-educated, experienced, and responsible; students can effectively use the online learning system. Thus, it becomes viable for them to use and realize its benefit in the learning process and increases their performance. Thus, top managers in HEIs should design compelling and functional TR modules so that online learning can be successfully adopted by their students. This boosts the essential technical requirements and develops a constant intention twards online learning as a risk prevention mechanism.

Fourth, the result of this study shows that TS plays a crucial part in the adoption of online learning. As Hypothesis 4 indicates, TS significantly affects PEU. The results ( $\beta$  = 0.225, t-value = 4.204, p < 0.05)

provided the evidence to support this H4. The result of this study supports previous literature (Gangwar et al., 2015; Low et al., 2011; Ramdani et al., 2009; Schillewaert et al., 2005; Teo et al., 2009). This result is consistent with the result presented by Lee et al. (2011), which indicated that TS facilitates the use of electronic learning systems. Thus, users tend to perceive the online learning system as easy to use if TS is presented. The study of Konradt et al. (2006) found that TS impacts the PEU of system technology. As indicated by Venkatesh(1999), during the initial stages of learning and system usage, TS will impact the PEU of the system positively. The educational institution's top management plays a vital role in persuading their students with their policies and guiding their e-learning practices. E-learning requires diligent and constant support for designing a conducive online learning environment (like providing the needed resources). Thus, top managers must recognize the role of technology in enhancing the performance of the organization, overcoming the performance gaps, and seizing the opportunities. This is particularly vital during the COVID-19 pandemic where online learning adoption is exploited by top management as a safety tool. Thus, TS is an essential factor to be considered for online learning adoption during a crisis.

Fifth, the result of this study suggests that PU has a considerable impact ( $\beta = 0.551$ , t-value = 12.068, p < 0.05) on the ATT towards adopting online learning. The result is in alignment with several prior TAM studies, which highlighted that PU is a critical determinant of technology adoption and directly influences users' ATT and behavioral intention (Boateng et al., 2016; Chau & Hu, 2002; Davis, 1989; Keil et al., 1995; Ong & Lai, 2006; Purnomo & Lee, 2013; Venkatesh & Davis, 2000). Those scholarly works illustrated that PU impacts intention to use directly through user ATTs.

Sixth, according to the results obtained from the measurement model, PEU affects the ATT towards adopting online learning positively. Based on the results ( $\beta = 0.185$ , t-value = 4.051, p < 0.05), hypothesis 6 is supported. This was also confirmed by Sanchez et al. (2013) study, in which better technical service support or aid provided to students, to assess in solving their issues, has impacted their perception towards the e-learning platform usage. The problem can be increased if top management fails to present suitable support. Therefore, top management should select an online learning system carefully and should offer the technical support that enables learners to gain competence and confidence in carrying out the required class activities.

Finally, a hypothesized path between ATT towards using online learning and CI to use has been established and a direct relationship is supported by this study. However, mixed results, considering this hypothesis, have been indicted in the literature. For example, Davis(1989) asserted that introducing the benefits of technology explicitly, in a user-friendly manner, enables users who lack a positive viewpoint about technology to use it. Thus, in the technology acceptance context, the role of ATT towards usage is modest in this case. Additionally, Al-hawari & Mouakket (2010) did not support the immediate influence of ATT on the adoption of technology. this result also confirms Ong & Lai's( 2006) study and contradicts the result obtained by Cheung & Vogel( 2013). in which PU was found to be the most determinant trigger of behavioral intention towards online learning.

### **RESEARCH CONTRIBUTIONS AND IMPLICATIONS**

This study supports the online learning adoption research and asserts previous findings from the literature. It entails implications for students, HEIs, and online learning providers. Its contributions are discussed further from theoretical and practical aspects in the following sections:

### **Theoretical Contribution**

This study manifests the key constructs that trigger students to adopt online learning during the COVID-19 crisis. The development of a validated model is a major contribution to online learning literature. The proposed research model integrates SVR, TOE with TAM. Constructs derived from the literature contribute towards a better perception of the CI to use online learning. The TAM model has been widely utilized in interpreting users' behavioral intention to use technology, still, a few studies validated the TAM model in the context of human values(Mehta et al., 2019). There are mixed pieces of evidence regarding the greater expository capacity of integrating SVR with TAM. It was determined by Mehta et al. (2019). first, human

values give tremendous power to the TAM to explain behaviors. This represents a remarkable contribution considering the existence of conservation values (CON, SEC) in the online learning context. The results suggest that students with a higher initial level of CON to authority and SEC tended to perceive online learning systems as useful during a crisis like the COVID-19 pandemic more than others. Moreover, this study extended TAM by employing a set of TOE variables related to continuous intention to use online learning. both TS and TR are critical factors influencing continuous intention to use online learning system during crisis. The successful continuous intention to use online learning relies on the competency of top management in creating an environment of trust. It should take serious measures to ensure that senior management, and support to prompt adopters of online learning. Findings show that PU, PEU, conservation values (SEC, CON), and organizational support (TR, TS) are important determinants for online learning adoption.

### **Practical Contribution**

SEC has major implications for the CI to use online learning during COVID-19. Online learning that is perceived as yielding high SEC is more likely to increase the CI to use online learning. Students should ensure that adopting online learning is all perceived as highly valuable to them. Practitioners implementing online learning in the educational process should also be aware of the link between perceived SEC and the PU of electronic learning during a crisis like COVID-19. Accordingly, top management in higher education institutions should invest further in technology to enable this shift from traditional learning style to remote education, this will lead to developing learning processes during the crisis and enhance access to the learning resources (Marinoni et al., 2020). it is advised that top management should seek to engage early in promoting online learning through positive word-of-mouth. Making online learning a mandatory choice is another recommended approach that top management can use. this will assist in informing novice users about the possible advantages of using online learning systems which will consequently increase their perceptions about how technology helps during the crisis period.

Also, the CI to use online education will refine the learning process, bridging the gap between rural and urban regions, and will help to meet education targeted visions. Moreover, the awareness of the importance of the TR in education should be considered by the top managers, they should provide adequate time and resources to train students, teachers, even parents on how to use online learning. TR is very essential in building self-esteem and presents users with adequate experience in utilizing electronic platforms. Teachers and instructors need to be trained not only on how to use the technology but also how to organize and deliver the material (Polloff & Pratt, 2001; G. Singh & Hardaker, 2014). Top management should reflect on their higher educational vision and mission to ensure the quality of their online learning subject matter by offering sufficient cutting-edge content that meets students' needs and the quality of learning outcomes (Rashid & Yadav, 2020). failing to offer the TR in terms of technology usage and the effectiveness of incorporating the innovation into the curriculum will negatively influence the CI to use online learning (Gulbahar, 2007; G. Singh & Hardaker, 2014; Surry et al., 2005). Moreover, top managers and policymakers should have follow-up plans for the further development of online learning platforms. Besides, they must maintain collaboration with the government and institutions to overcome the digital divide deficiency and make the online learning services more accessible, dependable, and affordable, also they should enhance the readiness of HEIs for any emergency cases.

### LIMITATION AND FUTURE WORK

This study has many restrictions, first, the population is specific merely to students at a higher educational level. Therefore, applying the outcomes of this study to students at the secondary level or lower requires caution, as the factors may vary with the age and level of students. Given the increasing importance of online learning technologies for schools during the COVID-19, and the considerable variations between graduated students and secondary level or lower students, however, CI to use online learning by lower-level students' grow over time and requires deep exploration. Second, the generalization of the conclusion and findings of

the study is limited. Although the research methodology chosen to fulfill the research goals of this study was sufficient, still, it was restricted to the questionnaire and online survey method for data collection. Choosing alternative data-gathering techniques like interviews or both qualitative and quantitative methods may result in various outcomes. Third, students from private sectors are not included in the sample. This restricts the generalizability of this study to other communities. Furthermore, the data, which is restricted to online learning during the COVID-19, was gathered in a limited base.

**Acknowledgements:** The authors would like to thank the participants who filled the study survey.

### **BIODATA AND CONTACT ADDRESSES OF AUTHORS**



**Shaden Ahmad MASADEH** is a lecturer at Imam Abdulrahman Bin Faisal University, Faculty of Computing, Saudi Arabia. She completed her undergraduate studies in the department of Computer Information Systems (CIS) at Jordan university of science and technology. She has a master's degree in Information Systems (Minor in Management Information System MIS) from Yarmouk University in Jordan (2012). Her main research interests are primarily in human-computer interaction, health information systems, the Internet of Things, the field of distance education environments, and the adoption of artificial intelligence tools in education.

Computer Department, Applied College. Address: Imam Abdulrahman Bin Faisal University, P.O.Box 1982, 31441, City of Dammam, Saudi Arabia Phone: +(966) 582639041 E-mail: samasadeh@iau.edu.sa



**Dr. Rabab ABUMALLOH** currently works as a lecturer at Imam Abdulrahman Bin Faisal University, Faculty of Computing, Saudi Arabia. She has recently finished her Ph.D. study at Universiti Teknologi Malaysia. She has authored and co-authored over 16 papers in international refereed journals. Her research interests include recommender systems, tourism management, electronic vehicles, e-learning, and Green IT/IS. Her works have been published in Technology in Society, Telematics and Informatics, Journal of Retailing and Consumer Services, International Journal of Environmental Science and Technology, and Journal of Trace Elements in Medicine, Biology, and Sustainability.

Rabab ABUMALLOH Computer Department, Applied College Address: Imam Abdulrahman Bin Faisal University, P.O. Box. 1982, Dammam, Saudi Arabi Phone: +966540058331, E-mail: ramolloh@iau.edu.sa



**Noha Siraj LABANI** is a lecturer at Imam Abdulrahman Bin Faisal University, Saudi Arabia. Noha is a Ph.D. student in the English department (writing, rhetorics, and literacies) at Arizona State University in Tempe, Arizona. As a doctoral student and a fellow in the Global Human Rights Hub, 2022-2023 at ASU her research interests revolve around the issues of education access and social justice, especially the case of the Syrian refugees. She enjoys exploring creative and technological means like appropriate technology, drama, and digital storytelling. She also works with the SoalrSPELL initiative at ASU, a global education initiative using solar-powered offline technology. She assists in many aspects of curating the Middle East library especially in creating Arabic training program from a UX and

culturally responsive perspective. Part of her research agenda is developing research-based frameworks for humanitarian aid agencies to better serve their users/beneficiaries.

Noha Siraj LABANI English Department Address: Arizona State University, Tempe, United States Phone: +1(602) 860-1995 E-mail: nlabani@asu.edu

#### REFERENCES

- Agasisti, T., & Soncin, M. (2021). Studies in Higher Education Higher education in troubled times : on the impact of Covid-19 in Italy. https://doi.org/10.1080/03075079.2020.1859689
- Ahmad, W., & Sun, J. (2018). Antecedents of SMMA continuance intention in two culturally diverse countries : An empirical examination. *Journal of Global Information Technology Management*, 21(1), 45–68. https://doi.org/10.1080/1097198X.2018.1423840
- Al-hawari, M. A., & Mouakket, S. (2010). The influence of technology acceptance model (TAM) factors on students' e-satisfaction and e-retention within the context of UAE e-learning. *Education, Business and Society: Contemporary Middle Eastern Issues*, 3(4), 299–314. https://doi. org/10.1108/17537981011089596
- Aldikanji, E., & Ajami, K. (2016). Studying Academic Indicators within Virtual Learning Environment Using Educational Data Mining. *International Journal of Data Mining & Knowledge Management* Process, 6(6), 29–42. https://doi.org/10.5121/ijdkp.2016.6603
- Alqahtani, F. N. (2016). Identifying the Critical Factors that Impact on the Development of Electronic Government using TOE Framework in Saudi E-Government Context: A Thematic Analysis. PQDT - UK & Ireland, October, 270.
- Alves, P., Miranda, L., & Morais, C. (2017). The Influence of Virtual Learning Environments in Students' Performance. Universal Journal of Educational Research, 5(3), 517–527. https://doi.org/10.13189/ ujer.2017.050325
- Amoako-Gyampah, K., & Salam, A. F. (2004). An extension of the technology acceptance model in an ERP implementation environment. *Information and Management*, 41(6), 731–745. https://doi. org/10.1016/j.im.2003.08.010
- Arpaci, I. (2017). Antecedents and consequences of cloud computing adoption in education to achieve knowledge management. *Computers in Human Behavior*, 70, 382–390. https://doi.org/10.1016/j. chb.2017.01.024
- Asoodar, M., Vaezi, S., & Izanloo, B. (2016). Framework to improve e-learner satisfaction and further strengthen e-learning implementation. *Computers in Human Behavior*, 63, 704–716. https://doi.org/10.1016/j.chb.2016.05.060

- Awa, H. O., Ojiabo, O. U., & Emecheta, B. C. (2015). Integrating TAM, TPB and TOE frameworks and expanding their characteristic constructs for e-commerce adoption by SMEs. *Journal of Science & Technology Policy Management*, 6(1), 76–94. https://doi.org/10.1108/JSTPM-04-2014-0012
- Babu, S. C., Ferguson, J., Parsai, N., & Almoguera, R. (2013). Open distance learning for development: Lessons from strengthening research capacity on gender, crisis prevention, and recovery. *International Review of Research in Open and Distance Learning*, 14(5), 27–50. https://doi. org/10.19173/irrodl.v14i5.1611
- Bagchi, K. K., Udo, G. J., Kirs, P. J., & Choden, K. (2015). Internet use and human values: Analyses of developing and developed countries. *Computers in Human Behavior*, 50, 76–90. https://doi. org/10.1016/j.chb.2015.03.055
- 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. https://doi.org/10.1016/j.chb.2015.04.024
- Binyamin, S. S., Rutter, M. J., & Smith, S. (2019). Extending the technology acceptance model to understand students' use of learning management systems in Saudi higher education. *International Journal of Emerging Technologies in Learning*, 14(3), 4–21. https://doi.org/10.3991/ijet.v14i03.9732
- Boateng, R., Mbrokoh, A. S., Boateng, L., Senyo, P. K., & Ansong, E. (2016). Determinants of e-learning adoption among students of developing countries. *International Journal of Information and Learning Technology*, 33(4), 248–262. https://doi.org/10.1108/IJILT-02-2016-0008
- Boer, D., & Fischer, R. (2013). How and when do personal values guide our attitudes and saociality? Explaining cross-cultural variability in attitude–value linkages. *Psychological Bulletin*, 139(5), 1113.
- Borgman, H. P., Bahli, B., Heier, H., & Schewski, F. (2013). Cloudrise: Exploring cloud computing adoption and governance with the TOE framework. *Proceedings of the Annual Hawaii International Conference on System Sciences*, 4425–4435. https://doi.org/10.1109/HICSS.2013.132
- C, H., Date, H., & Ramaswamy, R. (2015). Understanding determinants of cloud computing adoption using an integrated TAM-TOE model. *Journal of Enterprise Information Management*, 28(1), 107– 130. https://doi.org/10.1108/JEIM-08-2013-0065
- Chang, S. C., & Tung, F. C. (2008). An empirical investigation of students' behavioural intentions to use the online learning course websites. *British Journal of Educational Technology*, 39(1), 71–83. https:// doi.org/10.1111/j.1467-8535.2007.00742.x
- Chau, P. Y. K., & Hu, P. J. H. (2002). Investigating healthcare professionals' decisions to accept telemedicine technology: An empirical test of competing theories. *Information and Management*, 39(4), 297– 311. https://doi.org/10.1016/S0378-7206(01)00098-2
- Chau, P. Y. K., & Tam, K. Y. (1997). Factors affecting the adoption of open systems: An exploratory study. *MIS Quarterly: Management Information Systems*, 21(1), 1–20. https://doi.org/10.2307/249740
- Cheng, B., Wang, M., Yang, S. J. H., Kinshuk, & Peng, J. (2011). Acceptance of competency-based workplace e-learning systems: Effects of individual and peer learning support. *Computers and Education*, 57(1), 1317–1333. https://doi.org/10.1016/j.compedu.2011.01.018
- Cheung, R., & Vogel, D. (2013). Predicting user acceptance of collaborative technologies: An extension of the technology acceptance model for e-learning. *Computers and Education*, 63, 160–175. https:// doi.org/10.1016/j.compedu.2012.12.003
- Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences. Routledge.
- Davidov, E., Schmidt, P., & Schwartz, S. H. (2008). Bringing values back in: The adequacy of the European Social Survey to measure values in 20 countries. *Public Opinion Quarterly*, *72*(3), 420–445.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly: Management Information Systems, 13(3), 319–339. https://doi. org/10.2307/249008

- 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. https://doi. org/10.1287/mnsc.35.8.982
- Diddi, S., & Niehm, L. S. (2017). Exploring the role of values and norms towards consumers ' intentions to patronize retail apparel brands engaged in corporate social responsibility (CSR). *Fashion and Textiles*. https://doi.org/10.1186/s40691-017-0086-0
- Eseroghene, U., & Ahmad, A. (2018). The Impact of E-Learning on Academic Performance: Preliminary Examination of King Khalid University. *International Journal of Academic Research in Progressive Education and Development*, 7(71), 83–96. https://doi.org/10.6007/IJARPED/v7-i1/3903
- Freitas, S. De, Oliver, M., Freitas, S. De, & Oliver, M. (2006). Does E learning Policy Drive Change in Higher Education ?: A case study relating models of organisational change to e - learning implementation Does E-learning Policy Drive Change in Higher Education ?: A case study relating models of organisational cha. 9508, 80–95. https://doi.org/10.1080/13600800500046255
- Friedrich-Baasner, G., Fischer, M., & Winkelmann, A. (2018). Cloud Computing in SMEs: A Qualitative Approach to Identify and Evaluate Influential Factors. *Proceedings of the 51st Hawaii International Conference on System Sciences*, 9, 4681–4690. https://doi.org/10.24251/hicss.2018.590
- Gangwar, H., Date, H., & Ramaswamy, R. (2015). Understanding determinants of cloud computing adoption using an integrated TAM-TOE model. *Journal of Enterprise Information Management*, 28(1), 107–130. https://doi.org/10.1108/JEIM-08-2013-0065
- Gao, Q., Hu, Y., Dai, Z., Xiao, F., Wang, J., & Wu, J. (2020). The Epidemiological Characteristics of 2019 Novel Coronavirus Diseases (COVID-19) in Jingmen, China. SSRN Electronic Journal, 2(8), 113–122. https://doi.org/10.2139/ssrn.3548755
- Garay, L. (2019). Heliyon Analysis of the third-order structuring of Shalom Schwartz 's theory of basic human values n. 5(November 2018), 1–7. https://doi.org/10.1016/j.heliyon.2019.e01797
- Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and tam in online shopping: AN integrated model. *MIS Quarterly: Management Information Systems*, 27(1), 51–90.
- Goncalves, G., Oliveira, T., & Cruz-Jesus, F. (2018). Understanding individual-level digital divide: Evidence of an African country. *Computers in Human Behavior*, 87(March), 276–291. https://doi. org/10.1016/j.chb.2018.05.039
- Goyal, G., Phukan, A. C., Hussain, M., Lal, V., Modi, M., Goyal, M. K., & Sehgal, R. (2019). Correlation Between Weather and Covid-19 Pandemic in Jakarta, Indonesia. *Journal of the Neurological Sciences*, 116544. https://doi.org/10.1016/j.jns.2019.116544
- Grigoryan, L. K., Lebedeva, N., & Breugelmans, S. M. (2018a). A Cross-Cultural Study of the Mediating Role of Implicit Theories of Innovativeness in the Relationship Between Values and Attitudes Toward Innovation. *Journal of Cross-Cultural Psychology*, 49(2), 336–352. https://doi. org/10.1177/0022022116656399
- Grigoryan, L. K., Lebedeva, N., & Breugelmans, S. M. (2018b). A Cross-Cultural Study of the Mediating Role of Implicit Theories of Innovativeness in the Relationship Between Values and Attitudes Toward Innovation. https://doi.org/10.1177/0022022116656399
- Gulbahar, Y. (2007). Technology planning: A roadmap to successful technology integration in schools. Computers and Education, 49(4), 943–956. https://doi.org/10.1016/j.compedu.2005.12.002
- Hair, J., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2013). A Primer on Partial Least Squares Structural Equation Modeling. In *Sage publications* (Vol. 46, Issues 1–2). SAGE Publications Inc. https://doi. org/10.1016/j.lrp.2013.01.002
- Icek, A. (1991). The Theory of Planned Behavior Organizational Behavior and Human Decision Processes. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.

- Igbaria, M., & Angele, L. M. (1997). Personal computing acceptance factors in small firms : A structural equation model.
- January, S. (2020). Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. *The COVID-19 Resource Centre Is Hosted on Elsevier Connect, the Company's Public News and Information.*
- Jeyaraj, A., Rottman, J. W., & Lacity, M. C. (2006). A review of the predictors, linkages, and biases in IT innovation adoption research. *Journal of Information Technology*, 21(1), 1–23. https://doi.org/10.1057/palgrave.jit.2000056
- Journal, S., Support, T., & Park, S. Y. (2009). International Forum of Educational Technology & Society An Analysis of the Technology Acceptance Model in Understanding University Students 'Behavioral Intention to Use e-Learning Author (s): Sung Youl Park Published by : International Forum of Educati. 12(3).
- Keil, M., Beranek, P. M., & Konsynski, B. R. (1995). Usefulness and ease of use: field study evidence regarding task considerations. *Decision Support Systems*, 13(1), 75–91. https://doi.org/10.1016/0167-9236(94)E0032-M
- Kerimoglu, O., Basoglu, N., & Daim, T. (2008). Organizational adoption of information technologies: Case of enterprise resource planning systems. *Journal of High Technology Management Research*, 19(1), 21–35. https://doi.org/10.1016/j.hitech.2008.06.002
- Khachfe, H. H., Chahrour, M., Sammouri, J., Salhab, H. A., Makki, B. E., & Fares, M. Y. (2020). An Epidemiological Study on COVID-19: A Rapidly Spreading Disease. *Cureus, March.* https://doi. org/10.7759/cureus.7313
- King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information & Management*, 43(6), 740–755.
- Konradt, U., Christophersen, T., & Schaeffer-Kuelz, U. (2006). Predicting user satisfaction, strain and system usage of employee self-services. *International Journal of Human Computer Studies*, 64(11), 1141–1153. https://doi.org/10.1016/j.ijhcs.2006.07.001
- Kummer, T. F., Recker, J., & Bick, M. (2017). Technology-induced anxiety: Manifestations, cultural influences, and its effect on the adoption of sensor-based technology in German and Australian hospitals. *Information and Management*, 54(1), 73–89. https://doi.org/10.1016/j.im.2016.04.002
- Lee, Y. H., Hsieh, Y. C., & Hsu, C. N. (2011). Adding innovation diffusion theory to the technology acceptance model: Supporting employees' intentions to use e-learning systems. *Educational Technology and Society*, 14(4), 124–137.
- Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information and Management*, 40(3), 191–204. https://doi.org/10.1016/S0378-7206(01)00143-4
- Lian, J. W., Yen, D. C., & Wang, Y. T. (2014). An exploratory study to understand the critical factors affecting the decision to adopt cloud computing in Taiwan hospital. *International Journal of Information Management*, 34(1), 28–36. https://doi.org/10.1016/j.ijinfomgt.2013.09.004
- Liang, Y., Qi, G., Wei, K., & Chen, J. (2017). Exploring the determinant and influence mechanism of e-Government cloud adoption in government agencies in China. *Government Information Quarterly*, 34(3), 481–495. https://doi.org/10.1016/j.giq.2017.06.002
- Liaw, S.-S. (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers & Education*, 51(2), 864–873. https://doi.org/10.1016/j.compedu.2007.09.005
- Lisewski, B. (2004). *Implementing a learning technology strategy : top down strategy meets bottom up culture*. *12*(2). https://doi.org/10.1080/0968776042000216228

- Liu, I. F., Chen, M. C., Sun, Y. S., Wible, D., & Kuo, C. H. (2010). Extending the TAM model to explore the factors that affect Intention to Use an Online Learning Community. *Computers and Education*, 54(2), 600–610. https://doi.org/10.1016/j.compedu.2009.09.009
- Low, C., Chen, Y., & Wu, M. (2011). Understanding the determinants of cloud computing adoption. *Industrial Management and Data Systems*, 111(7), 1006–1023. https://doi.org/10.1108/02635571111161262
- Marinoni, G., Van't Land, H., & Jensen, T. (2020). The impact of Covid-19 on higher education around the world. *IAU Global Survey Report*.
- Mehta, A., Morris, N. P., Swinnerton, B., & Homer, M. (2019). The Influence of Values on E-learning Adoption. *Computers & Education*, 141(December 2018), 103617. https://doi.org/10.1016/j. compedu.2019.103617
- Mohd Sharif, M. H., Rosli, K., & Ahmi, A. (2017). A Model of Social Media Adoption and Impact on Malaysian Small and Medium-sized Enterprises (SMEs). Proceedings of the 4th International Conference on E-Commerce (ICoEC) 2017, 148–152.
- Molnar, A., Miron, G., Elgeberi, N., Barbour, M. K., Huerta, L., Shafer, S. R., & Rice, J. K. (2019). Virtual Schools in the U.S. 2019. 0249(May).
- Mtingwi, M. (2015). E-Education adoption in emerging economy countries: Case of Malawi. 2015 IST-Africa Conference, IST-Africa 2015, 1–9. https://doi.org/10.1109/ISTAFRICA.2015.7190567
- Oliveira, T., & Martins, M. F. (2009). Firms patterns of -business adoption: Evidence for the European union-27. *Proceedings of the 3rd European Conference on Information Management and Evaluation*, *ECIME 2009*, 13(1), 371–379.
- Ong, C. S., & Lai, J. Y. (2006). Gender differences in perceptions and relationships among dominants of e-learning acceptance. *Computers in Human Behavior*, 22(5), 816–829. https://doi.org/10.1016/j. chb.2004.03.006
- Pahnila, S., Siponen, M., Myyry, L., & Zheng, X. (2011). the Influence of Individualistic and Collectivistic Values To Utaut: the Case of the Chinese Ebay. *Ecis*, 2011.
- Panigrahi, R., Srivastava, P. R., & Sharma, D. (2018). Online learning: Adoption, continuance, and learning outcome—A review of literature. *International Journal of Information Management*, 43(July 2016), 1–14. https://doi.org/10.1016/j.ijinfomgt.2018.05.005
- Partala, T., & Saari, T. (2015). Understanding the most influential user experiences in successful and unsuccessful technology adoptions. *Computers in Human Behavior*, 53, 381–395.
- Polloff, R. M., & Pratt, K. (2001). Lessons from the cyberspace classroom. *The Realities of Online Teaching.* San Francisco: Jossey-Bass.
- Price, L., Richardson, J. T. E., Jelfs, A., Price, L., Richardson, J. T. E., & Jelfs, A. (2007). Studies in Higher Education Face - to - face versus online tutoring support in distance education Face-to-face versus online tutoring support in distance education. 5079. https://doi.org/10.1080/03075070601004366
- Purnomo, S. H., & Lee, Y. H. (2013). E-learning adoption in the banking workplace in Indonesia: An empirical study. *Information Development*, 29(2), 138–153. https://doi.org/10.1177/02666666912448258
- Ramdani, B., Kawalek, P., & Lorenzo, O. (2009). Predicting SMEs' adoption of enterprise systems. Journal of Enterprise Information Management, 22, 10–24. https://doi.org/10.1108/17410390910922796
- Rashid, S., & Yadav, S. S. (2020). Impact of Covid-19 Pandemic on Higher Education and Research. 14(2), 340–343. https://doi.org/10.1177/0973703020946700
- Rhema, A., & Miliszewska, I. (2012). The Potential of E-Learning in Assisting Post-Crisis Countries in Re-Building Their Higher Education Systems: The Case of Libya. *Issues in Informing Science and Information Technology*, 9(January 2012), 149–160. https://doi.org/10.28945/1611
- Riyadh, A. N., Akter, S., & Islam, N. (2009). The Adoption of E-banking in Developing Countries : A Theoretical Model for SMEs. *International Review of Business Research Papers*, 5(6), 212–230. https://doi.org/10.1016/j.technovation.2007.10.003

- Rizun, M., & Strzelecki, A. (2020). Students' Acceptance of the COVID-19 Impact on Shifting Higher Education to Distance Learning in Poland. *International Journal of Environmental Research and Public Health*, 17(18), 6468. https://doi.org/10.3390/ijerph17186468
- Rogers, E. M. (2010). Diffusion of innovations. Simon and Schuster.
- Rokeach, M. (1973). *The nature of human values (new editio)*. New York: The Free Press, Macmillan Publishing Co. Inc.
- Salehan, M., Kim, D. J., & Lee, J. N. (2018). Are there any relationships between technology and cultural values? A country-level trend study of the association between information communication technology and cultural values. *Information and Management*, 55(6), 725–745. https://doi. org/10.1016/j.im.2018.03.003
- Salwani, M. I., Marthandan, G., Norzaidi, M. D., & Chong, S. C. (2009). E-commerce usage and business performance in the Malaysian tourism sector: Empirical analysis. *Information Management and Computer Security*, 17(2), 166–185. https://doi.org/10.1108/09685220910964027
- Sanchez, R. A., Hueros, A. D., & Ordaz, M. G. (2013). E-learning and the University of Huelva: A study of WebCT and the technological acceptance model. *Campus-Wide Information Systems*, 30(2), 135–160. https://doi.org/10.1108/10650741311306318
- Saqr, M., Fors, U., & Tedre, M. (2018). How the study of online collaborative learning can guide teachers and predict students' performance in a medical course. *BMC Medical Education*, 18(1), 1–14. https://doi.org/10.1186/s12909-018-1126-1
- Saris, W. E., & Schwartz, S. H. (2013). Operationalizing the Theory of Human Values : Balancing Homogeneity of Reflective Items and Theoretical Coverage. 7(1), 29–44.
- Schillewaert, N., Ahearne, M. J., Frambach, R. T., & Moenaert, R. K. (2005). The adoption of information technology in the sales force. *Industrial Marketing Management*, 34(4 SPEC ISS.), 323–336. https://doi.org/10.1016/j.indmarman.2004.09.013
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, *25*(1), 1–65.
- Schwartz, S. H. (1994). Are There Universal Aspects in the Structure and Contents of Human Values? Journal of Social Issues, 50(4), 19–45. https://doi.org/10.1111/j.1540-4560.1994.tb01196.x
- Schwartz, S. H. (2012). A Proposal for Measuring Value Orientations across Nations. *Core ESS Questionnaire*, 259–319. https://doi.org/10.1111/j.1540-6237.2011.00830.x.Fitting
- Schwartz, S. H., Cieciuch, J., Vecchione, M., Davidov, E., Fischer, R., Beierlein, C., Ramos, A., Verkasalo, M., Lonnqvist, J. E., Demirutku, K., Dirilen-Gumus, O., & Konty, M. (2012). Refining the theory of basic individual values. *Journal of Personality and Social Psychology*, 103(4), 663–688. https://doi.org/10.1037/a0029393
- Seddig, D., & Davidov, E. (2018). Values, Attitudes Toward Interpersonal Violence, and Interpersonal Violent Behavior. 9(May), 1–13. https://doi.org/10.3389/fpsyg.2018.00604
- Senyo, P. K., Effah, J., & Addae, E. (2016). Preliminary insight into cloud computing adoption in a developing country. *Journal of Enterprise Information Management*, 29(4), 505–524. https://doi. org/10.1108/JEIM-09-2014-0094
- Shahzad, F., Xiu, G. Y., Khan, I., Shahbaz, M., Riaz, M. U., & Abbas, A. (2020). The moderating role of intrinsic motivation in cloud computing adoption in online education in a developing country: a structural equation model. *Asia Pacific Education Review*, 21(1), 121–141. https://doi. org/10.1007/s12564-019-09611-2
- Shih, H. P. (2004). Extended technology acceptance model of Internet utilization behavior. *Information and Management*, 41(6), 719–729. https://doi.org/10.1016/j.im.2003.08.009

- Singh, G., & Hardaker, G. (2014). Barriers and enablers to adoption and diffusion of eLearning : A systematic review of the literature - a need for an integrative approach. *Education and Training*, 56(2), 105–121. https://doi.org/10.1108/ET-11-2012-0123
- Singh, R. K. (2013). Analyzing the Factors for VMI Implementation: A Framework. *Global Business Review*, 14(1), 169–186. https://doi.org/10.1177/0972150912466476
- Smith, P. B. (2002). Levels of Analysis in Cross-Cultural Psychology. Online Readings in Psychology and Culture, 2(2), 1–9. https://doi.org/10.9707/2307-0919.1018
- Sohrabi, C., Alsafi, Z., Neill, N. O., Khan, M., & Kerwan, A. (2020). Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information. January.
- Srite, M., & Karahanna, E. (2006). The role of espoused national cultural values in technology acceptance. *MIS Quarterly: Management Information Systems*, *30*(3), 679–704. https://doi.org/10.2307/25148745
- Surry, D. W., Ensminger, D. C., & Haab, M. (2005). A model for integrating instructional technology into higher education. *British Journal of Educational Technology*, *36*(2), 327–329.
- Tantiponganant, P., & Laksitamas, P. (2014). An analysis of the technology acceptance model in understanding students' behavioral intention to use university's social media. Proceedings - 2014 IIAI 3rd International Conference on Advanced Applied Informatics, IIAI-AAI 2014, 12, 8–12. https://doi.org/10.1109/IIAI-AAI.2014.14
- Tarhini, A., Hone, K., Liu, X., & Tarhini, T. (2017). Examining the moderating effect of individual-level cultural values on users' acceptance of E-learning in developing countries: a structural equation modeling of an extended technology acceptance model. *Interactive Learning Environments*, 25(3), 306–328. https://doi.org/10.1080/10494820.2015.1122635
- Taylor, S., & Todd, P. (1995). Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly*, *19*(4), 561. https://doi.org/10.2307/249633
- Teo, T. S. H., Lin, S., & Lai, K. hung. (2009). Adopters and non-adopters of e-procurement in Singapore: An empirical study. *Omega*, 37(5), 972–987. https://doi.org/10.1016/j.omega.2008.11.001
- Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). *Processes of technological innovation*. Lexington books.
- Tweel, A. (2012). Examining the Relationship between Technological, Organizational, and Environmental Factors and Cloud Computing Adoption Dissertation Submitted to Northcentral University Graduate Faculty of the School of Business and Technology Management in Partial Fu. *ProQuest LLC, July*, 164.
- Udo, G. J., Bagchi, K. K., & Kirs, P. J. (2012). Exploring the role of espoused values on e-service adoption: A comparative analysis of the US and Nigerian users. *Computers in Human Behavior*, 28(5), 1768– 1781. https://doi.org/10.1016/j.chb.2012.04.017
- van de Heyde, V., & Siebrits, A. (2019). The ecosystem of e-learning model for higher education. *South African Journal of Science*, 115(5–6), 78–84. https://doi.org/10.17159/sajs.2019/5808
- Venkatesh, V. (1999). Creation of favorable user perceptions: Exploring the role of intrinsic motivation. MIS Quarterly: Management Information Systems, 23(2), 239–260. https://doi.org/10.2307/249753
- Venkatesh, V., & Davis, F. D. (2000). Theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science*, 46(2), 186–204. https://doi.org/10.1287/ mnsc.46.2.186.11926
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly: Management Information Systems*, 27(3), 425– 478. https://doi.org/10.2307/30036540

- Wang, S., & Noe, R. A. (2010). Human Resource Management Review Knowledge sharing : A review and directions for future research. *Human Resource Management Review*, 20(2), 115–131. https://doi. org/10.1016/j.hrmr.2009.10.001
- Wang, Y. M., Wang, Y. S., & Yang, Y. F. (2010). Understanding the determinants of RFID adoption in the manufacturing industry. *Technological Forecasting and Social Change*, 77(5), 803–815. https://doi. org/10.1016/j.techfore.2010.03.006
- Weltman, H. R., Timchenko, V., Sofios, H. E., Ayres, P., & Marcus, N. (2019). Evaluation of an adaptive tutorial supporting the teaching of mathematics. *European Journal of Engineering Education*, 44(5), 787–804. https://doi.org/10.1080/03043797.2018.1513993
- Wu, J. H., & Wang, S. C. (2005). What drives mobile commerce? An empirical evaluation of the revised technology acceptance model. *Information and Management*, 42(5), 719–729. https://doi. org/10.1016/j.im.2004.07.001
- Xie, M., & Chen, Q. (2020). Insight into 2019 novel coronavirus An updated interim review and lessons from SARS-CoV and MERS-CoV. In *International Journal of Infectious Diseases* (Vol. 94, pp. 119– 124). International Society for Infectious Diseases. https://doi.org/10.1016/j.ijid.2020.03.071
- Yilmaz, O. (2015). The effects of "live virtual classroom" on students' achievement and students' opinions about "live virtual classroom" at distance education. *Turkish Online Journal of Educational Technology*, 14(1), 108–115.
- Zhu, K. (2004). The complementarity of information technology infrastructure and E-commerce capability: A Resource-based assessment of their business value. *Journal of Management Information Systems*, 21(1), 167–202. https://doi.org/10.1080/07421222.2004.11045794

## **APPENDIX 1**

Table 5. Constructs' Reliability and Convergent Validity Test (N=310)

Variable	Indicator	Outer Loadings	CA	CR	AVE	
	ATT1	0.877				
	ATT2	0.837				
ATT	ATT3	0.887	0.929	0.946	0.779	
	ATT4	0.910				
	ATT5	0.901				
CL	CI1	0.893				
CI	CI2	0.930	0.873	0.922	0.797	
	CI3	0.854				
	CON1	0.807				
CON	CON2	0.886				
	CON3	0.875	0.907	0.022	0.665	
	CON4	0.860	0.897	0.922	0.665	
	CON5	0.669				
	CON6	0.775				
PEU	PEU1	0.815				
	PEU2	0.855	0.772	0.868	0.686	
	PEU3	0.814				
DU	PU1	0.877				
PU	PU2	0.882	0.841	0.904	0.759	
	PU3	0.854				
тс	TS1	0.884				
15	TS2	0.905	0.855	0.911	0.774	
	TS3	0.849				
	TR1	0.760				
TR	TR2	0.795	0.734	0.848	0.651	
	TR3	0.862				
	SEC1	0.795				
	SEC2	0.795		0.017		
SEC	SEC3	0.864	0.901		0.650	
SEC	SEC4	0.871	0.091	0.917	0.000	
	SEC5	0.716				
	SEC6	0.788				

**Table 6.** Fornell-Larcker Criterion (N=310).

	ATT	CI	CON	PEU	PU	SEC	TS	TR
ATT	0.883							
CI	0.813	0.893						
CON	0.665	0.625	0.816					
PEU	0.445	0.440	0.448	0.828				
PU	0.638	0.623	0.676	0.472	0.871			
SEC	0.644	0.601	0.720	0.433	0.681	0.806		
TS	0.528	0.527	0.620	0.422	0.832	0.607	0.880	
TR	0.431	0.434	0.373	0.628	0.369	0.435	0.362	0.807

Construct		Item	References		
CON	1.	I think that I need to follow what people in leadership ask.	(Mehta et al., 2019;		
	2.	It is vital to me to obey instructions even when no one is monitoring.	Saris & Schwartz, 2013)		
	3.	Following all the rules is significant to me.			
	4.	It is significant to me to prevent disturbing other people			
	5.	I believe it is vital not to disturb anyone.			
	6.	l attempt to be sensitive and assure not to irritate others.			
SEC	7.	I try to prevent anything that might threaten my safety	(Mehta et al., 2019;		
	8.	My security is highly significant to me.	2013)		
	9.	It is significant for me to be in a secure environment.	_		
	10.	It is vital to me that my government defends us against all dangers.			
	11.	I think the government needs to be firm to protect the community.	_		
	12.	We need to have rules and stability in the community.			
TS	13.	Our upper administration considers the adoption of online learning as strategically significant.	(Gangwar et al., 2015; Shahzad et al.,		
	14.	Our upper administration provides powerful direction and shows a culture of broad knowledge sharing.	2020)		
	15.	Our upper administration takes risks entailed in the adoption of online learning			
	16.	The upper administration has the regulations to support the utilization of online learning			
TR	17.	My organization supports me with comprehensive training in using online learning	(Gangwar et al., 2015)		
	18.	The training can enhance my understanding of online learning			
	19.	The training empowers my self-esteem in utilizing online learning			
PU	20.	Online learning would enhance my learning outcomes.	(Tantiponganant &		
	21.	Online learning would raise academic productivity.	Laksitamas, 2014)		
	22.	Online learning easiness the study of course contents.			
PEU	23.	I find the online learning system easy to use	(Tantiponganant &		
	24.	Learning how to use an online learning system is easy	Laksitamas, 2014)		
	25.	It is easy to become proficient at using an online learning system			
	26.	The benefits of using an online learning system were more than the difficulties in operation			
ATT	27.	I believe that adopting online learning is good for the educational process.	(Taylor & Todd,		
	28.	I think that adopting online learning is beneficial for the educational process.	1995)		
	29.	I think that using online learning is wise during COVID-19.			
	30.	I think that using the online system is the best choice during COVID-19.			
	31.	I think that adopting online learning is appropriate during COVID-19.			
CI	32.	If I can access the online learning system, I will continue to use it.	(Davis, 1989;		
	33.	I recommend others to use online learning.	venkatesh & Davis, 2000)		
	34.	If I can access the online learning system, I will use it in the future	· ·		

# Table 7. The Questionnaires Items

## **APPENDIX 2**

## Table 8. Cross-Loadings Test

	ATT	CI	CON	PEU	PU	SEC	TS	TR
ATT1	0.877	0.717	0.616	0.380	0.577	0.568	0.486	0.362
ATT2	0.837	0.668	0.562	0.378	0.506	0.546	0.429	0.381
ATT3	0.887	0.680	0.545	0.423	0.557	0.555	0.456	0.375
ATT4	0.910	0.717	0.601	0.394	0.570	0.587	0.464	0.362
ATT5	0.901	0.800	0.607	0.391	0.601	0.587	0.493	0.419
CI1	0.740	0.893	0.589	0.413	0.583	0.577	0.487	0.393
CI2	0.766	0.930	0.610	0.396	0.559	0.558	0.469	0.409
CI3	0.669	0.854	0.466	0.368	0.526	0.470	0.457	0.359
CON1	0.596	0.562	0.807	0.344	0.612	0.634	0.545	0.270
CON2	0.614	0.549	0.886	0.430	0.609	0.625	0.538	0.335
CON3	0.517	0.489	0.875	0.336	0.526	0.573	0.500	0.314
CON4	0.534	0.481	0.860	0.311	0.540	0.561	0.513	0.297
CON5	0.457	0.491	0.669	0.335	0.481	0.498	0.442	0.334
CON6	0.510	0.470	0.775	0.434	0.515	0.612	0.481	0.278
PEU1	0.383	0.389	0.377	0.815	0.441	0.335	0.366	0.436
PEU2	0.333	0.353	0.341	0.855	0.374	0.352	0.329	0.486
PEU3	0.385	0.351	0.390	0.814	0.361	0.382	0.352	0.616
PU1	0.529	0.547	0.566	0.407	0.877	0.579	0.742	0.336
PU2	0.562	0.519	0.618	0.447	0.882	0.591	0.732	0.300
PU3	0.575	0.562	0.582	0.379	0.854	0.609	0.703	0.331
SEC1	0.531	0.547	0.557	0.434	0.519	0.795	0.465	0.385
SEC2	0.537	0.493	0.577	0.387	0.553	0.795	0.499	0.377
SEC3	0.538	0.526	0.641	0.355	0.607	0.864	0.537	0.335
SEC4	0.592	0.522	0.641	0.369	0.581	0.871	0.521	0.362
SEC5	0.453	0.404	0.479	0.255	0.479	0.716	0.434	0.354
SEC6	0.459	0.409	0.572	0.288	0.546	0.788	0.472	0.299
TR1	0.306	0.245	0.206	0.454	0.236	0.257	0.225	0.760
TR2	0.396	0.399	0.307	0.428	0.321	0.358	0.316	0.795
TR3	0.349	0.400	0.372	0.608	0.333	0.421	0.329	0.862
TS1	0.446	0.478	0.555	0.357	0.739	0.536	0.884	0.339
TS2	0.469	0.438	0.564	0.422	0.746	0.533	0.905	0.296