How Course, Contextual, and Technological Challenges are Associated with Instructors' Individual Challenges to Successfully Implement E-Learning: A Developing Country Perspective

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ABSTRACT Many universities and colleges in developing countries around the world have started using e-learning courses to keep up with the technological revolution of the higher education sector in the developed world. E-learning has served as a catalyst for higher education to expand in the last decade. However, there are still many challenges facing universities in the developing world, as they attempt to implement e-learning. This paper investigated the main challenges that could significantly impact the implementation of e-learning in developing countries. The main objective of this paper was to identify these challenges and examine how they are related to the challenges facing instructors when using e-learning systems. A total of 107 university instructors responded to an online questionnaire about their perceptions of the main challenges in implementing e-learning in a university context. A partial least squares structural equation model (PLS-SEM) was employed to test the relationships between certain course, contextual, technological, and individual challenges. Challenges related to the design of the course, the support provided, societal/culture, and technology were found to have a significant impact on the instructors' use of e-learning systems. Several implications for the policymakers and practitioners were discussed.

INDEX TERMS E-learning, higher education, individual challenges, technology utilization.

I. INTRODUCTION

The current utilization of advanced technologies has become an integral part of our daily routine. The use of Information and Communication Technology (ICT) has grown at an impressive rate in higher education institutions of developing nations [1], leading to new opportunities and challenges. This growth in ICT has transferred the learning process from the traditional classroom to an e-learning environment. E-learning is one of the important areas that many developing countries are trying to support and sustain in order to emulate the development experience of other countries [2], [3]. Shifting from the traditional way of education to an electronic format may lead to new issues and challenges [4]. Perhaps this is one reason why most universities in developing countries have recently begun to mimic the trends of e-learning in an attempt to achieve the same benefits experienced by

universities in developed countries [5]. The move towards e-learning can be justified by its efficiency and low cost, transparency, flexibility, accessibility, consistency, and ability to improve student performance [1], [2], [6], [7]. It can also promote collaborative learning, deep understanding, help learners think and communicate creatively, increase learners' motivation, offer a wider range of learning resources for students [8]. This led higher education institutions generally to acknowledge the importance of e-learning in facilitating students' learning in traditional classroom environments. However, the greatest majority of e-learning initiatives in developing countries are still lagging behind those of developed countries [9]. This is due to various factors that are yet to be addressed in order to successfully implement e-learning [1], [6], [7], [10]. For example, e-learning technologies that are designed and developed outside the context of developing countries may not comply with the required standards [11]. The literature showed that for e-learning to be successfully implemented, various individual

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(instructors and learners) factors needed to be considered [12]. Understanding the challenges that affect individual use of e-learning facilitates the creation of appropriate e-learning environments for teaching and learning. In addition, other aspects related to the acceptance of new technology can be also influenced by several social and organizational factors within a specific culture [13], [14].

Our review of the literature showed that most of the previous studies on the effective implementation of e-learning have concentrated on three main dimensions: organizational or contextual, cultural or social, and pedagogical issues [14]–[17]. In addition, the importance of individual differences, social influence, and technology accessibility [14], [16], [18] have also been addressed in the literature.

Although there are many evidences regarding the role of contextual and course challenges in promoting e-learning technologies [15], [19], [20], there is still little evidence on how these challenges may contribute to the individual challenges of instructors to implement e-learning. More recently the literature has begun to address the relationship between the challenges of e-learning implementation in a university context [1], [21]–[23]. It is believed that examining such relations may help identify variables important to the development of e-learning in the developing world.

Therefore, this study sets out to identify the challenges related to instructors' implementation of e-learning in developing countries. The present study used the conceptual framework of Andersson and Grönlund [19] as a reference for understanding the challenges of e-learning implementation in a blended learning setting (more details in the following section). It is anticipated that outcomes from this study will help educators and policy makers to understand the reasons behind the slow adoption or use of e-learning among instructors in higher education. While most previous studies have paid special attention to the utilization, acceptance, adoption, success and failure of e-learning, the present study examined the relationships between certain course, contextual, technological, and individual challenges with regard to the implementation of e-learning.

II. E-LEARNING CHALLENGES IN DEVELOPING COUNTRIES

Now many new universities are competing intensely in the global higher-education market. However, the implementation of e-learning systems is still at the infancy stage in most developing countries [6], [24]. Some previous studies have emphasized on the role of organizational cultures and planning in affecting the utilization of e-learning systems among individuals [25]–[28]. For example, Kyzy *et al.* [16] pointed out that the lack of online education experience of instructors is one important factor that may affect their use of e-learning in a blended learning context. Another study conducted by Wang *et al.* [29] found that culture, the uneven level of information literacy, the lack of favorable e-learning environments, and the lack of mechanisms for resources construction are the main challenges of e-learning implementation

and adoption. In addition, Kisanga and Ireson [30] indicated that poor interface design and software, inadequate support, lack of knowledge, teachers' resistance to change, and other financial constraints are the main barriers for the implementation of e-learning or the adjustment of existing e-learning initiatives. Mulhanga and Lima [31] argued that the integration of e-learning platforms in higher education institutions of developing nations, particularly in Africa, can be subjected to various cultural, political, and economical constraints. Similarly, Kenan *et al.* [32] classified the barriers that may affect individual use of e-learning into four main categories: implementation barriers, technological barriers, mismanagement barriers, and cultural barriers. Moreover, they studied how certain social and cultural issues may affect e-learning effectiveness in a university context. They found that cultural issues, such as computer illiterate, language, and lack of e-learning resources, can potentially influence instructors' use of e-learning in their context. Chen and Tseng [33], on the other hand, studied the factors influencing instructions' use of web-based e-learning systems. They found that motivation and Internet self-efficacy are significantly associated with instructors' use of e-learning systems.

Alkharang and Ghinea [34] reported that factors related to management (management awareness and support), technical (bandwidth, Internet speed, infrastructure, computer and data confidentiality), and language may contribute to the individual adoption of e-learning. Studies by Salmon and Jones [35] and Selim [36] have stated that training on the technological aspects of e-learning is the first step to its realization. Likewise, Arabiyat [37] found a high degree of significance between organizational factors and instructors' satisfaction with e-learning systems. Despite these efforts, none of these studies have tried to examine the association between the different challenges and individual instructors' use of e-learning.

III. RESEARCH MODEL AND HYPOTHESES

The study model was constructed based on the conceptual framework of Andersson and Grönlund [19]. Andersson and Grönlund studied and analyzed several related papers dealing with e-learning challenges in different developing countries. They developed a conceptual framework of e-learning for understanding the challenges that users may face when implementing e-learning. Based on their findings, these challenges are interrelated which increases the feasibility of the framework for utilization in developed and developing countries. Several studies have adapted this framework to examine the challenges that are of most significance to the use of e-learning in their countries (e.g., [61], [55], and [70]). Thirty challenges have been found and categorized into four main categories and seven subcategories: individual (instructors and students), course (course design and support provided), contextual (organizational, cultural, and societal), and technological challenges. It is common to say that both instructors and students are the main users of any online learning system; however, this study was concerned
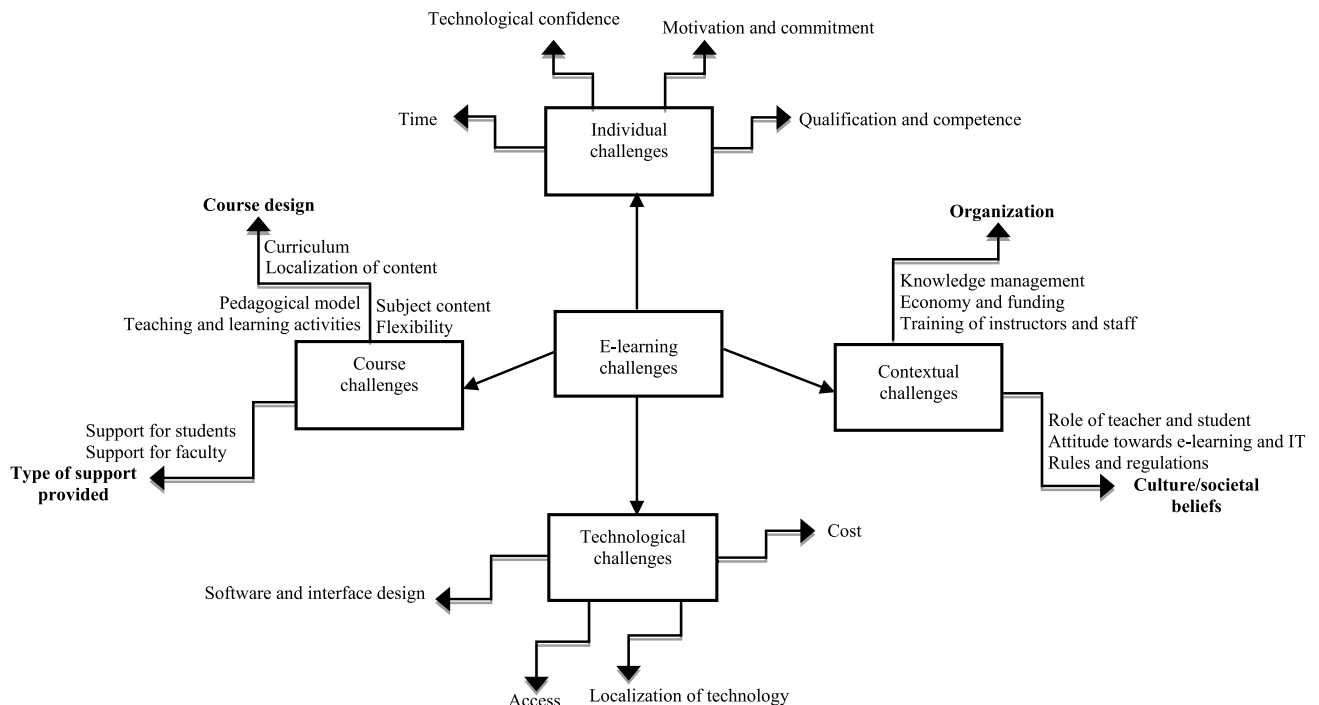
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FIGURE 1. Andersson's conceptual framework.

about examining individual instructors' use of e-learning (see Figure 1). This is because the effectiveness of e-learning systems mainly depends on the instructors' role in determining the level of technology integration into instruction [38]. For instance, if instructors accept the idea of online teaching and conduct their activities through e-learning systems, students will accordingly use these systems in their learning [39].

Universities and higher educational institutions over the world are focusing on providing sustainable e-learning initiatives to improve the learning process and to support traditional teaching methods. Previous research indicates that some challenges are interrelated and therefore will affect individuals' implementation and use of e-learning systems.

The lack of organizational support, technical support, and adequate information technology infrastructure can lead to the failure of e-learning initiatives [1], [7], [40], [41].

For example, if an organization faces a major financial crisis, it will become less willing to pay for the training of the instructors, or for course designers. This may pose more problems for instructors with regard to the technology and its use [15]. According to Andersson and Grönlund [19], although individual challenges play a crucial role in e-learning implementation in any nations, however, there are little researches on these challenges where, in most cases, the focus was on the student rather than the classroom teacher. Hence, this study comes as a response to these calls [2], [6], [34], [42]. This study is believed to help policymakers in higher education to understand how different e-learning

challenges are associated with instructors' implementation of e-learning. The following section explains the four main dimensions of the proposed research model.

A. INDIVIDUAL CHALLENGES

Individual challenges represent an important dimension to the successful implementation of e-learning [5]. Understanding challenges to implement e-learning technologies and their impact on the quality of educational practices can help in aiding the e-learning development in higher education [14]. According to Andersson and Grönlund [19], individual challenges (related to the instructors' circumstances, characteristics, and attitude) are less researched in developing countries. This includes instructors' academic and technological confidence, personal motivation and commitment, qualification, competence, capacity, organizational and social support, and time management. These variables are found to have vital effects on the implementation of e-learning. The literature also showed that individual challenges may potentially be linked to the lack of organizational and technical support, software and hardware capabilities [20], [38]. Based on these, it can be anticipated that the success of e-learning depends largely on the level of organizational and social support required by the university to facilitate technology implementation [1], [43]. In addition, organizational factors are likely to have a significant impact on individuals' decisions to use e-learning technology. This implies that when a university faces organizational challenges, individuals' use of e-learning will be affected, which in turn could increase their

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personal challenges [13]. Moreover, individuals may struggle to adopt technologies that are designed and developed for different cultural settings. It is a fact that the implementation of e-learning in developing countries mimic what developed countries have done in an attempt to achieve the same benefits. However, such attempts fail because the learning and teaching settings are often not contextualized to the individual needs [11]. According to Fayyoumi et al. [44], the most common problem faced by the instructor is to accept the new teaching culture and the required training and skills to use new technologies. This led Afshari et al. [15] to explore the reasons behind teachers' resistance to integrate technology in their teaching. They found that teachers' limited knowledge about technology undermined their ability to implement and use e-learning systems effectively. Based on these, there seems to be a substantial evidence base supporting the impact of organizational, social, and technological challenges on individual challenges to use e-learning, however, such a relationship has not been addressed in previous studies. Therefore, addressing this impact can potentially increase educational policy makers' understanding of how to facilitate instructors' use of e-learning.

B. COURSE CHALLENGES

Course challenges refers to the main issues concerning course design (content of the course, activities, the pedagogical model, the delivery mode, and flexibility) and the support provided by the organization to the individuals to successfully deliver the course online [19].

1) COURSE DESIGN

Course design is frequently addressed in the literature as one of the most significant challenges facing the implementation of e-learning in learning and teaching [19]. The design of an e-learning course is a key issue in determining the success or failure of e-learning systems in any educational institution [1], [2], [7], [15]. According to Willging and Johnson [45], if the individuals involved in the course are not well prepared to use the e-learning technology, they will likely not engage in the course activities, eventually leading them to drop out [15]. In addition, Kyzy et al. [16] stated that instructors are mostly less concerned about using e-learning technology in their teaching. Instructors' limited experience and knowledge in using the technology may lead to a poor learning environment [46]. This proves that if issues surrounding the design of online course materials are found, then there will be an impact on the individual use of e-learning, which adds more challenges to the actual implementation process. This also implies that there is an urgent need to examine the level of impact of each factor on the individual level.

Based on Andersson and Grönlund's [19] conceptual framework, course design challenges consist of issues related to the online course curriculum, pedagogical model, subject content, teaching and learning activities, localization of the content, and flexibility. In general, instructors need to provide different types of e-learning strategies, adopt different pedagogical approaches and localize the content to the local cultures, and explore new teaching methods for their e-learning courses [47], [48]. Thus, instructors need to be supported by the university to overcome course design challenges. It is argued that successful technology innovation can be determined through interrelated factors that might impact instructors' decision to implement e-learning such as professional skills and competence, self-confidence, and motivation. Despite that previous studies have highlighted the potential impact of online course design challenges on individuals' use of e-learning [16], [47], [48], [51], such impact remains concealed and needs to be confirmed. Taken together, it is reasonable to assume that the e-learning course design challenges are associated with the challenges an instructor might face when using e-learning. Thus, the following hypothesis is proposed:

H1: There is a relationship between course design and instructors' individual challenges relating to the e-learning implementation.

2) THE TYPE OF SUPPORT PROVIDED

The type of support provided for individuals may play a role in facilitating their learning of the e-learning module. This includes the support provided by the organization to the instructors and the support provided by the instructors to the students [19]. Interventions provided by the organization (to provide immediate support to both instructor and student) can potentially improve the continuity of e-learning in the higher education institutions [7], [31], [52], [53]. However, the low level of support from the university would discourage individuals from using the e-learning system [29]. The support provided for instructors could be through the provision of technical, training, motivation, and commitment to the e-learning system [54]. These types of supports are necessary for ensuring a successful implementation of e-learning courses [55]. Moreover, Selim [36] stated that university support should not be centered only on technical support, but should also consider information facilities and other services. According to Golden et al. [56], ensuring that instructors have the required access to e-learning resources could play a key factor in increasing their use of e-learning. Furthermore, Lee [57] found that increasing instructors' use of e-learning is associated with their access to technology. Otherwise, the lack of support provided by the instructors to the students is viewed as an important challenge for e-learning implementation in higher education. For example, Mtebe [58] reported that individuals are less likely to implement e-learning efficiently if there is a lack of support provided to them when taking online courses. Likewise, Mohamadzadeh et al. [52] and Buchanan et al. [12] have identified the main challenges with regard to the support provided by the instructor and its role in increasing the individual challenges. They reported that the low support provided to the instructors in terms of access to the learning materials and resources, training, and time for course planning to be the three main aspects that

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can influence the implementation of e-learning. Meanwhile, when a university fails to provide the required level of support to their instructors, it could ultimately decrease instructors' motivation and commitment to teaching [10], [59]. This will eventually cause many students to drop out of the course. Hence, the type of support provided by the university may pose different challenges on teachers' individual efforts or willingness to use e-learning [9], [13], [52], [60]. This led us to shape the following hypothesis:

H2: There is a relationship between the type of support provided and instructors' individual challenges relating to the e-learning implementation.

C. CONTEXTUAL CHALLENGES

The implementation of e-learning happens within a particular context. Based on the literature, contextual factors have been found to be association with the success or failure of e-learning [56]. In addition, the policy of the organization plays an important role in promoting the use of e-learning among teachers and students. The contextual challenges include factors related to the organizational and the cultural issues, which play important roles in the implementation of e-learning in any organization [61]. These factors are explained in the two following sections:

1) ORGANIZATIONAL CHALLENGES

Any e-learning environment requires some changes in the organizational structure to ensure flexible delivery of e-learning courses for the students [36], [62], which can take place through individual training, allocation of resources, financial and knowledge management support, economizing and funding [15], [19]. The literature showed that the implementation of e-learning initiatives is closely related to certain organizational changes and understanding of the relationships between individuals involved in e-learning projects and their organizational context [13], [14]. Organizational challenges have been found in many previous studies to be related to the challenges of implementing e-learning in higher education. For example, Khan and Nawaz [14] pointed out that if certain organizational challenges are encountered during the implementation of e-learning in any educational institution, it would affect individual work performance. In addition, Dube and Scott [22] stated that organizational challenges may contribute to the poor adoption of e-learning, which would negatively affect the individual implementation of it. Granger *et al.* [63] conducted a study to identify factors contributing to the implementation of innovative technology among instructors in four higher education institutions. They concluded that ensuring a successful implementation of e-learning require not only new systems but also organizational and community capacity for development. This confirms that if an organization faces certain challenges in providing scalable and sustainable support solutions to their instructors, it can potentially lead to an unsuccessful implementation [2], [7], [15], [64]. Tarus *et al.* [65] reported that some instructors are reluctant and resistant to accept

e-learning technology, especially when the economic pressure on resources increased.

Consequently, we can say that certain organizational issues can reflect individuals' use of e-learning in which such issues have been found to have a significant impact on the implementation of e-learning [5], [66], [67]. Many prior studies have also suggested studying the relationship between organizational challenges and the individual challenges related to the use of e-learning [1], [22], [60], [68]. Hence, the following hypothesis is formed:

H3: There is a relationship between organizational challenges and instructors' individual challenges relating to the e-learning implementation.

2) SOCIETAL/CULTURAL CHALLENGES

Culture is an aspect that describes individuals' behaviors and differences within an organization, group, or society. In an e-learning environment, the influence of cultural factors on the use of e-learning systems can be measured by the roles, beliefs, and attitudes of individual users. It also includes individual adherence to the rules and regulations of the local community where e-learning takes place [15], [19]. Although it is believed that e-learning is educationally and culturally neutral, investigating its cultural suitability is an important issue because learning itself is a cultural activity [69]. Cultural or societal challenges are defined as the factors that may hinder the implementation of e-learning in any educational institution [20], [42]. These challenges may arise the system is designed without human users in mind [6], [60]. Hence, e-learning developers tend to overlook the impact of social, cultural and economic issues when integrating e-learning into the educational system [7], [70]. Each country or demographic region has its own beliefs about e-learning and has a set of rules and policies applicable to its educational system [44], [71].

Several studies have emphasized the importance of culture for e-learning implementation and support in a particular society [2], [7], [9], [68]. In addition, the lack of awareness and confidence would prevent an individual from using technology effectively, thus changing an individual's attitudes and interests [72]. This may potentially affect the individual acceptance and use of new technologies. Tarus *et al.* [66] emphasized that several socio-cultural challenges can influence individuals' interest in implementing e-learning.

On the other hand, several studies have explored the organizational culture factors and their relationship to the e-learning implementation. For instance, Czerniewicz and Brown [69] found a link between organizational culture and the way in which e-learning is embedded in the institution. Taha [73] confirmed that cultural factors have a tremendous impact on how individuals learn and work. Accordingly, if an organization is driven by the presence of different cultural challenges, then this would certainly influence individuals' use of technology [15]. Thus, the design of custom e-learning solutions for a certain culture may not be suitable for other

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cultures [1], [7], [32], [62]. Based on these observations, the following hypothesis is proposed:

H4: There is a relationship between cultural challenges and instructors' individual challenges relating to the e-learning implementation.

D. TECHNOLOGICAL CHALLENGES

Factors related to technology access, availability, and cost can play a key role in the implementation of e-learning. Technological challenges can be defined as any technical problems an individual may face when using technology in teaching and learning. This includes the lack of easy access, low Internet bandwidth, the lack of technological equipment, the lack of necessary software and other computer facilities [22], [74]. According to Osuafor and Emeji [75], when a university is established, many economic and technological factors shape its shape its position in certain industries. Wang *et al.* [77] found that the main challenges associated with the instructors' use of e-learning are related to the lack of access, reliability, cost, and skills needed for an individual to use the available computer and communication resources. According to Ali and Magalhaes [76], e-learning technology requires constant technical maintenance. Thus, if the organization is unable to continuously maintain its e-learning initiatives, then instructors would also be unable to implement e-learning successfully. In addition, Ahmad *et al.* [21] reported that having sufficient access to e-learning materials may be positively associated with instrucotrs' use of technology in creative teaching practices.

On the other hand, the lack of hardware availability, software, Internet connection, and technical qualification may not result in a successful implementation of e-learning, thus adding to the academic challenges of individual instructors [1], [15], [62], [75]. This is why most previous studies addressed the role of various technological factors in affecting students' and teachers' use of technology [29], [48], [66], [78]. This assumption is supported by Dube and Scott [22] who found a positive relationship between technological factors and individual factors which inhibit the successful implementation of e-learning in a university context. Based on these observations, it is assumed that understanding the relationship between technological challenges and instructors' individual challenges can help universities to develop the capacity needed to effectively promote the use of e-learning. Therefore, the following hypothesis is proposed:

H5: There is a relationship between technological challenges and instructors' individual challenges relating to the e-learning implementation.

IV. METHOD

A survey research method was used to collect the data for this study. A structured self-administered questionnaire was employed to test the proposed research model shown in Figure 2.

A. STUDY CONTEXT

This study was conducted in one public university in Western Asia (Yemen). The university has an e-learning center equipped with new computer labs, Internet, and new technology devices such as projectors, television sets, and receivers.

B. SAMPLE

The population of this study consisted of instructors from one public university in a developing country. A total of 120 sets of hand delivered questionnaire have been prepared and distributed to the instructors who have experience using e-learning in their teaching. A total of 107 questionnaire copies

were collected, which represent 89.2% of the total response rate. To further confirm the appropriateness of the sample size obtained with respect to the variables inherent in the hypothesized model, the formula proposed by Green [79] was employed to calculate the sample size of the study. According to Green [79], the sample size (n) must be greater than $50 + 8m$ (where m is number of independent variables). In this study, the number of variables is five and according to the equation, the sample size of the study should be $> 50 + 8 * 5$ (n > 90). Based on this, and since 120 instructors responded to the questionnaire, it can be said that the sample size in this study adequately satisfies the mentioned requirements and, therefore, satisfactory for structural equation modeling [80].

C. INSTRUMENT

A closed-ended questionnaire consisted of 37 items (divided into two main parts) was used in this study. The first part of the questionnaire consisted of items about demographic characteristics: gender, age, teaching experience, e-learning training, and e-learning experience.

The second part consisted of 30 items related to individual challenges (7), course challenges (11), contextual challenges (9), and technological challenges (3). The items were self-built based on the factors identified in Andersson and Grönlund's [19] framework. The distribution of items is shown in Table 1. The respondents were asked to rate their agreement with each item using a 4-point Likert Scale: 1 = No affect, 2 = Minor affect, 3 = Moderate affect, 4 = Major effect.

D. DATA ANALYSIS TOOLS

Structure equation modeling (SEM) was employed to test the hypothesized model. The Partial Least Squares (PLS) approach was used to test the research model [80]. Specifically, SmartPLS 3.0 software was used for the analysis of data. In addition, SPSS software was used to measure the descriptive statistics.

V. RESULT
A. DEMOGRAPHIC BACKGROUND

Among the 107 respondents, 62.6 % were male and 37.4% were female (See TABLE 2). The majority of respondents,

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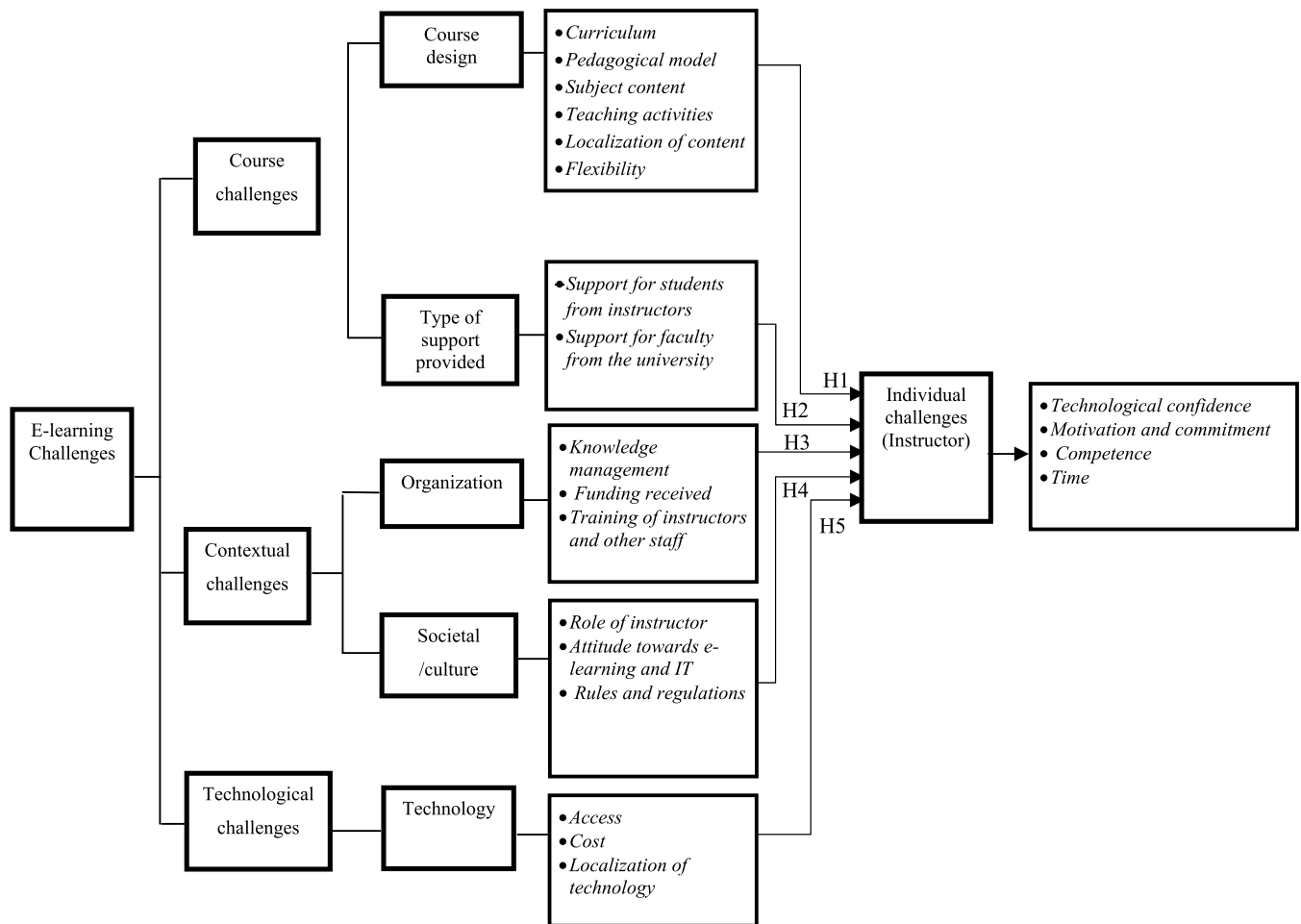
FIGURE 2. Proposed model.

76.6% (N: 82) ranges between 25 to 46 years old. Most of the respondents were from the Faculty of Education 29.9% (N: 32).

B. STRUCTURE EQUATION MODELING (SEM)

Since SEM was employed to test the hypothesized model, SmartPLS 3.0 was chosen to analyze the data for many reasons. For example, it is able to model latent model constructs because of its high efficiency in factor estimation which help determine the significance of specific path estimates [80], [81]. For data analysis, a two-step SEM process was used [82], [83]. Firstly, the assessment of the measurement model was established by examining the reliability and the convergent and discriminant validity of the measures. Secondly, an evaluation of the structural model and the relationship between the constructs was conducted.

1) ASSESSMENT OF THE MEASUREMENT MODEL

In order to validate the measurement model, a confirmatory factor analysis was used to evaluate the convergent validity and discriminant validity.

a: CONVERGENT VALIDITY

Convergent validity refers to the degree to which the formatively measured construct correlates positively with a single item measure of the same construct [80]. According to Fornell and Larcker [84], there are three criteria to test the convergent validity. These are 1) Indicator loadings should be significant and greater than 0.70, 2) The construct reliability value (Composite reliability and Cronbach's Alpha) should be greater than 0.70, and 3) the average variance extracted (AVE) value should be greater than 0.5 for each construct. The result in Table 3 shows that most of the factor loadings for the items exceeded the acceptable value of 0.70 (18 items). The first testing results showed a total of 12 items with factor loading less than 0.5. These items were removed from the SEM-PLS analysis. The second testing result revealed a total of six items (C-CH 4, T-CH1, T-CH2, I-CH1, I-CH2, and I-CH3) with low factor loadings (0.626-0.697). However, Hair, Jr., *et al.* [80], [86] recommended to delete items, that had a low factor loading, if their absence will improve or increase the composite reliability (CR) or AVE values. In the case of this study, the deletion of these

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TABLE 1. The distribution of items.

Independent variables	Constructs	Items	Item code
Individual challenges	Instructors	- *Technological confidence*	I-CH1
		- *Motivation and commitment*	I-CH2
			I-CH3
		- *Competence*	I-CH4
			I-CH5
		- *Time*	I-CH6
			I-CH7
Course challenges	Course design	- *Curriculum*	C-CH1
		- *Pedagogical model*	C-CH2
		- *Subject content*	C-CH3
		- *Teaching and learning activities*	C-CH4
		- *Localization of content*	C-CH5
		- *Flexibility*	C-CH6
	Type of support provided	- *Support for students from instructors*	SP-CH 1
			SP-CH 2
			SP-CH 3
		- *Support for instructors from the university*	SP-CH 4
			SP-CH 5
Contextual challenges	Organizational	- *Knowledge management*	Org-CH1
		- *Funding received*	Org-CH2
			Org-CH3
		- *Training of teachers and staff*	Org-CH4
	Societal /Cultural	- *Role of instructors and students*	Cl-CH1
		- *Attitude on e-learning and IT*	Cl-CH2
			Cl-CH3
		- *University roles and regulation*	Cl-CH4
			Cl-CH5
Technological challenges	Technology	- *Access*	T-CH1
		- *Cost*	T-CH2
		- *Software and Interface design*	T-CH3

TABLE 2. Demographic variables.

Demographic Variables		Frequencies	Percentage (%)
Gender	Male	67	62.6
	Female	40	37.4
Age			
	25-35	42	39.3
	36-46	40	37.4
	47-57	23	21.5
	More than 57	2	2%
Discipline			
	Faculty of Education	32	29.9
	Computer Science & Engineering	22	20.6
	Commerce & Economics	21	19.6
	Medicine and Health Science / Faculty of Dentistry	10	9.3
	Faculty of Fine Arts	7	6.5
	Marine & Environment	6	5.6
	Sharia and Law Faculty	2	1.9

items did not change the pattern of results. The construct reliability (CR) values, ranging from 0.804 to 0.893, have exceeded the standards recommended threshold level of 0.70.

Likewise, the AVE values for all constructs, ranging from 0.516 to 0.637, have exceeded the generally accepted threshold level of 0.5. Therefore, the three conditions of convergent validity have been met. Furthermore, the α values ranged from 0.696 to 0.850, which is greater than the recommended 0.6 cut off point. The loadings for all item and constructs are presented in Table 3.

b: DISCRIMINANT VALIDITY

Discriminant validity investigates how the construct is truly distinct from other constructs by empirical standards. AVE is usually used to measure the variance captured by the indicators relative to the measurement error, which should be greater than 0.5 to justify the use of a construct [81].

However, to justify the discriminant validity, the values of latent variables should not exceed the AVE values. Fornell and Larcker [84] recommended three criteria for adequate discriminant validity: the square root of the AVE value for each construct is larger than all other cross-correlations (the squared correlations between the constructs): the AVE values are above 0.50; the principal component factor analysis of factor loading is greater than 0.60; and all items are not highly loaded on any other construct(s). Table 4 presents the correlation coefficient between the latent variables, which

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TABLE 3. Constructs measures and loading.

CH	Construct measures	Factor loading	CR	α	AVE
Course Challenges	**Course Design (CD-CH)**		0.830	0.696	0.621
	C-CH 1: E-learning curriculum	0.864			
	C-CH 2: Availability of pedagogical model for e-learning	0.764			
	Support Provided (SP-CH)		0.893	0.850	0.626
	SP-CH 1: Level of support for students from instructors in the e-learning courses	0.874			
	SP-CH 2: Level of support for instructors from university and academic affairs	0.761			
	SP-CH 3: Financial support for faculty to use e-learning	0.804			
Contextual Challenges	**Organizational Challenges (Or-CH)**		0.874	0.805	0.637
	Org-CH1: Funding received	0.922			
	Org-CH2: Training of teachers to use e-learning	0.738			
	Societal / Cultural Challenges (C-CH)		0.885	0.841	0.608
	Cl-CH1: Understanding of the new role of instructor and student in the e-learning Environment	0.793			
	Cl-CH2: Instructors' beliefs and attitude towards e-learning and IT	0.851			
	Cl-CH4: University rules and regulation	0.796			
	Cl-CH5: Laws taken into consideration by the university	0.807			
Technological Challenges	**Technological challenges (T-CH)**		0.804	0.715	0.516
	T-CH1: Access to Internet and other e-learning technologies	0.626			
	T-CH2: Cost of technologies needed in setting up the e-learning system	0.687			
	T-CH3: Software and interface design	0.958			
Individual Challenges	**Individual Challenges (Instructor) (I-CH)**		0.862	0.801	0.557
	I-CH1: Technological confidence to use e-learning	0.776			
	I-CH2: Qualification to implement e-learning	0.697			
	I-CH3: Competence to implement e-learning	0.632			
	I-CH4: Time	0.839			

TABLE 4. Discriminant validity.

E-learning Challenges	C-CH	Cl-CH	I-CH	Or-CH	SP-CH	T-CH
Course design (C-CH)	**788**					
Culture (Cl-CH)	0.416	**0.782**				
Instructor (I-CH)	0.322	0.488	**0.729**			
Organization (Org-CH)	0.315	0.418	0.321	**0.860**		
Support provided (SP-CH)	0.482	0.451	0.427	0.520	**0.789**	
Technology (T-CH)	0.339	0.515	0.261	0.333	0.403	**0.745**

defines the shared variance between the variables. Based on the table, it can be noted that the squared correlation did not exceed the recommended AVE value of 0.50. As such, the discriminant validity was adequately demonstrated, and the structural model was assessed with confidence.

c: COMMON METHOD BIAS (CMB)

For the PLS-SEM analysis, common method bias (CMB) can be obtained using a collinearity test [85]. The variance inflation factor (VIF) values should be lower than the 3.30 threshold [85], [86]. As shown in Table 5, VIF values for all constructs were lower than the recommended threshold value. This indicate that the model is free from CMB.

TABLE 5. Collinearity statistics.

Constructs	VIF value
Course Design	2.621
Societal / Cultural	3.106
Organization	2.059
Support provided	1.501
Technology	2.418

2) ASSESSMENT OF THE STRUCTURAL MODE

The structural model was used to examine the independent relationships between the variables proposed in this study.

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TABLE 6. Significance testing.

Path	β	T Value	P Values	Sig	Hypothesis testing
H1: Course design -> Instructor	0.346	2.543	0.011	**	Supported
H2: Type of support provided -> Instructor	0.226	2.654	0.008	***	Supported
H3: Organization -> Instructor	0.007	0.042	0.966	NS	Not Supported
H4: Culture -> Instructor	0.324	1.971	0.049	**	Supported
H5: Technology_ -> Instructor	0.287	2.817	0.040	**	Supported

*p<0.10,   **p<0.05,   ***p<0.01,   NS= not significant

The path coefficients (β) was calculated to estimate the effects between constructs (the relationships modeled among the constructs) along with the level of significance. In addition, bootstrapping procedure (with 5000 samples) was applied to examine the significance of path coefficients. The global goodness of fit (GoF) statistic for the research model was examined based on the recommendations of Tenenhaus *et al.* [87] and Wetzels *et al.* [88]. The GoF measure was assessed using the following equation:

$$GoF = \sqrt{\left(\overline{R^2} + \overline{AVE}\right)}$$

The GoF result showed a value of 0.47, which exceed the threshold of GoF > 0.36 recommended by Wetzels *et al.* [88]. Thus, it can be concluded that the research model has a good overall fit.

The results in Table 6 shows the significance testing results of the structural model path coefficients. The test results of H1 revealed that course design construct ($\beta = 0.346$, t = 2.543, p < 0.05) was significantly related to the instructors' use of e-learning. Since the quality of online courses mainly depends on instructors' satisfaction with online instruction, therefore, the lack of flexibility and quality of curriculum design, time to use technology, and the lack of online resources are the main obstacles faced by instructors in the implementation of e-learning. The result also indicated that the support provided (H2) appears to have a significant relationship with the instructors' individual challenges ($\beta = 0.226$, t = 2.654, p < 0.01). It is assumed that providing appropriate support, such as management and financial support for instructors in the e-learning environment, would lead to a successful use of e-learning.

Likewise, it is anticipated that the students who are appropriately supported by their teachers not only achieve higher academic results but also experience an increase in their personal values (e.g., flexibility and self-confidence).

As for the impact of contextual challenges on individual challenges, although lack of organizational factors such as knowledge management, funding received, and types of training provided to instructors may add to the challenges of implementing e-learning in a university context, this study did not find an association between organizational challenges (H3) and instructors' individual challenges ($\beta = 0.007$, t = 0.042, p = 0.966). This could be attributed to the lack of organizational development capacity in order to facilitate instructors' use of e-learning. On the other hand, our analysis showed a significant relationship between cultural challenges (H4) and instructors' individual challenges related to the use of e-learning ($\beta = 0.324$, and t = 1.971, p < 0.05). This assumption can be related to the attitude of instructors and their roles, the influence of the beliefs and attitudes of decision-makers in promoting or impeding the use of e-learning in university environment.

Despite that the AVE of technological challenges was on the borderline, the result revealed that there is a significant relationship between technological challenges and instructors' individual challenges of using e-learning ($\beta = 0.287$, t = 2.817, p < 0.05). This can be attributed to that most of the technological issues are related to the limited access to software repositories (hosted within organizations), and a poor infrastructure in terms of bandwidth. In addition, since the majority of the participants aged 25-46 years, they are considered the most active users of ICTs [59]. Accordingly, this might have affected the outcome of this study by changing instructors' perceptions about the importance of e-learning in their teaching [62].

To confirm the hypothesized model based on the predictive accuracy between a specific endogenous construct's actual and predicted values, coefficient of determination (R^2) or R Square Adjusted was used. Hair, Jr., *et al.* [80] described R^2 values of 0.75, 0.50, and 0.25 for the endogenous constructs as substantial, moderate, and weak respectively. As shown in Figure 3, four dimensional constructs of course design, culture, technology, and support provided appears to be crucial for instructors' use of e-learning, which explain 36.3 % of the variance of instructors' individual challenges.

VI. DISCUSSION

The successful implementation of innovation in any educational institution can be attributed to its individual ability and readiness. However, this will not be accomplished without determining the challenges that need to be prioritized to effectively use technology [1], [7], [40], [41]. Therefore, this study examined the relationship between e-learning challenges (course design, support provided, organization, culture, technology, and individual) from the instructors' perspectives.
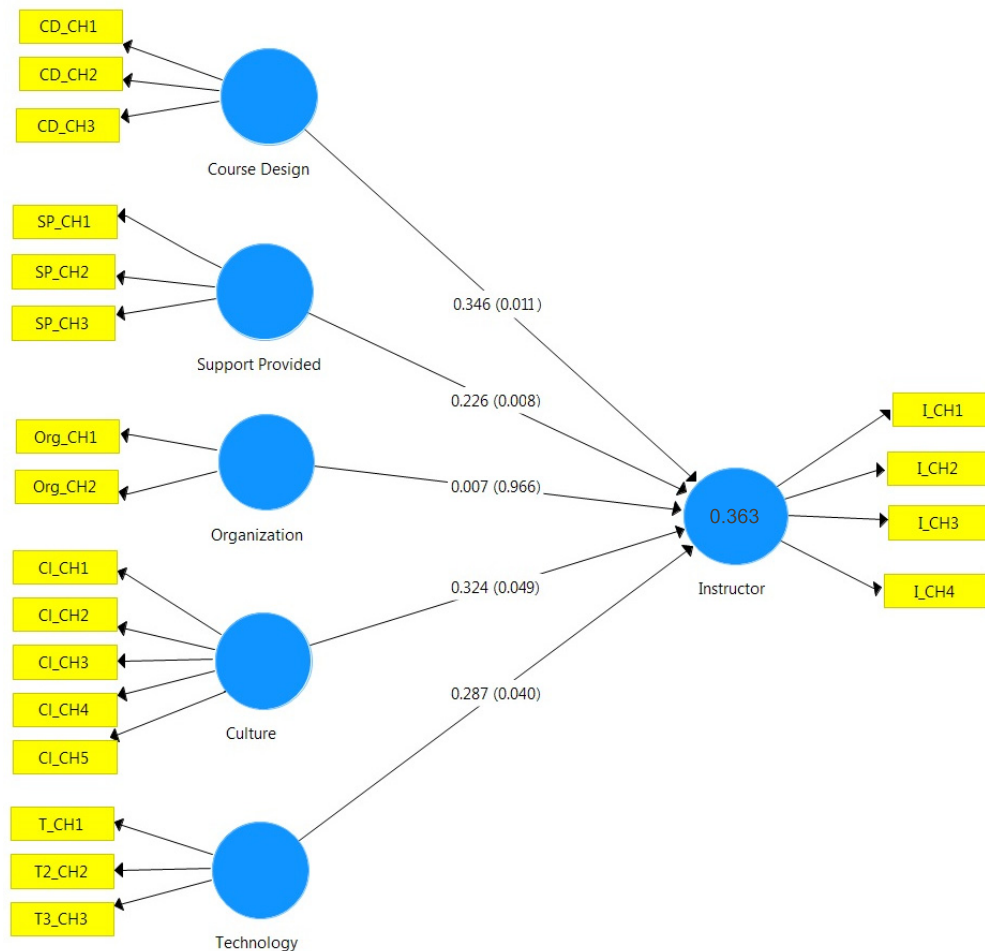
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FIGURE 3. Path coefficients and P value.

The findings (see Figure 4) revealed that course design challenges have a strong relationship with instructors' individual challenges to implement e-learning technology in teaching.

This can be attributed to the fact that course design, as a process, is closely related to instructors' pedagogical knowledge for designing learning goals and the tasks. Therefore, course challenges may certainly increase instructors' individual challenges to use e-learning and vice versa. University instructors, in general, requires more time, professional skills and competencies in order to design effective learning materials for e-learning [21], [49], [89]. This finding is in line with many previous studies which stressed that effective course design requires consideration of individual skills, educational beliefs, and pedagogical styles [21], [47], [90] in order for the instructor to be able to use e-learning effectively. In addition, Kyzy *et al.* [16] stated that when instructors are not skilled in designing e-learning courses or able to manage the available resources, they likely will find themselves less able to meet the technology demands. Hence, for the successful implementation of e-learning at a university level, instructors need to be provided with the support necessary to design an effective course [2], [15], [20].

Another interesting finding was that the type of support provided by the university have a crucial role in increasing the challenges individual instructors face when implementing e-learning.

These findings are in parallel with some prior studies [12], [91], [92]. In these studies, the authors emphasized that the level of support provided to instructors was one of the main challenges that influenced their use of e-learning. This, as a result, has influenced the instructors' motivation and commitment to consider using the system [10], [42], [59]. It is also believed that instructors who are very active in using e-learning systems, providing motivational support, and providing quick feedback can positively contribute to students' satisfaction with e-learning [6], [93]. The findings also showed that the culture or societal challenges have a significant relationship with instructors' individual challenges of implementing e-learning. These challenges arise when the university does not consider the local context and the dynamics of e-learning systems, which in turn may affect individuals' beliefs and motivation to use technologies in more innovative ways [1], [7], [50], [72]. This finding is in line with the work of Buchanan *et al.* [12] who indicated that both individual and contextual factors need
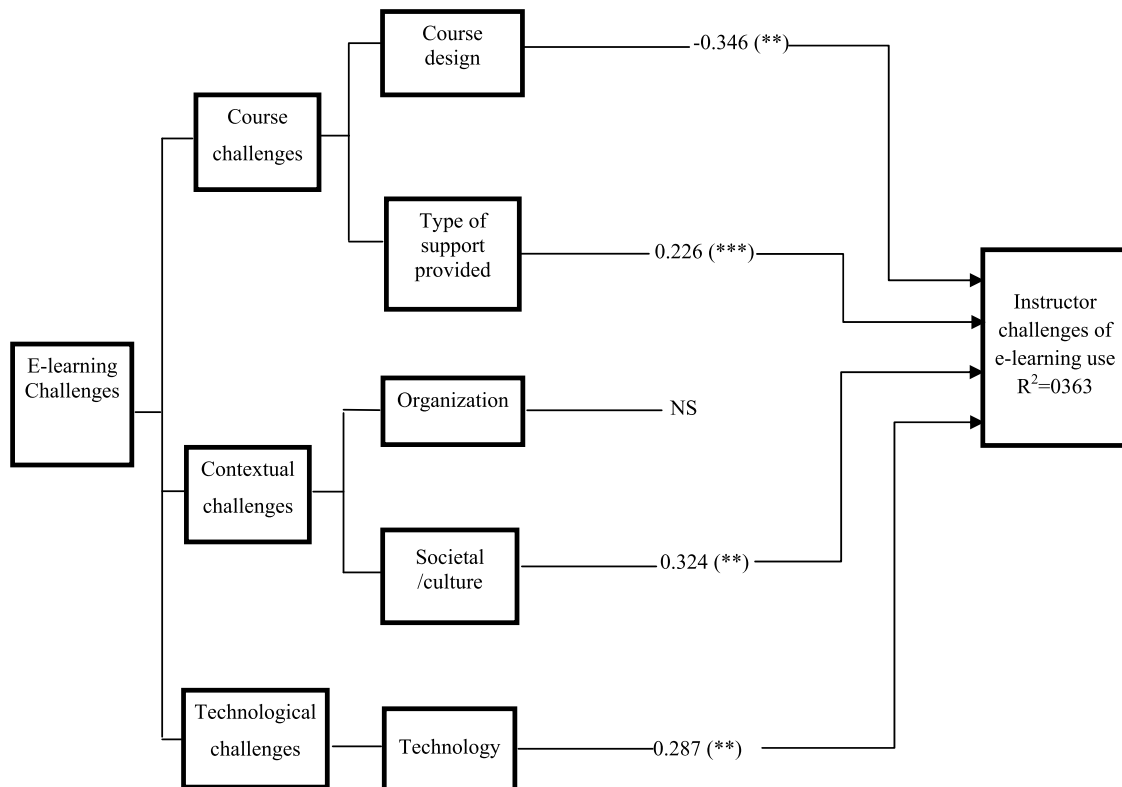
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FIGURE 4. Tested model.

to be taken into account when any educational institution begins to study the factors that effect on instructors' use of e-learning. This finding also seems reasonable and consistent with the findings of some prior studies which found a positive relationship between cultural factors and individuals use of e-learning systems [2], [15], [32], [62]. These studies also addressed how the challenges associated with organizational culture may influence individuals' acceptance of e-learning systems. Furthermore, according to Goi and Ng [94] and Andersson and Grönlund [19], every demographical area has its individual beliefs and cultural values that may potentially impact the implementation of new technologies [20], [44]. In this regard, universities are encouraged to pay more attention to the role of individual differences, culture, and other social concerns in implementing e-learning systems [21], [22], [91], [95].

Unexpectedly, the relationship between organizational challenges and instructors' individual challenges was not significant. This finding is in line with the results of Mohammadyari and Singh [13], which reported no significant association between these two dimensions. However, our finding is inconsistent with findings from some studies [10], [14], [19] that have emphasized the important role of various organizational factors in facilitating instructors' use of e-learning solutions. Providing the required organizational elements would allow individuals to effectively use technologies in teaching. This includes providing the necessary course support, course management, resources, and evaluation as

well as other organizational factors (e.g., funding and training) [96], [97]. However, there is still a need for more comprehensive, consistent, accurate, and timely support for instructors in universities of developing countries in order for them to make informed decisions [98], [99].

The result also showed that the technological challenges have a significant relationship with instructors' individual challenges. This finding is supported by many previous studies [1], [21], [31], [66] which have reported that the technological challenges of e-learning are among the critical aspects that posed more challenges for individuals involved in the e-learning program. This finding is also consistent the work of Dube and Scott [22] who confirmed that there is a relationship between technological factors and individual factors which impede the successful implementation of e-learning in a university context. Meanwhile, technological challenges have been consistently mentioned in many studies as one of the most significant barriers that may affect teachers' use of technology [6], [62], [91], [100]. For example, Afshari *et al.* [49] and Sfenrianto *et al.* [62] have reported that when the university lacks the hardware and software support, instructors' use of e-learning will be certainly affected. In addition, having insufficient access to e-learning materials was also found to be positively associated with instructors' use of e-learning [21], [44]. Based on these, it can be anticipated that the courses offered by universities in developing countries must be compatible with the latest software and hardware. Therefore, the findings of this study conclude that

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course design, university support, culture, and technology are the main challenges influencing instructors' use of e-learning systems.

VII. IMPLICATIONS TO PRACTICE

The relationships between the four main dimensions of e-learning challenges (course, contextual, and technological, and individual) were examined in this study. This study adds to the few studies that take into account a set of e-learning challenges and its relationships to certain individual factors. This study offers some practical insights into the implementation of e-learning by instructors in developing countries. For example, challenges facing instructors in their use of e-learning are not only limited to their individual differences and professional skills, but also include other course design issues, university support, social and organizational beliefs, cultural values, infrastructure and access to training resources. Therefore, policymakers are encouraged to consider introducing practical strategies for course design and classroom practices that may help teachers negotiate their distinct teaching preferences. Meanwhile, it is recommended that instructional designers should decide on the best approach that fits the context of their society before implementing e-learning solutions. They should identify issues and behaviors that are insufficiently supported by today's technology. As a result, instructors are expected to build their proficiency and experience in designing e-learning courses, which should be designed to fit the cultural beliefs and practices of students. Since, there are many parties involved in the e-learning environment, universities in developing countries should be responsible for stakeholders training, develop the computer self-efficacy of practitioners, and provide flexible e-learning courses to ensure a successful implementation of e-learning.

VIII. LIMITATIONS AND FUTURE WORKS

This study has some limitations that need to be further explored. For instance, although this study examined the impact of course, contextual, and technological challenges on individual instructors' use of e-learning, understanding how to overcome these challenges has not been investigated. In addition, the sample in this study was limited to instructors from one developing country. Our findings demonstrate the relationship between the different challenges of e-learning and their impact on the individual instructors' use of e-learning in one developing country. However, the impact of these challenges may vary from one developing country to another. Therefore, we hope this study will stimulate future investigation of how these challenges are associated with individual use of e-learning in different countries. It is also suggested that solutions to overcome these challenges should be studied more deeply in future works. Future research may also consider performing further analysis on other universities from different developing countries. Finally, the proposed model can be further examined from the perspective of university students.

IX. CONCLUSION

In this study, we investigated the main challenges that could significantly affect the implementation of e-learning in developing countries. Our findings showed that certain course (the design of the course and the type of support provided), contextual (societal/culture), and technological challenges had a significant relationship with the instructors' use of e-learning. In addition, the relationship between organizational challenges and instructors' individual challenges was not significant. The low awareness among instructors about the organization's role in facilitating the implementation of e-learning might have played a role in this. This study is expected to add new insights into the current state of e-learning implementation in developing countries. It can be also used to guide educational decision makers to adopt new strategies to compare the interrelated relationships between multiple challenges, thus ensuring a successful implementation of e-learning.

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