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Research Article

# Sustainability in virtual education: A case study of virtual university of Pakistan

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## ABSTRACT

The penetration of technology has helped in better online learning and training around the world by minimizing the time and space issues coupled with traditional education and training. Regardless of the several benefits, keeping students on online platforms is an arduous task. Taking the case study of the Virtual University of Pakistan, this paper explores the impact of personal and environmental factors on online Leaner's intention to continue through satisfaction. Primary data was gathered from 361 students of 3 regional campuses through a self-administrated closed-ended questionnaire. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the data in SmartPLS software. The study results indicate that only the provision of satisfying personal and environmental factors by distance learning higher education institutions can help them in attracting and retaining students. The post-COVID-19 situation has made the student intake and retention task even harder as the traditional education institution has also built the capabilities to provide online education and diminishing the niche market of virtual education institutions.

**Keywords:** *Virtual Education; Sustainability; Online Education*

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## 1. INTRODUCTION

In the new global economy, the use of technology in education has become statutory. Virtual/online education is on the rise around the globe as it allows easy access to quality education at an affordable price. Furthermore, it minimizes the terrestrial and spatial challenges associated with traditional education (Panigrahi et al., 2018). Virtual/online education is being provided in both synchronous and asynchronous environments. Synchronous online platforms cover geographical distances whereas asynchronous environments address the concerns of time lag (Jolliffe et al., 2012). This channel of education provides an opportunity for the students to learn at their own pace and convenience (Chang & Kang, 2016). Online learning is being effectively used, not only in academia but also in industry (Dağhan & Akkoyunlu, 2016). The e-learning market has drastically expanded over the last few years due to the popularity of the online learning across the education sector and industry (Nazir et al., 2015). Research and Markets (2018a) report that the expected volume of the global e-learning market will be 65.41 billion $ by 2023 at an average growth rate of 7.07%. Moreover, the size of the global learning management system (LMS) is anticipated to be 18.44 billion $ in the year 2025 at a phenomenal growth rate of 15.52% (Research &Markets, 2018b).

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Notwithstanding the growth and popularity of e-learning, retaining students in e-learning platforms is an arduous task, as the intention to continue online education/learning is low (Perna et al., 2014). Lack of learning engagement, personal touch of an instructor, and self-discipline on the part of the student, are among key reasons for low intentions to continue (Allen & Seaman, 2007; Hu & Hui, 2012) Nazir et al. (2015), suggested various strategies like buddying, briefing and feedback to retain students on e-learning platforms. Moreover, the sustainable success of online learning platforms requires continuous investment in infrastructure, staff training, and student engagement. The data presented in Fig. 1 highlights the issue of sustainability of virtual education. It depicts the shrinking enrollment statistics of the Virtual University of Pakistan at three regional campuses (Muzaffarabad, Kotli, and Mirpur) in Azad Kashmir. Bear in mind that the Virtual University of Pakistan is Pakistan's first and largest virtual university which is completely based on modern information and communication technologies. The post-COVID-19 situation may have further worsened the situation as the niche of virtual higher education institutions has evaporated due to the introduction of LMS at every traditional university in the COVID-19 period.

Therefore, the primary focus of current research is to measure the influence of factors associated with the Virtual University of Pakistan's ability to retain its students. This university initially manage to attract the students due to its technology nascence and first mover advantage. Will it be able to retain them? The answer is ambivalent. Insight of online learners' intention to continue virtual education will give a clear answer to previously raised questions. Hence, the influence of personal and environmental factors associated with online learners' intention to continue virtual education is measured in a developing and technology nascent economy, where people still have doubts about virtual education.

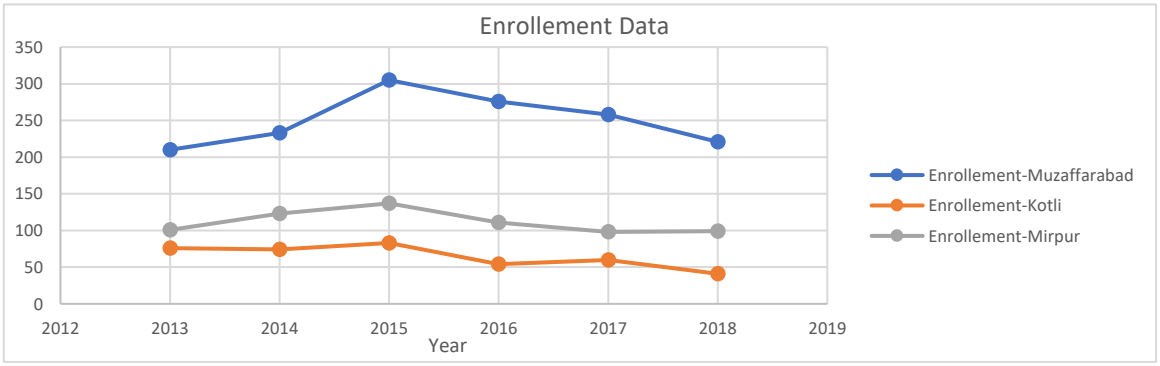


**Fig. 1.** Enrollment Data

## 2. LITERATURE REVIEW

Online/Virtual education is a major subset of distance education as it overcomes terrestrial and spatial challenges through technology (Khan et al., 2017). Various phraseology, for instance, e-learning, internet learning, distributed learning, networked learning, tele-learning, computer-assisted learning, and web-based learning, has been used for online learning/ virtual education (Hanley, 2018). All these nomenclatures connote that the learner and tutor are at a distance and connected through some form of technology to access the learning materials and interact with each other (El Mhouti et al., 2018).

Continuation of online/virtual education is human behaviour, which, according to the Social Cognitive Theory of Bandura (1989), is an outcome of personal and environmental factors. Personal factors, for example, perceived usefulness, perceived ease of use, attitude, perception of interaction, self-distraction, cognitive absorption, playfulness, cognitive age, perceived enjoyment, perceived behavior control, effort expectancy, and performance expectancy are related to an online learner's intent to continue online/virtual education (Dağhan & Akkoyunlu, 2016; Panigrahi et al., 2018). Likewise, information quality, system quality, service quality, instructor quality, system use, group norm, and knowledge quality are important environmental factors in the continuance of online/virtual education (Chang, 2016; Panigrahi et al., 2018). This paper looks at the significant personal and environmental factors associated with the continuation of online/virtual education through the lens of Social Cognitive Theory. The theoretical framework/conceptual framework of the study is presented in Fig. 2.

## 2.1. THEORETICAL FRAMEWORK

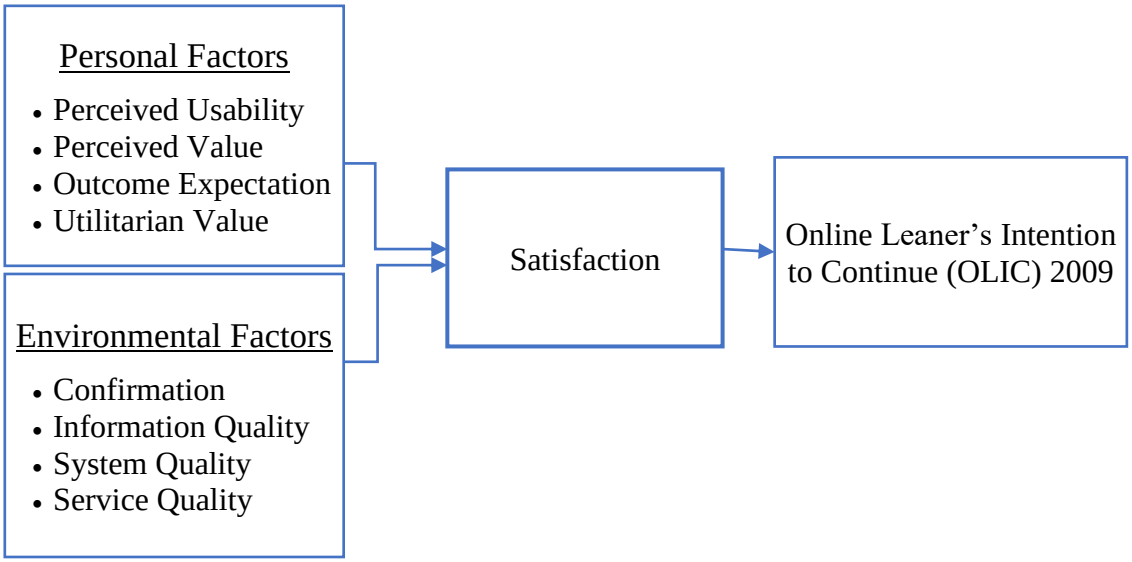


**Fig. 2.** Conceptual framework

### 2.1.1. Online Learners' Intention to Continue

People tend to ignore their core beliefs while making adoption decisions and become the victim of imitation or herd behaviour. Consequently, they make bad decisions, which are bound to change in the post-adoption stage (El Mhouti et al., 2018). The existing secondary information results in herd behaviour whereas uncertainty of adoption leads to discounting own information (Sun, 2013; Khan et al., 2017). Online Learner's Intention to Continue (OLIC) is a construct that measures the intention of an online/virtual student to continue his/her learning through the online educational forum (Shiau & Luo, 2013). It is an immediate online/virtual education outcome variable, which measures its effectiveness. The study of antecedents of continuation of online/virtual education provides a better understanding of how to engage students in online environments. Panigrahi et al. (2018), have carried out a

systematic literature review on factors associated with the continuation of learning with e-learning forums and categorized them into personal and environmental factors.

### 2.1.2. Satisfaction

In the context of our study, satisfaction is online learners' emotions about their experience with online/virtual education. Satisfaction is one of the principal antecedents of online learners' intention to continue with an online learning platform (Alraimi et al., 2015; Bhattacherjee, 2001; Limayem & Cheung, 2008, Shiau & Luo, 2013). It is the main anchor of Bhattacherjee's (2001), Information Systems Expectation Confirmation model. This model contends that users' personal and environmental expectations determine their level of expectations.

### 2.1.3. Personal Factors

The literature review of Panigrahi et al. (2018), reports several personal factors which are related to online learners' intention to continue. However, the following four factors appear to be predominant in influencing the continuance intention of online learners. First personal factor: 'perceived usability is also dubbed as 'perceived ease of use in the literature. Davis' (1989), Technology Acceptance Model considers perceived ease of use along with perceived usefulness as major antecedents of technology adoption and its continuance use. Shin et al. (2013), Cheng (2012), Knight and Burn (2011), and Ros et al. (2015), have found a positive impact of perceived usability on online learners' intention to continue with technology platforms.

The perceived value appeared to be the second dominant personal factor. It measures the value an online learner perceives to extract in terms of staying abreast and satisfying the needs for knowledge, learning, and development. Chang (2016), and Dağhan and Akkoyunlu (2016), have found a positive and significant influence of perceived value on online learners' intention to continue. Thirdly, the outcome expectation personally motivates online learners to continue with their online learning platforms (Hsu et al., 2011; Dağhan & Akkoyunlu, 2016). Lastly, the utilitarian value, is a comparative benefit an online learner extract from using an online learning platform. They compare the effort, time, and overall inputs with the value they expect from an online learning platform. Utilitarian Value is positively correlated with online learners' intention to continue (Chiu et al., 2007; Kim et al., 2011; Dağhan & Akkoyunlu, 2016)

### 2.1.4. Environmental factors

Various environmental factors are associated with online learners' intention to continue (Panigrahi et al., 2018) but forthcoming four factors are highly influential. First, confirmation: it is perceptions regarding the harmony between the users' expectations of the information system and the system's actual performance (Dağhan & Akkoyunlu, 2016). Confirmation positively affects the continuation intention in an online system through perceived usefulness and satisfaction (Alraimi et al., 2015; Bhattacherjee, 2001). Similarly, the three IS quality parameters- information quality, system quality, and service quality affects the satisfaction of online learners, which in turn influence the intention to continue learning on an online platform (DeLone & McLean, 2003). In the study of Cheng (2012), these quality

parameters have influenced perceived usability, perceived value, and perceived enjoyment. Furthermore, system use, information quality, and system quality have a shrinking influence on satisfaction when the system is used under the voluntary use context (Sun, Fang, & Hsieh, 2014). Perceived information quality is more influential than perceived system quality on perceived individual benefits and user satisfaction, and the latter two determine the continuance intention in a virtual learning environment (Zheng et al., 2013).

There are few studies (Jin et al., 2010; Cheng, 2012; Cheung et al., 2011) about the online learners' intention to continue learning through an online learning environment. However, these studies are not holistic as they are either based on personal utilitarian motivations or social factors/ hedonic factors. Our study is different from the prior studies as it presents a holistic approach to measuring the online learners' continuance intention by taking into account personal and environmental factors. Grounding on Social Cognitive Theory, the study model treats satisfaction as a mediator between personal and environmental factors and online learners' intention to continue. The study has a unique context i.e. it is carried out in a technology nascence country.

### 2.2. Research Hypotheses:

1. There is a positive relationship between perceived usability and online leaner's intention to continue through satisfaction.
2. There is a positive relationship between perceived value and online leaner's intention to continue through satisfaction.
3. There is a positive relationship between outcome expectation and online leaner's intention to continue through satisfaction.
4. There is a positive relationship between utilitarian value and online leaner's intention to continue through satisfaction.
5. There is a positive relationship between confirmation and online leaner's intention to continue through satisfaction.
6. There is a positive relationship between information quality and online leaner's intention to continue through satisfaction.
7. There is a positive relationship between system quality and online leaner's intention to continue through satisfaction.
8. There is a positive relationship between service quality and online leaner's intention to continue through satisfaction.

## 3. METHODS

All the students of the Virtual University of Pakistan who are enrolled at its three regional campuses (Muzaffarabad, Kotli, and Mirpur) in Azad Kashmir constitute the population of the study. In the year 2018, there were in total 361 (Muzaffarabad = 221, Kotli = 41, Mirpur =99) enrolled students in these three regional campuses. Proportionate stratified random sampling was used to extract an optimal sample of 186 subjects, as this sampling strategy gives equal representation to all the three regional campuses. Primary data was collected from 186 students, out of these, 114 were from Muzaffarabad, 21 from Kotli, and 51 from Mirpur regional campus. The data was gathered during terminal examinations of the fall

2018 semester. Data was gathered through a self-reported questionnaire comprising valid and reliable scales given in table 1.

**Table 1.** Sources of Scales Used

| Construct | No. of items | Source |
|---|---|---|
| Perceived Usability | 6 | Kang, Hong, & Lee (2009) |
| Perceived Value | 3 | Chang, 2016 |
| Outcome Expectations | 4 | Hsu, Chang, & Yen (2011) |
| Utilitarian Value | 4 | Kim & Oh, 2011; Chiu, et al., 2007; |
| Confirmation | 3 | Kang, Hong, & Lee (2009) |
| Information Quality | 6 | Chang, 2016 |
| System Quality | 5 | Chang, 2016 |
| Service Quality | 4 | Chang, 2016 |

## 4. FINDINGS

The statistical tool named Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to analyze the data in SmartPLS software as the study was testing new relationships among logically connected variables. Before testing the measurement and structural models of the study, data screening and descriptive analysis were carried out to look for missing values, univariate normality, and common methods variance. Table 2 presents the characteristics of the sample.

**Table 2.** Descriptive Statistics

| Demographics | Frequency | Percentage |
|---|---|---|
| *Campuses* | | |
| Muzaffarabad | 221 | 61 |
| Mipur | 99 | 27 |
| Kotli | 41 | 12 |
| Total | 361 | 100 |
| *Gender* | | |
| Males | 218 | 60 |
| Females | 143 | 40 |
| Total | 361 | 100 |
| *Program* | | |
| Undergraduate | 81 | 22 |
| Postgraduate | 280 | 78 |
| Total | 361 | 100 |

### 4.1. MEASUREMENT MODEL

The measurement model assesses the reliability and validity of the constructs. Measurement model validation is done through examination of internal consistency reliability, convergent, and discriminant validity. Internal consistency reliability was measured through Cronbach's Alpha and composite reliability. Convergent validity was assessed through AVE and outer loading whereas discriminant validity was ensured through the Fornell-Larcker Criterion and Hetro Trait Mono-Trait (HTMT) ratio of correlations. Table 3 indicates that scales used in the study have internal consistency reliability as Cronbach's alpha, rho_A, and composite reliability for all variables are above

0.60, 0.708, and 0.708 respectively. Table 3 also shows the convergent validity of the questionnaire as all items of the questionnaire have outer loadings greater than 0.40 and similarly all scales have composite reliability of greater than 0.50.

**Table 3.** Construct Reliability and Validity

| CONSTRUCTS | ITEMS | LOADING | CRONBACH'S ALPHA | RHO_A | CR | AVE |
|---|---|---|---|---|---|---|
| PERCEIVED UTILITY | PU1 | 0.544 | 0.669 | 0.716 | 0.781 | 0.560 |
| | PU2 | 0.371 | | | | |
| | PU3 | 0.691 | | | | |
| | PU4 | 0.728 | | | | |
| PERCEIVED VALUE | PV1 | 0.588 | 0.690 | 0.795 | 0.777 | 0.516 |
| | PV2 | 0.558 | | | | |
| | PV3 | 0.768 | | | | |
| OUTCOME EXPECTATION | OE1 | 0.742 | 0.822 | 0.830 | 0.816 | 0.531 |
| | OE2 | 0.788 | | | | |
| | OE3 | 0.549 | | | | |
| | OE4 | 0.806 | | | | |
| UTILITARIAN VALUE | UV1 | 0.507 | 0.797 | 0.823 | 0.799 | 0.507 |
| | UV2 | 0.856 | | | | |
| | UV3 | 0.748 | | | | |
| | UV4 | 0.692 | | | | |
| CONFIRMATION | CON1 | 0.968 | 0.697 | 0.826 | 0.706 | 0.573 |
| | CON2 | 0.468 | | | | |
| | CON3 | 0.513 | | | | |
| INFORMATION QUALITY | IQ1 | 0.641 | 0.831 | 0.834 | 0.832 | 0.652 |
| | IQ2 | 0.694 | | | | |
| | IQ3 | 0.640 | | | | |
| | IQ4 | 0.685 | | | | |
| | IQ5 | 0.745 | | | | |
| | IQ6 | 0.624 | | | | |
| SYSTEM QUALITY | SQ1 | 0.627 | 0.727 | 0.728 | 0.726 | 0.597 |
| | SQ2 | 0.545 | | | | |
| | SQ3 | 0.598 | | | | |
| | SQ4 | 0.564 | | | | |
| | SQ5 | 0.610 | | | | |
| SERVICE QUALITY | SerQ1 | 0.668 | 0.786 | 0.809 | 0.785 | 0.615 |
| | SerQ2 | 0.602 | | | | |
| | SerQ3 | 0.600 | | | | |
| | SerQ4 | 0.878 | | | | |
| ONLINE LEARNER INTENTION TO CONTINUE (OLIC) | OLIC1 | 0.683 | 0.839 | 0.773 | 0.781 | 0.694 |
| | OLIC2 | 0.421 | | | | |
| | OLIC3 | 0.442 | | | | |
| SATISFACTION | Sat1 | 0.484 | 0.755 | 0.788 | 0.719 | 0.589 |
| | Sat2 | 0.568 | | | | |
| | Sat3 | 0.765 | | | | |

Table 4 and Table 5 comprise the results of the tests used for the measurement of discriminant validity. Table 4 presents the result of the Fornell and Lacker criterion. In the table, the square root of AVE is greater than the correlations among constructs; hence, it is confirmed that every construct is unique and captures a specific phenomenon. Likewise, Table 5 contains the second criterion used to measure the discriminant validity, that is,

Hetro Trait Mono-Trait (HTMT) ratio. All the constructs have an HTMT ratio below the benchmark i.e. 0.90. These results are evidence presence of discriminant validity.

**Table 4.** Fornell and Lacker Criterion

| | Con | IQ | OLIC | OE | PU | PV | Sat | SerQ | SQ | UV |
|---|---|---|---|---|---|---|---|---|---|---|
| Con | 0.788 | | | | | | | | | |
| IQ | 0.636 | 0.773 | | | | | | | | |
| OLIC | 0.621 | 0.594 | 0.884 | | | | | | | |
| OE | 0.561 | 0.467 | 0.350 | 0.829 | | | | | | |
| PU | 0.507 | 0.488 | 0.643 | 0.632 | 0.891 | | | | | |
| PV | 0.523 | 0.609 | 0.533 | 0.686 | 0.713 | 0.904 | | | | |
| Sat. | 0.598 | 0.529 | 0.617 | 0.692 | 0.442 | 0.721 | 0.938 | | | |
| SerQ | 0.495 | 0.476 | 0.419 | 0.679 | 0.383 | 0.398 | 0.635 | 0.896 | | |
| SQ | 0.620 | 0.470 | 0.587 | 0.669 | 0.574 | 0.577 | 0.742 | 0.419 | 0.889 | |
| UV | 0.671 | 0.437 | 0.539 | 0.625 | 0.628 | 0.464 | 0.695 | 0.363 | 0.601 | 0.812 |

**Table 5.** Hetro Trait Mono-Trait Ratio (HTMT)

| | Con | IQ | OLIC | OE | PU | PV | Sat | SerQ | SQ | UV |
|---|---|---|---|---|---|---|---|---|---|---|
| Con | 0.788 | | | | | | | | | |
| IQ | 0.711 | | | | | | | | | |
| OLIC | 0.756 | 0.669 | | | | | | | | |
| OE | 0.614 | 0.662 | 0.759 | | | | | | | |
| PU | 0.893 | 0.781 | 0.724 | 0.769 | | | | | | |
| PV | 0.819 | 0.703 | 0.669 | 0.746 | 0.816 | | | | | |
| Sat. | 0.752 | 0.748 | 0.658 | 0.698 | 0.667 | 0.788 | | | | |
| SerQ | 0.339 | 0.272 | 0.343 | 0.163 | 0.366 | 0.297 | 0.767 | | | |
| SQ | 0.523 | 0.649 | 0.794 | 0.662 | 0.867 | 0.782 | 0.871 | 0.418 | | |
| UV | 0.788 | 0.851 | 0.625 | 0.619 | 0.844 | 0.666 | 0.622 | 0.261 | 0.813 | |

## 4.2. Structural Model

The structural model verifies the study hypothesis through assessment coefficients of variables (β), t-values, and multivariate coefficient of determination (R2). In table 6, β values and T values indicate that "satisfaction" is a significant mediator between all independent variables and the dependent variable, that is, OLIC. The multivariate coefficient of determination (R2) shows the combined effects of all exogenous variables on a dependent variable. The R2 value of 0.667 for the overall model indicates that one unit change in the independent variable (s) will bring a 0.667 percent change in the dependent variable. Fig. 3 presented the pictorial view of empirically tested model.

**Table 6.** Structural Model

| Hypothesis | Relationship | Beta | T-value | Decision | R2 |
|---|---|---|---|---|---|
| H1 | Perceived Usability → Satisfaction → OLIC | 0.475 | 8.475 | Supported | 0.667 |
| H2 | Perceived Value → Satisfaction → OLIC | 0.078 | 2.102 | Supported | |
| H3 | Outcome Expectation → Satisfaction → OLIC | 0.148 | 2.775 | Supported | |
| H4 | Utilitarian Value → Satisfaction → OLIC | 0.228 | 2.194 | Supported | |
| H5 | Confirmation → Satisfaction → OLIC | 0.585 | 11.029 | Supported | |
| H6 | Information Quality → Satisfaction → OLIC | 0.084 | 2.625 | Supported | |
| H7 | System Quality → Satisfaction → OLIC | 0.097 | 3.065 | Supported | |
| H8 | Service Quality → Satisfaction → OLIC | 0.265 | 2.821 | Supported | |

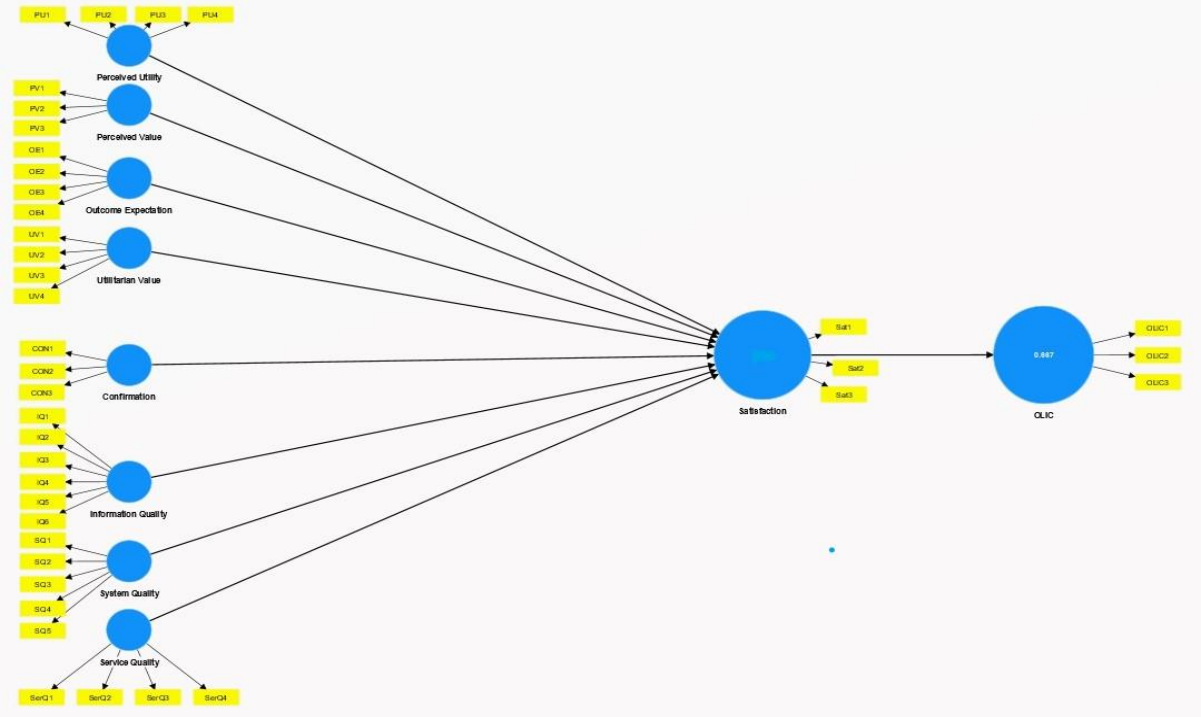


**Fig. 3.** Empirically Tested Model

## 5. DISCUSSIONS AND CONCLUSION

The study result highlights that the satisfaction of online learners is the main driver for their intent to continue online education. All the personal and environmental factors lead to learners' satisfaction or dissatisfaction. Hence, virtual education institutions are required to ensure the presence of above mentioned personal and environmental satisfier in their functioning. These institutions cannot only rely on their primary niche, that is, convenience through minimizing the temporal and spatial challenges. The post-COVID-19 situation has almost neutralized this niche of virtual education institutions as almost all traditional higher education institutions have developed the capabilities to provide online education. In this scenario, the sustainability of virtual education lies with the quality and satisfaction of the online learners.

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Conceptualization/introduction, literature review and discussion section is carried out by Dr. Bilal Ahmed Abbasi (1st author) and methodology and data analysis was done by Dr. Ambreen Gul (2nd author).

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## Informed Consent Statement:

Informed consent was obtained from all subjects involved in the study.

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## Conflicts of Interest:

No Conflicts of interest.

## Reference:

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