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Mediating Role of Individual Proactive Behaviour in Relationship between Learning Management System (LMS) and Students Academic Performance

AZHAR KHAN
Phd Scholar, Department of Management Sciences,
Islamia College Peshawar, Pakistan.
Email: azhar5896081@gmail.com

IHTESHAM UR RAHMAN
Lecturer, Institute of Business Studies and Leadership
Abdul Wali Khan University, Mardan.
Email: ihtesham@awkum.edu.pk

SHAHZAD KHAN
Demonstrator, Institute of Business Studies and Leadership
Abdul Wali Khan University, Mardan.

ATAULLAH
Demonstrator, Institute of Business Studies and Leadership
Abdul Wali Khan University, Mardan.

Abstract

This current study of research shed light on how proactive behavior acts as a bridge between technology and performance. This study is unique as it uses individual proactive behavior as mediator to strengthen the relationship between Learning Management System and student academic performance. The study is new because most of the universities offer traditional education rather than online and there is limited literature available in KPK, Pakistan. However, individual proactive behavior is an important concept that emphasizes the veneration of TAM's theoretical contribution. The study employs a quantitative, explanatory, and cross-sectional design. Four hypotheses based on TAM and Theory of Reasoned Action were tested (TRA) was formulated. The study population was limited to one university in Nowshera, which recently converted its classical education system to an online education system. A questionnaire was distributed among 917 students recently enrolled in the newly adopted LMS. In which 307 filled questionnaires were received back. In order to determine the direct and in-direct effects of exogenous and intervening variables, the data were modeled using partial least squares (PLS-SEM). The result of this study confirms prior research indicating that LMS has a significant effect on student academic performance. Additionally, it was discovered that individual proactive behavior plays a significant mediating role between LMS and student academic performance. Finally, more work in LMS and technology is recommended, as online education is the most effective tool in retaining students globally.

Keywords: *LMS, Individual Proactive Behavior, Academic Performance, SMART PLS, TAM, TRA.*

Introduction

The global landscape of higher education has shifted dramatically in recent months as a result of the coronavirus outbreak (also known as COVID-19). Students and their studies have been severely impacted

worldwide as a result of the virus (Covid-19), isolation measures, social distancing, quarantines, travel restorations, closures of study centers, and border closures (UNESCO,2020).

One of the renewed associations, "International Association of Universities" is closely monitoring the consequences of coronavirus on the education sector all around the globe. International Association is an independent worldwide NGO which was established in 1950 and associated with UNESCO. International Association of Universities has established the first Global Survey on the issues related to coronavirus and its impact on Higher Education.

Nexus to the crisis, online education is considered as one of the most effective tools in keeping students retaining and maintaining. Around the globe, the mainstream of schools, colleges, and universities assimilate some form of online education. Whereas, certain colleges and universities may already have a well-established online education system. While smaller universities in the developing and under-developing countries are struggling to establish or adopt an online education system.

The pandemic has not only sealed economies all around the world but has also flattened the education system in developing and developed countries. Around one and half billion (1.5) students of the world are badly affected due to Covid-19 and they are not able to physically go to education institutions (UNESCO, 2020).

Presently, teachers and faculty are still struggling to regain and maintain their students with the same depth of engagement as they could have in a classroom environment. Accordingly, they are using Google Meet, and Zoom applications to keep in touch with the students. Indeed, it is a challenging task for both the teachers and learners especially the process of transforming the traditional classical model into an online model.

Information Technology has become an approach for educational institutions to facilitate the overall students' performance (Magalhães et al., 2020). Through the use of information technology, students have been given the advantage to study on-line as same as in the class environment without the need for teacher-students physical interaction by using just an E-learning model (Azhari et al., 2015). This new online system of education serves as a way to accelerate the learning process (Denan et.al. 2020). Learning Management System (LMS) through information technology provides an excellent opportunity not only for academic applications but also for the administration of educational institutions and training centers of organizations (Polizzi, 2020).

Several studies have been conducted to identify the abilities to create a flexible Virtual Learning Environment (VVLE) (Van-Raaij and Schepers, 2008). (Liu, 2020). Implementing and testing LMS is considered third generation.

Several studies have examined the impact of LMS on student academic achievement. In this context, a University of Chile study looked into the relationship between Moodle (a type of LMS) and teacher performance. Similarly, six Saudi universities used Moodle as a learning management system in their teaching-learning process. The results show that individual attitudes and behaviors are the main impediment to using LMS as a learning technology (Alghamdi and Bayaga, 2016). Another study was conducted at the University of China, where 45 students were interviewed about their views on the use of LMS. In response, a conceptual construction model was developed to explain student differences and acceptance of VLE use (Van-Raaij and Scheper, 2008).

Similarly, Gulzar and Leema (2016) studied the use of LMS systems in India to benefit from 700 virtual tools, while Ahmad (2020) studied the use of LMS systems in Jordan to influence individual virtual environments. Another study in Iraq collected data from universities about the use of LMS and its

implications to improve student academic performance using the Technology Acceptance Model (TAM) (Radif, 2016).

Problem Statement

The Coronavirus crisis has impacted both students and universities like posing complex and extraordinary challenges to higher education. As a result, the traditional education system must be transformed into an online education system in accordance with the Higher Education Commission's guidelines. But the main issue is unawareness of on-line education like Moodle's, and behavior of both the faculty and students as they do not like to change the pattern of the classical education system which leads to a negative impact on Students Academic Performance.

Structure of the Study

This article is composed of 5 parts. The first part has discussed the pandemic of coronavirus and its impact on higher education. Part 2 is about the theory of the technology acceptance model (TAM). Accordingly, part 3 is about the need for a learning management system (LMS). Part 4 is about individual proactive behavior toward the use of technology. And finally, part 5 is about the academic performance of students been to go through with the LMS.

Literature Review and Hypothesis Development

Learning Management System (LMS)

LMS is software composed of tools and commands used to support teachers, learners, and administrators in educational institutions to deliver timely, efficient, and effective training materials online (Dutton, et al., 2004; Bongalos, et.al., 2006; Garrote, 2009). LMS provides a link between teachers and learners/ students so that they can share and sent information between them. It is just like a classroom for both students and teachers (Adzharuddin, 2013).

LMS is an online E-learning system in the form of a gateway through which learners and instructors can collaborate on a variety of classroom activities via a wide area network. In this platform, learners and instructors can use technology as an alternative to the classroom (Park, 2009). It is a computer and internet-based system used by many organizations as a training tool in developed countries. Learners and students are provided an easy way to register and avail of the facilities of LMS online.

According to Park (2009), a learning management system is a computer-oriented system used by organizations mainly for training purposes. The most popular LSM are Moodle, Desire2Learn, and Blackboard. It plays a critical role in higher education especially in universities all over the world. LMS allows to access the digital library, submission of assignments, quizzes, and examination papers. It provides the facilities for sharing textbooks, research materials, and links of videos to YouTube channels (Park, 2009).

Moreover, LMS provides facilities to the learners but they are certain challenges associated with LMS including poor signals of the Internet, cost of Internet Packages, attitude towards technology, and required technical skills to use LMS properly. LMS is not that much user friendly as it is dull and rigid as compared with the other social networking sites like Facebook, YouTube, LinkedIn, and Instagram.

Behavior towards adopting new technology is based on intention. And the intention of students regarding the use of LMS is the critical situations of Covid-19 instead of a classical model of classroom activities that are seen to be difficult and impossible. According to Selim (2007), four critical extents are influencing the effectiveness of the learning management system: the characteristics of the trainer, the characteristics of the instructor, features of technology, and the support of others (Selim, 2007). Similarly, Park (2009) further

elaborated and stated that not only teachers and students should review and change their behavior, attitude, beliefs, perspectives, and habits to be able to adopt the use of technology as LMS efficiently. In this connection, Park (2009) indicates three more considerations about the use of technology as LMS i.e. characteristics of the learner, instructional structure, and interactions between trainer and learner. All the aforesaid suggestions expose that individual behavior towards the understanding of new technology as LMS should be given more attention when developing an online education system.

Proactive Behavior (IPB)

The word "Proactive Behavior" has become a part of literature when German investigators (Frese; Kring; Soose; Zempel, 1996) used it in their work. Since then, numerous studies have been done in the United States, Europe, Africa (Frese et al., 2007); Pakistan Ghafoor et.al., (2011), and many other regions around the globe (Grant; Ashford, 2008).

At present, IPB is composed of five elements that represent as a. IPB is dependent on the goal of organization b. is focused on the future goals c. is driven by a long term objective d. is determined by facing hindrances and obstacles i.e. IPB boost individual for self-started (Frese et. al., 1996).

IPB seeks to improve the worst situation by referring to actions taken by individuals to influence themselves and their environment, as well as proactive and problem-solving behavior (Parker et. al., 2006; Parker and Collins, 2010). Researchers are currently concentrating their efforts on human characteristics such as disposition, effectiveness, and abilities as they relate to variables that influence constructive behavior.

Many researchers have focused on the outcomes of IPB due to the importance of individuals in the organization. They concluded that IPB gives positive results like improvement in job performance, career success, satisfaction in job activities, satisfaction in career, innovation in task performance, and task mastery (Ashforth et. al., 2007; Ruder, 2003; Yi, 2009; Bolino et al., 2010; Thomas et al., 2010; Saks et al., 2001). Similarly, Unsworth and Parker (2003) stated that IPB leads employees to feel proud and motivated thus contributing to generating a dynamic workforce in the organization.

According to Salovaara and Oulasvirta (2004), IPB is based on the intention to cause a change rather than just to react and expected to change. Proactive individuals are consistently looking ahead with the proper vision and future activities, anticipating actions, and strive for possible and fruitful outcomes (Parker, 2010). IPB comprises acting in advance of future directions rather than only reacting.

According to (Kickul, 2006), IPB is about sustained effort, and students are engaged in identifying additional chances and opportunities for success. Additionally, it is stated that students with a high IPB are more likely to succeed academically.

LMS and its Association with Academic Performance (SAP)

The widespread use of technology and online education has prompted researchers to examine the impact of online learning on student outcomes and academic performance. Numerous studies have yielded mixed results. However, while some research studies found no significant differences between online and traditional learning (Dell et al., 2010), others have shown the value of adopting online education (Moore, 2016). Another study found a positive impact due to the fact that they not only meet educational needs but also student needs (Herlo, 2016). Less time spent on the computer means more time spent on learning. Bryson (2015). Studies show that online education not only increases student ownership in learning but also increases student effectiveness in meeting student needs and increasing student responsibilities (Bryson and Jenkin 2015).

The ease of accessing study materials provided by LMS improves learners' ability to learn without having to physically attend class. Using LMS has improved learners' learning skills (Nair and Patil, 2012). According to Ebardo (2009), using LMS improves academic performance in higher education. He did a comparative study with two classes of the same professor. In his study, one group of students did not have access to LMS while the other did. The results showed that using an LMS improved students' **SAP**.

Theory Support

The important thing is to understand how technology affects behavior. In this connection, the researcher is taking the theory support from the theory of Reasoned Action (TRA) by Ajzen (1975), and a new version of this theory is the technology acceptance model (TAM) developed by Davis (1989). These two theories are explaining human behavior behind the use of technology. According to the TRA, it is believed that actual behavior is generally based on the intention of humans. Liker and Sindi (1997) proposed that human behavioral intention is a decision of acting or not. The beliefs of an individual refer to his understanding of certain phenomena. Consequently, the overall individual beliefs establish a foundation that regulates the intention of individual behavior towards the accomplishment of a certain act (Ajzen, 1975).

Davis (1986) developed a theory based on the TRA model called the Technology Acceptance Model (TAM), which was based on Fishbein and Ajzen's TRA model. Since 1989, TAM has been a widely used theory in the field of technology (King and He, 2006). Individuals' acceptance of computer technology is defined by this model.

The theory of TAM is based on five types of a construct such as perceived usefulness, perceived ease of use, behavior-based by intention, attitude towards its use, and the use of system properly. According to the TAM model, perceived usefulness is about the belief of an individual that using new technology (LMS) boosts up individual performance (Davis et.al., 1989). The perceived ease of use is based on the efforts of an individual in evaluating the new technology (LMS), whereas behavior intention to use is backed by individual behavior (Davis et.al., 1989). Indeed, the trainer/ instructor needs to know what motivates students to proactively access the LMS and how the effectiveness of the technology contributes to their academic performance.

Numerous studies were carried out in the field of computer technology and the use of TAM theory found positive and significant results. In this connection, a study was done by Van-Raaij and Schepers (2008), who used Virtual Learning Environment (VLE) for which TAM was applied and found significant results. Similarly, ICT has experienced a prosperous with the use of the M-learning model as LMS applied TAM and found positive feedback.

Similarly, a quantitative study was carried out in the universities of Ecuador to evaluate a personal virtual environment by using LMS in which the TAM model was applied and found significant results.

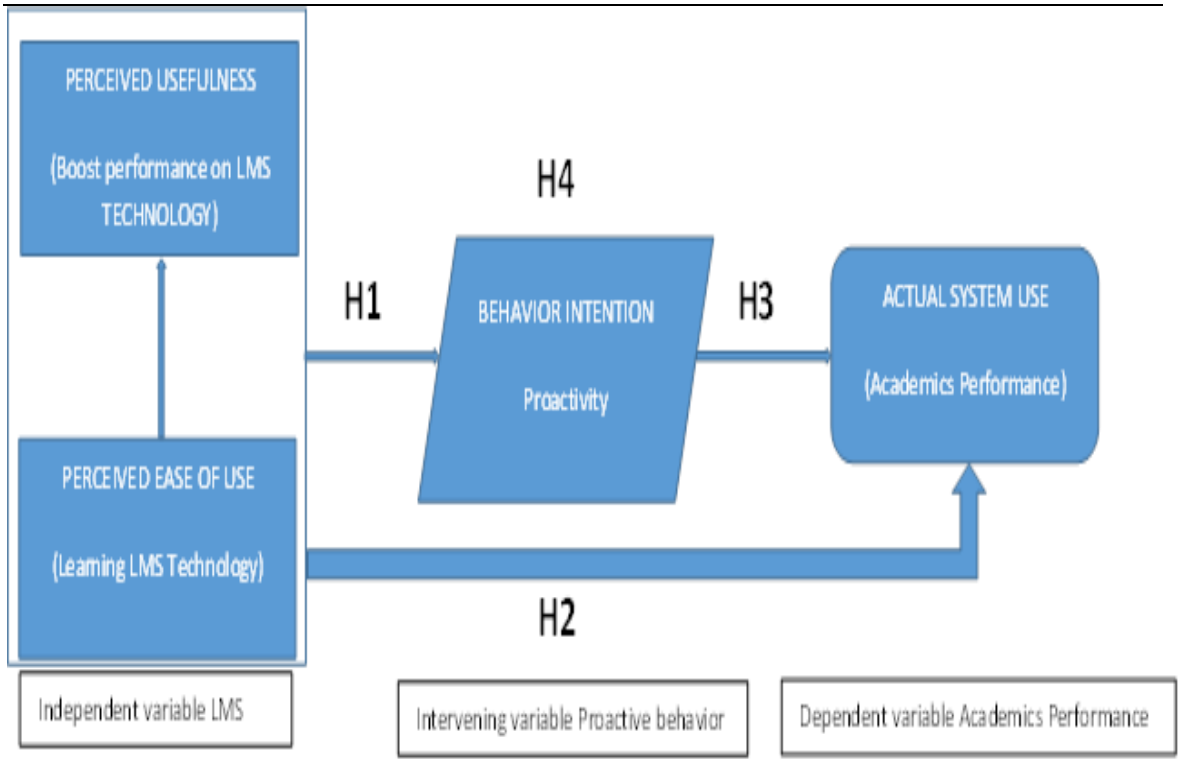
Theory in Action

Studies related to E-learning were carried out both in developed and developing countries found mixed results. In this connection, Park et al., (2012) focused on mobile learning which is found in a new study that evaluates the behavioral intention to the use of mobile learning. In this regard, data were collected from 288 students of the Konkum University of Korea. The empirical results demonstrated that the Technology Acceptance Model (TAM) is an acceptable model that predicts students' acceptance of mobile learning. TAM model has been used by many Arabian countries to investigate students' behavior. Nexus to this aim, a study was done in Lebanon among the students of different Universities (Tarhini et.al, 2013). The study showed that TAM had affecting student’s acceptance of the E-learning environment positively. Another research by the same author in the same year was made the elaborate the TAM model to investigate the behavior of students baked by intention to use the E-learning program. This time TAM model was used

with two other factors i.e. social norms and quality of work life. In this connection, an empirical study was carried out in which data were collected from 569 undergraduate and postgraduate students of Lebanon Universities. The result was found significant and fruitful for policymakers consider that E-learning is affected by cultural and social factors (Tarhini, 2013).

Nexus to the aforesaid review, the researcher conjectures the following hypotheses:

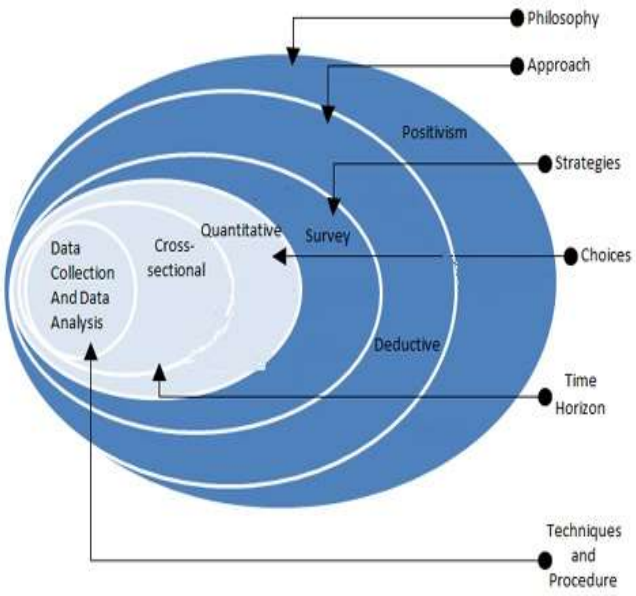
H1: LMS has a significant impact on **IPB**.
H2: LMS has a significant impact on Students' **SAP**.
H3: **IPB** has a significant impact on Students' **SAP**.
H4: **IPB** has a significant mediating effect between LMS and Students' **SAP**.



Methodology

According to the onion model, this is empirical and explanatory research (Saunders et al., 2008). The study is quantitative in nature, positivist in philosophy, deductive in **ap**proach, and cross-sectional in time horizon.

The data is from Northern University Nowshera KP, Pakistan. The university is in a rural area where students lack basic Internet access. They have problems with weak signals and expensive Internet packages. The study population was limited to one university in Nowshera, which recently converted its classical education system to an online education system. 917 students enrolled in the newly adopted LMS received a questionnaire. 307 completed questionnaires were accepted.



Analysis

SEM was used to analyze the Partial Least Squares (PLS). The testing model's structures dictated this methodology (Ali et al., 2018). Missing values, etc., are not issues in nonparametric data. Missing values, etc., are not an issue in PLS-SEM. It is compact in PLS-SEM. Cronbach's alpha, rho A, and composite reliability measure internal consistency. AVE assesses convergent validity. HTMT and Fornell and Larcker calculate discriminant validity. Q2 (effect size) was included in the structural model (predictive performance). Use nonparametric 10,000-sample bootstrapping (Streukens and Leroi-Werelds, 2016).

Measurement Model

It's necessary to assess model reliability, convergent validity, and discriminant validity. Internal coherence is the first. The consistency of construct indicators is defined by this. All of the alpha coefficients, rho A, and Composite Reliability CR values were greater than 0.700 (Hair et al., 2013).

Table 1: Global Reliability, the latent variables' CRs are all above 0.7, indicating divergent validity (Hair, Black, Anderson, 1998).

Table 1: Reliability and Convergent validity

	Alpha	rho_A	CR	AVE
LMS	0.73864	0.7447	0.83579	0.56116
IPB	0.89681	0.90689	0.90423	0.71052
SAP	0.88005	0.88541	0.90881	0.62485

Chart 1 Alpha

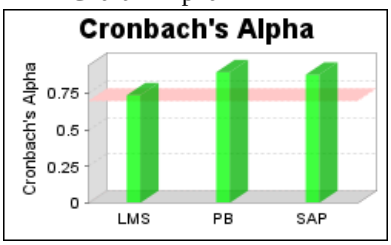


Chart 2 CR

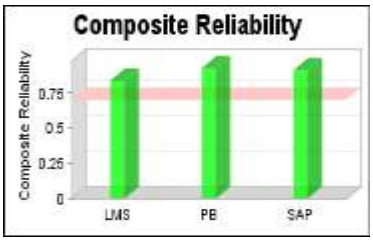
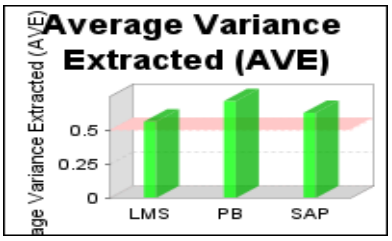
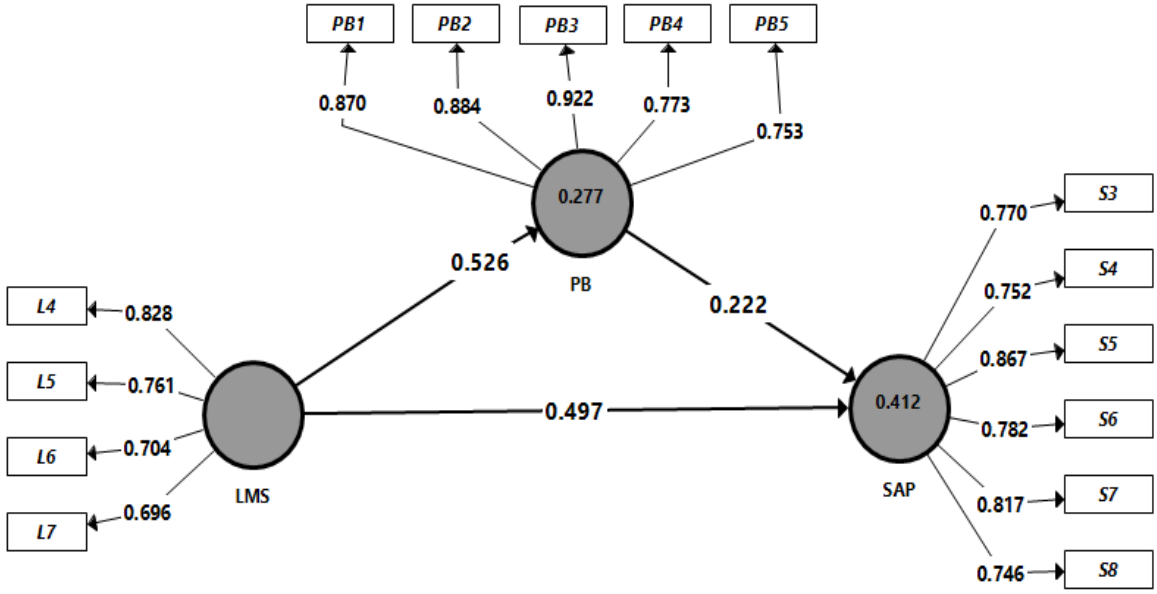


Chart 3 AVE





Confirmatory factor analysis was used in the second phase of the measurement model evaluation (CFA). Only items with loadings greater than 0.708 were kept, while those with loadings less than 0.7 were removed, with the exception of L6 and L7.

Convergent validity is the third evaluation phase. Regarding convergent validity, the average variance extracted (AVE) of all latent variables was found to be greater than 0.5, indicating explained variance is greater than unexplained variance.

The HTMT ratio was used in the fourth phase of measurement model evaluation to assess discriminant validity. Henseler, Ringle, and Sarstedt (2015) recommend HTMT values below 0.9. Table 2 shows **IPB** and **SAP** ratios below 0.9. When the correlation of indicators of all latent variables is less than the correlation of indicators within a single variable, discriminant validity is established.

Table 2: HTMT

	LMS	IPB	SAP
LMS			
IPB	0.62819		
SAP	0.74091	0.53026	

Chart 4 HTMT

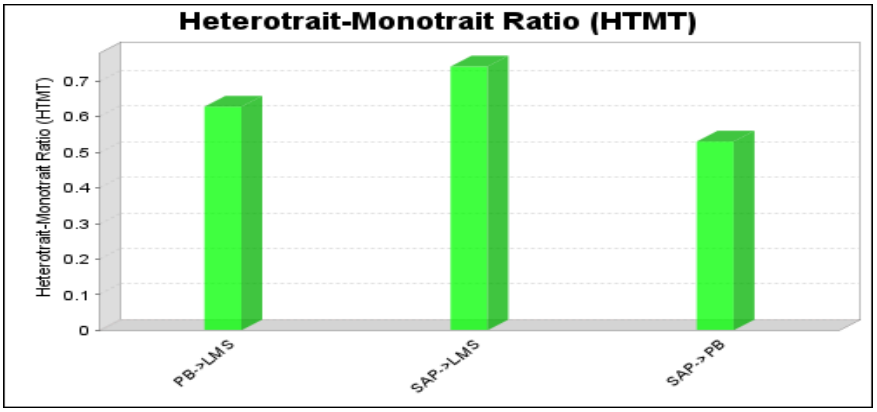


Table 3 summarizes the findings. In order to investigate the result of discriminant validity, another test of Fornell and Larcker's Fornell Larcker satisfactory levels of latent variables was conducted.

Table 3: Fornell Larcker

	LMS	**IPB**	**SAP**
LMS	0.74911		
IPB	0.52586	0.84292	
SAP	0.61353	0.48333	0.79048

Structural Model

More important than the path coefficient estimates alone in structure modeling is the overall fit of the estimated model, which includes the path coefficient estimates, the effect size (f2), and the coefficient of determination (R2). The steps for estimating the structural model are outlined in Table 4.

Path Coefficient

An estimate of a path coefficient is statistically significant when it is changed from zero (0) at a 5% level of significance when the p-value is less than 0.05 when it is used in structural modeling. The path coefficient results in an overall positive and statistically significant relationship between LMS and SAP of Students, as shown in Table 4. Path analysis results reveal that LMS and IPB (= 0.52586, p 0.0000) have a significant and positive impact on the path analysis results. Similar to this, the LMS and SAP (= 0.49672) have the greatest and most significant influence (p 0.0000). As a result, the results of the IPB and SAP path analyses (= 0.22213, p 0.00002) have a statistically significant impact. There is statistical significance in all hypotheses because the t value is greater than 1.96 for all of them. As a result, the H2 and H3 hypotheses are accepted as valid explanations.

Table 4: Path coefficient

	Path Coeff B	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
LMS -> **IPB**	0.52586	0.52993	0.05647	9.31163	0.00000
LMS -> **SAP**	0.49672	0.49896	0.04634	10.7181	0.00000
IPB -> **SAP**	0.22213	0.22183	0.05251	4.23058	0.00002

The Direct, Indirect, Total Effect

The results of the mediating analysis are presented in this report's Tables 5, 6, and 7. IPB is defined as a continuous effort between exogenous and endogenous variables, according to previous research. 1 However, there have been fewer studies on the use of IPB in the fields of learning management systems (LMS) and student SAP. According to the current findings, the IPB serves as a complementary mediator between the LMS and SAP. In the case of H4, the fact that "IPB has a significant mediating effect on the effect between LMS and SAP," as stated above, backs it up.

As shown in Table 5, the total indirect effects of LMS on SAP are statistically significant (= 0.11681, p 0.00057), indicating that hypothesis H2 is accepted. Table 6 displays the findings of this study, which show that IPB plays a highly significant mediating role in the specific indirect effects of individual proactive behavior between LMS and SAP (= 0.1681; p 0.00057). As a result, hypothesis H4 was discovered to be true.

Table 7 shows that the total direct effects of LMS and IPB, as well as the total direct effects of IPB and SAP, are all positive and statistically significant, with p-values under 0.05 for each. The importance of individual proactive behavior cannot be overstated, as this mediating variable was successful in persuading students to use LMS in their academic endeavors. As a result, it is possible to conclude that individual proactive behavior, rather than reactive behavior, played a significant role in the development of proactive behavior rather than reactive behavior among students who used LMS to replace the traditional education system in a pandemic situation.

Table 5: Total Indirect Effects

	Path Coeff B	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
LMS -> **IPB**					
LMS -> **SAP**	0.11681	0.11841	0.03389	3.44683	0.00057
IPB -> **SAP**					

Table 6: Specific Indirect Effects

	Path Coeff B	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
LMS -> IPB -> SAP	0.11681	0.11841	0.03389	3.44683	0.00057

Table 7: Total Effects

	Path Coeff B	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
LMS -> **IPB**	0.52586	0.52993	0.05647	9.31163	0.00000
LMS -> **SAP**	0.61353	0.61737	0.03403	18.02788	0.00000
IPB -> **SAP**	0.22213	0.22183	0.05251	4.23058	0.00002

It is shown in Table 8 that the structural model has been evaluated, and that the t-statistics for all four hypotheses of the study are in agreement with each other, and the p-values are within acceptable limits. When using IPB, the R square of an LMS is 27 percent, whereas when using SAP, the R square of an LMS is 41 percent.

Table 8: Structural Model Evaluation

Hypotheses	T Statistics (|O/STDEV|)	P Values	Effect Size f^2	R^2	Q^2
H1: LMS -> **IPB**	9.31163	0.00000	0.38223	0.27653	0.1915
H2: LMS -> **SAP**	10.7181	0.00000	0.30364	0.41212	0.2369
H3: **IPB** -> **SAP**	4.23058	0.00002	0.06072		
H4: LMS -> **IPB** -> **SAP**	3.44683	0.00057			

Cohen (1988) assessed effect sizes, with values of H1 being f2 = 0.3822 representing a large effect size, H2 being f2 = 0.30364 representing a large effect size, and H3 being f2 = 0.06072 representing a small effect size. Cohen (1988) assessed effect sizes with values of H1 being f2 = 0.3822 representing a large effect size, H2 being f2 = 0.30364 representing a large effect size, and H3 being.

In the final step, the predictive performance of the structural model was evaluated using the Q2 prediction predictor. Predict values for Q2 were interpreted using the Hair et al. (2019a) thumb rule, and values of 0.01, 0.25, and 0.50 were used to indicate the minimal, medium, and high-relevance scenarios for a given model, respectively.

H1 indicates that the model is only marginally relevant, whereas H2 indicates that the model is moderately relevant.

Discussion, Implication, and Recommendation

All theories are accepted on the basis of how the evidence is analyzed and interpreted. It is statistically significant that the LMS has an impact on SAP, in particular. Meanwhile, the IPB acts as a go-between in the higher education market to mediate this relationship.

These findings demonstrate that the theory of the Technology Acceptance Model (TAM) is frequently applied in the field of education. The importance of IPB as an organization was examined in this study.
Despite the fact that this study found evidence to support the hypotheses put forth, it did have some limitations. Only one institution limits the probability to the degree of the findings for the study group of 307 participants, and that institution is the University of California.

This finding suggests that improved individual proactive behavior between the LMS and students' academic performance will most likely result in improved academic performance for students in the long run. These findings, as well as previous findings, are consistent with the findings of the research on (Moore, 2016; Herlo, 2016; Bryson and Jenkins, 2015; Nair and Patil, 2012; and Ebardo, 2009).

A further benefit of this empirical study is that the findings will be published in the literature as an example of individual proactive behavior in the context of TAM and TRA theory. As a second contribution, this study contributed to the body of knowledge by putting TAM theory to the test in one of Pakistan's less developed areas, where students are denied access to basic technology such as the Internet, smartphones, and application software. Finally, in the critical situation of covid-19, where the concept of learning management system (LMS) was unfamiliar to the students, this applied research was carried out to determine the impact of LMS on their academic performance.

Conclusion

Using PLS-SEM was a favorable methodological aspect of the study. Among the benefits of using PLS-SEM is that it allows researchers to estimate complex models without requiring distributional data assumptions with different constructs and indicators (Hair et al., 2017).
The findings support the theories that proceed to deepen those components. LMS is a broad component of the academic performance of students that should be managed by the IPB.

Recommendations

Eventually, we agree that it should be controlled and consistent with the philosophy of TAM to provide a stronger and more effective educational environment using LMSs, studying, and teaching practices. In a way, it is possible to best exploit the advantages of web and face-to-face experiences.

The research study concludes by stating that Learning Management Systems has been very beneficial to the students. It is recommended that both styles of learning such as classical and on-line education systems should continue in the larger interest of students and their careers.

Finally, to overwhelm the limitation of the present study, a future study in the field of LMS and students' academic performance is required with the use of individual and group proactive behavior. Besides, this study employed a cross-sectional technique while the future study can employ a longitudinal study to verify the behavioral intention of students regarding the use of technology in their studies.

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