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Technology Acceptance Model and Academic Performance of Postgraduate Students: The Moderating Role of Academic Self-Efficacy

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Abstract

Different models and theories have been tested in educational institutions to predict academic performance of the students. With the development of the technology and the advancement of communication channels, this study explores the impact of the usage of technology on student' academic performance. For this purpose, the study aims at hiring technology acceptance model (TAM) to test the effect of the usage of social media on academic performance. TAM-core variables are comprised of five variables including perceived ease of use of social media, perceived usefulness of social media, intention to use of social media, and actual use of social media. Interestingly, the study sees the effect of TAM-core variables predicting academic performance of the postgraduate students by the moderating of academic self-efficacy. The study used Quantitative research method by adopting design survey questionnaires. First, the study administered survey questionnaires among the postgraduate students of public and private universities. The study found that there was the significant links among TAM-core variables. In addition, actual use of social media was found to have significant and positive impact on academic performance. Moreover, academic self-efficacy was found to have the moderating role between actual use of social media and academic performance. Second, the study uses Qualitative research method by conducting face-to-face interviews to support the academic self-efficacy of the students to respond academic performance positively. The study identified personal and socio-contextual factors further categorizing into other factors. Finally, the study contributes to future directions, limitations and practical implications.

Keywords: *TAM-core variables, actual use of social media, academic self-efficacy, academic performance, sequential explanatory research design, public and private universities, postgraduate students*

Introduction

Social media, the modern medium of mass media, has truly become an imperative mode of communication in current era. The common concept of widespread social networking through various applications of social media among the people of different ethnicity, cultures and societies residing in far-flung places across the globe has reduced the distances. Using social media by people makes links between people-to-people and country-to-country have become so easier. Now people can communicate with each other, share files, still and motions pictures and videos, generate discussion on social media forums through text messages, and conduct real-time live audio-video conversations.

According to social media perspective, Davis (1989) proposes the Technology Acceptance Model (TAM) that revolves around user motivation and adoptive behavior. According to TAM, perceived ease of use, perceived usefulness and behavioral intentions of using technology lead to shape up behavioral intentions and the usage of technology (e.g. intention to use and actual use of social media respectively). In addition, perceived usefulness (PU) and perceived ease of use (PEU) are key factors that directly and indirectly boost academic outcomes (Marangunić & Granić, 2015). Moreover, some higher external variables including subjective norms (SN), self-efficacy (SE) and simplifying circumstances enlighten the notch of deviations in perceived usefulness and perceived ease of use (PEU) (Abdullah & Ward, 2016 and Schepers & Wetzels, 2007). In other words, perceived ease of use and perceived usefulness are rudimentary rudiments that assist as intentions to accept and utilize novel technologies.

As well as, self-efficacy is reflected as the stages of inevitability people have in their capacity to achieve or accomplish certain tasks e.g. performance (Bandura, 1977, 1982, 1997). It is proposed that personal efficacy affects the behavior that becomes a reason to take initiatives in order to start a specific task, how much effort be put to achieve the objective, and the degree of perseverance to deal with challenges and difficulties to achieve the result (Bandura, 1997). The uprightness of this entitlement has contributed to a number of research accomplishments and interests of people associated with the practice. It is commonly agreed that practical intercessions ought to be established on a premise of theory and research. One objective of this research is to scrutinize self-efficacy and its properties on academic performance of the postgraduate students. Findings of a number of researches are evident that self-efficacy may result into higher academic performances, in spite of the fact that the intensity of relationship differs among the studies. Bandura (1997) claims that self-efficacy is scrutinized to anticipate the academic performance,

self-efficacy parameters are made to make TAM-components vital in achieving the behavioral intentions. Self-efficacy measurements and their performance must be lying within the same behavioral domain. It is authoritative that the parameters that researcher chooses as the substance for self-efficacy levels must be the parameters obligatory in implementing subsequent performance (Lachman & Leff, 1989; Pajares, 1996, and Pajares & Miller, 1995). Henceforward, self-efficacy investigation must engage an in-depth analysis of the competences that support performance. The study has a strong relationship with self-efficacy. Through this study an endeavor made to understand the role and impact of self-efficacy on academic performance of the postgraduate students of higher education institutions in Punjab. Additionally, this study is going to test the links among the TAM-core variables in TAM model. Therefore, this study also practices self-efficacy (as a moderator) theory between actual use and academic performance as guiding principle for studying academic performance of postgraduate students of public and private sector universities/HEIs in Punjab.

Literature Review and Theoretical Framework

Links among TAM-core Variables

Literature studies provide evidence that Technology acceptance model (TAM) is based on Reasoned Action theory (RAT) first introduced by Martin Fishbein in 1967 (Fishbein, 2008). The TAM was further developed by Fred D. Davis in 1989 (Fred D Davis, 1989). The theory, technology acceptance model, primarily emphases on "perceived ease of use (PEU)" and "perceived usefulness (PU)" of technology that ultimately becomes "actual use" of technology. Technology acceptance model states that acceptance of technology primarily depends on two-core variables perceived usefulness and perceived ease of use of the technology. Both of these factors shape up users' "attitude towards use" of the technology, which leads to form users' "behavioral intention to use" of the technology. Users' "behavioral intention to use" of technology results into "actual use" of the technology (Fred D Davis (1993).

Social media may be defined as online platforms that help users to create and share content as well as facilitating two-way communication with interactive features (Carr & Hayes, 2015). Technology has made its place as an essential part in peoples' lives. Social media is omnipresent and has become a mean of quick and rapid way of communication. The study in hand is an effort to investigate adoption, usage and impacts of new technology on students' academic performance. Technology acceptance model is one among the most famous theories used to understand and

investigate the adoption and use of technology among variety of populations. Further, it is also considered that Technology Acceptance Model theory can be easily applied to study the acceptance and usage of technologies and information systems (Lee, Kozar, & Larsen, 2003). Majority of research literature on the subject provides evidences that technology acceptance model can be successfully employed to understand and investigate adoption and use of social media.

While presenting a comparison of two theories in studying the acceptance of computer technology among users, Fred D. Davis, Bagozzi, & Warshaw (1989) noted that perceived usefulness of computer technology was significantly impact upon users' intention to utilize computer. Furthermore, it was also observed that second largest determinant of intention to use of computer technology was perceived ease of use of computer technology among people. This is a strong evidence that technology acceptance model can be successfully applied to explore usage of innovative technological applications. Based on above evidences, this study proposes the following hypotheses.

H1. Perceived ease of use (PEU) of social media significantly predicts perceived usefulness (PU) of social media in HEIs in Punjab

H2. Perceived usefulness (PU) of social media significantly predicts intention to use (ITU) social media in HEIs in Punjab.

H3. Perceived ease of use (PEU) of social media significantly predicts intention to use (ITU) of social media in HEIs in Punjab

H4. Intention to use (ITU) of social media significantly predicts actual use (AU) of social media in HEIs in Punjab

Influence of actual use of social media on academic performance

The study reported the results of four research studies conducted by Wood and Locke (1987) to investigate the relationship between actual use of social media and academic performance. Mathieson., (1991) compared technology acceptance model (TAM) concerning theory of planned behavior (TPB) to test the intentions of users in using information systems to academic performance of the undergraduate students. Furthermore, a structural equation modeling analysis was made by Elkaseh, Wong, and Fung (2016) on the use and usefulness of social media for e-learning among students and teachers in Libyan higher education. Based on literature support, this

study proposes that actual use of social media may influence academic performance of the postgraduate students of Pakistani Universities.

H5. Actual use (AU) of social media significantly predicts academic performance (AP) in HEIs in Punjab

Moderating Role of academic self-efficacy between actual use of social media and academic performance

While conducting research on two hundred and sixty undergraduate students, Putwain, Sander, and Larkin (2013) noted that academic self-efficacy is a critical variable in predicting the academic performance in the study. In addition, the findings of the study of Bandura's (1977, 1982, 1986) explains that self-efficacy belief is most related to academic behavior. Furthermore, Pajares (1996) noted that studies conducted to understand correlation of self-efficacy and academic performance of mathematics students demonstrated higher correlation between both variables as compared to rest of academic disciplines such as writing and reading comprehension. A meta-analysis research was conducted by Multon, Brown, and Lent (1991) purported to know relationship of academic self-efficacy to academic outcomes. Additionally, Diseth (2011) noted that self-efficacy played mediating role in preceding and subsequent academic performances among undergraduate students of Psychology in Norway.

As well as, B. J. Zimmerman (2000) suggests that self-belief of efficacy not only predicts academic performance but may also play a moderating role in improvements in students' learning methods. However, the study confirmed the previous research of the subject that self-efficacy mediated academic achievements and outcomes but unfortunately, the moderating role of self-efficacy was not found in the previous studies. Moreover, it was also confirmed by the study that academic self-efficacy beliefs of students were strong predictors of academic achievements. Students' homework practices were found robust predictor of academic achievements. The study also reported that self-efficacy beliefs played a mediational role to predict academic achievements and outcomes. This study was conducted in a sample of one hundred and seventy-nine girl undergraduate students from a multi-ethnic and socioeconomic background. The researchers also identified a significant relationship between student's self-efficacy and learning beliefs (Barry J. Zimmerman & Kitsantas, 2005). To explore the neglected impact of self-efficacy as a moderating

variable, this study proposes the research hypothesis. Moreover, the final model of the present study is developing below:

>**H6.** Academic self-efficacy (ASE) significantly moderates the link between actual use of social media and academic performance in HEIs in Punjab
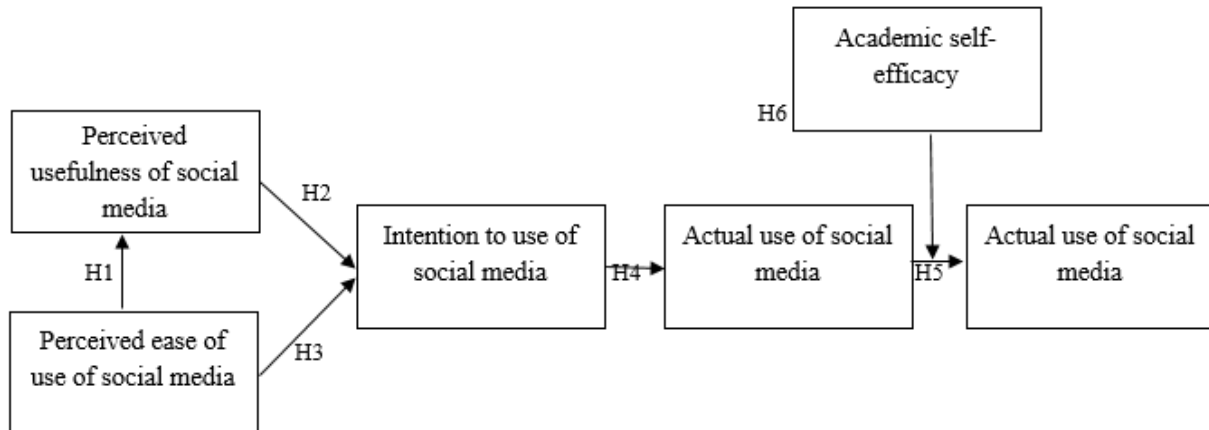

Figure 1. TAM-core measurement Model 3

Research methodologies

Quantitative Research Design

This study applied the Quantitative research design by following multi-stage sampling approach. The quantitative method is very convenient in saving cost, time & effort (Dhanapati Subedi, 2017). Therefore, the data was collected from the postgraduate students by administering designed survey questionnaire. The questionnaire method is very beneficial in terms of cost, time saving and reduces interview biasness. In addition, survey questionnaires were distributed among the students of different educational institutions based on different educational levels.

The Quantitative research method is followed by three main research method i.e. correlational research method, survey research method and experimental research method Design (Creswell & Plano Clark. 2011), explain that correlational research design is when the researcher wants to understand the kind of relationship of one variable with another variable. Survey questionnaire is a method where the researcher administers survey questionnaires among the research participants/respondents from the entire population. However, experimental research

design where the research reconstructs the casual relationship among the variables by explaining the casual validity of the variables. Interestingly, this study follows the survey questionnaire method by administering the questionnaires among the respondents.

Population and sample size

The target of this study was public and private Universities of Pakistan. Data was collected from the students of said universities including only MS/MPhil students. The respondents of this study were male and female (equally chance to participate in this study) using social media. This study includes the demographic variables to describe student characteristics. The demographic variables describe the participants to what type of sector they belong and provide authentic information about their using social media and authenticity. The present research focuses to collect data from the students of 12 public and private Sector Universities located in Lahore and Faisalabad. This study administers 480 survey questionnaires among the students of the Universities but out of 480, 403 survey questionnaires were proved valid and reliable. So, the response rate was 83.96%.

Survey instruments

The present study tests the technology acceptance model (TAM) in the higher educational institutions in Pakistan. TAM model is the combination of FIVE dimensions including perceived usefulness of social media, perceived ease of use of social media, intention to use of social media, actual usage of social media and academic performance. However, this study aims at exploring the moderating role of academic self-efficacy between actual usage of social media and academic performance. TAM model and its dimensions were valid and reliable in the literature studies so, that the present study used valid and reliable TAM model in the Pakistani context. Therefore, perceived usefulness of social media, comprised of six items has been adapted from Aboelmaged, (2010) and Eraslan Yalcin & Kutlu, (2019). Six items of perceived ease of use of social media have been adapted from (Eraslan Yalcin & Kutlu, 2019; Pikkarainen et al. 2004 and McKenzie et al. 2006). Intention to use of social media comprised of six items has been adapted from Ronnie H. Shroff, (2011). Actual use of social media, comprised of three items has been adapted from (Eraslan Yalcin & Kutlu, 2019). Academic performance consists of five items from Peter Osharive's (2015), Questionnaire (SMAAPOS) and eight items of academic self-efficacy from

Morgan and Jink's Self Efficacy Scale (MJSES) (1999). All measurement scales are measured on 5-point Likert scale ranging from 1=not et al to 5frequently.

Demographic Information

This study includes the demographic characteristics i.e. gender (male=1, female2), Qualification (MS=1, MPhil=2), University status (Public=1, Private=2), age (Up to 30=1, 31-35=2 and 36 & above=3), Academic status (Course work=1, research work=2) and Faculty (science and technology=1, other than=2).

Findings of the study

Demographic characteristics

First, SPSS Software (version 20) was used to explain the characteristics of the demographic variables. SPSS shows the details of the demographic variables i.e. Mean, Percentage, Frequencies, standard deviation. This study presents the demographic information by showing Mean for gender ($\bar{x}$=1.46), for University ($\bar{x}$=5.54) and for Qualification ($\bar{x}$=1.48), for academic performance ($\bar{x}$=1.63) and for faculty ($\bar{x}$=2.85). The research presents that there were 217 (53.8%) male students and 186 (46.2%) female students of higher classes. This study presents that 6.7% of Punjab University, 11.2% of University of central Punjab, 12.2% of University of Lahore, 11.7% of Government college University Lahore, 9.9% of Government college University Faisalabad, 5.5% of Faisalabad textile University, 11.2% of Lahore Leads University, 13.9% of Bahria University Lahore, 8.7% of University of veterinary and animal sciences, Lahore, and 9.2% of University of Engineering and technology, Lahore students took part in filling survey questionnaires. The study presents the details of Qualification of the students by showing that 209 students of MPhil class took part in study and remaining 194 students took part from MS classes. The weightage of MPhil students was 51.9% and weightage of MS students was 48.1%. Additionally, this study presents the details of the students' academic status to know whether they were doing research work or course work in their study career. 149 (37%) of students were doing research work while 254 (63%) of students were belonged to course work. 12.9% students took part from the faculty of social sciences and arts, 24.3% from the faculty of science and technology, 32.5% from the faculty of media and communication studies, and 30.3% from the faculty of physics. Moreover, 42.7% students were up to age of 30 years, 48.4% students were between the age of 31-35 years and only 8.9% of students were 36 years.

Testing Measurement Model

For the assessment of measurement model, the study applies partial least square (PLS-SEM) structural equation modeling. First, the study measures the measurement model by testing validity and reliability. Validity including convergent validity and discriminant validity was further categorized. Convergent validity includes the two parameters, outer loadings and average variance extracted (AVE) and discriminant validity also includes the two stages, cross loadings and HTMT ratio. PLS algorithm applied to explore the validity of constructs and its items. PLS algorithm is an essential weight factors of regressions. In case of reflective measurement, a researcher begins with examining the indicator factor's loading (Joseph F. Hair, 2013). Factor loadings above 0.7explains that construct is over 50% of the indicator variance (Hair *et al*., 2012; Wong, 2013; T. Coltman, 2008 and Joseph F. Hair, 2013). Average variance extracted can be calculated by means of square loadings of all construct's indicators and AVE value should be equal to 0.5 or higher value indicates high variance of a construct (Joseph F. Hair, 2013). By assessing discriminant validity cross loading of each item should be higher than 0.6 suggested by (Hair *et al*., 2013) and also higher than the cross-loadings of other construct. Second, this research followed the criteria of Heterotrait-Monotrait Ratio (HTMT) that suggests the value of 0.7 or greater than 0.7 (Joseph F. Hair, 2013).

Table 2 presents that outer loadings of all items of core-variables were higher than 0.7 *(see table .1)* except the items PEU6=0.590 and ASE=0.618 were deleted from the model because their loadings were lower than the threshold value 0.70.

Table 1. Factor Loadings of the TAM-core variables

	Academic Performance	Academic Self-efficacy	Actual Usage of social media	Intention to Use of social media	Perceived Usefulness of social media	Perceived ease of use social media
AP1	0.816					
AP2	0.799					
AP3	0.881					
AP4	0.851					
AP5	0.753					
ASE1		0.751				
ASE2		0.733				

ASE3	0.781			
ASE5	0.779			
ASE6	0.832			
ASE7	0.833			
AUS1		0.783		
AUS2		0.805		
AUS3		0.799		
IUS1			0.735	
IUS2			0.738	
IUS3			0.775	
IUS4			0.797	
IUS5			0.759	
IUS6			0.767	
PEU1				0.750
PEU2				0.881
PEU3				0.867
PEU4				0.872
PEU5				0.835
PU1			0.730	
PU2			0.841	
PU3			0.792	
PU4			0.811	
PU5			0.798	
PU6			0.775	

Table 3 presents the average variance extracted values that were higher than 0.5 therefore, the convergent validity of all constructs was good and valid. As well as, this study presents the cross loadings of all measurement items. Cross loadings of one variable were greater than the cross loadings of another variable. Moreover, **table 2** presents the Heterotrait-Monotrait Ratio (HTMT) ratio by showing that the value of each construct was higher than 0.6. Finally, convergent and discriminant validity of all constructs were proved to be valid.

Table 2. Heterotrait-Monotrait Ratio (HTMT)

	Academic Performance	Academic Self-efficacy	Actual Usage of social media	Intention to Use of social media	Perceived Usefulness of social media	Perceived ease of use social media
Academic Performance						

Academic Self-efficacy	0.659				
Actual Usage of social media	0.727	0.777			
Intention to Use of social media	0.736	0.650	0.699		
Perceived Usefulness of social media	0.846	0.681	0.705	0.752	
Perceived ease of use social media	0.700	0.662	0.677	0.639	0.677

Cronbach alpha and Compostie Reliability

PLS-SEM is a reliable technique that is used in complex model with a small level of observation. To obtain cronbach alpha and composite reliability, the PLS algorithm technique was applied*.* In assessing reliability, values are considered accepable between 0.60 to 0.70 in term of "Exploratory research" whereas values are considered satisfactory laid down between 0.70 and 0.95 (Hair *et al*., 2012; Hair *et al*., 2013; T. Coltman, 2008). Research argues that internal consistency greater than 0.95 is considered problematic because it indicates the items redundant that leads to undesireable response and straight lining (Sarstedt *et al*., 2014). **Table 3** shows that the cronbach alpha and composite reliability of all constructs were greater than 0.7 therefore, we can say that there was also good reliability of TAM-core variables, academic performance and academic self-efficacy.

Table 3. Average Variance Extracted, Cronbach's alpha and Composite reliability

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Academic Performance	0.879	0.887	0.912	0.674
Academic Self-efficacy	0.876	0.881	0.906	0.617
Actual Usage of social media	0.711	0.713	0.838	0.633
Intention to Use of social media	0.856	0.857	0.893	0.581
Perceived Usefulness of social media	0.881	0.885	0.910	0.627
Perceived ease of use social media	0.897	0.899	0.924	0.710

Testing Path Model

Smart-PLS generates T-statistics to test the inner and outer model significance levels by applying a technique called bootstrapping. The procedure follows the 3000 subsamples from the original sample 300 (maximum iterations with stop value-7) with replacement to standard errors in bootstrap that gives output in the form of T-statistics values and significance testing of Path model. Using two-tailed test with a significance level p<5 and standard error. Although t-statistics are greater than 1.96 then there would be significant path coefficient (Wong, 2013), but on the other hand, the researchers should not only see the significant or non-significant relationship between constructs but it should also see effect size.

The path coefficient has standard values from +1 to -1 (Joe F. Hair Jr, 2014; Roni *et al*., 2015; T. Coltman, 2008; T. Coltman, 2008; Hair *et al*., 2013 and Joseph F. Hair, 2013) represent that path model coefficient closer to +1 indicates higher positive relationship and on the inverse side shows the higher negative relationships. therefore, the t-values should be equal to 1.96 or higher in case 5% significant level and p-values should be lesser than 0.05 (Joseph F. Hair, 2013).

Table 4 presents the findings of this study that reveals that 'perceived ease of use of social media' has a positive and significant impact on 'perceived usefulness of social media' with **(β =0.605***, t=15.447, p<0.05)**. Similarly, 'perceived ease of use of social media' was found to have positive and significant effect on 'intention to use of social media' with **(β =0.258***, t=5.281, p<0.05)**. In addition, 'perceived usefulness of social media' was also found to have positive and significant impact on 'intention to use of social media' with **(β =0.502***, t=11.056, p<0.05).** 'Intention to use of social media' was also found to have positive and significant effect on 'Actual usage of social media' with **(β =0.551***, t=13.625, p<0.05).** Interestingly, 'Actual usage of social media' was found to be a good predictor to 'academic performance' with **(β =0.365***, t=7.179, p<0.05).** Therefore, the hypotheses H1, H2, H3, H4, and H5 were significant and accepted on the grounds of research ethics and guidelines.

Table 4. Regression coefficients of the variables

TAM (Model) Variables	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Confidence Interval 2.5%	97.5%
Actual Usage of social media -> Academic Performance (H5)	0.365	7.179	**0.000**	0.264	0.464

Intention to Use of social media -> Actual Usage of social media (H4)	0.551	13.625	**0.000**	0.469	0.628
Perceived Usefulness of social media -> Intention to Use of social media (H2)	0.502	11.056	**0.000**	0.416	0.591
Perceived ease of use social media -> Intention to Use of social media (H3)	0.258	5.281	**0.000**	0.161	0.351
Perceived ease of use social media -> Perceived Usefulness of social media (H1)	0.605	15.447	**0.000**	0.524	0.679

***p<0.05

Moderating Effect

The present study introduced the moderating variable; academic self-efficacy in TAM Model. The fundamental need of this moderator is to see that whether it moderates the relationship between 'actual usage of social media' and 'academic performance' **(table 5).** The findings show that the moderator (academic self-efficacy) was found to have direct significan effect on 'academic performance' with **(β =0.410***, t=8.526, p<0.05).** Interestingly, the direct effect of the moderator was significant that leads to the significant moderating effect of 'academic self-efficacy' on academic performance with **(β =0.064***, t=2.883, p<0.05).** That's why, it was decided that 'academic self-efficacy' was the good moderator to moderate the relationship between 'actual usage of social media' and 'academic performance'. So, the hypothesis H6 was significant and accepted.

Table 5. Moderating Path Coefficient

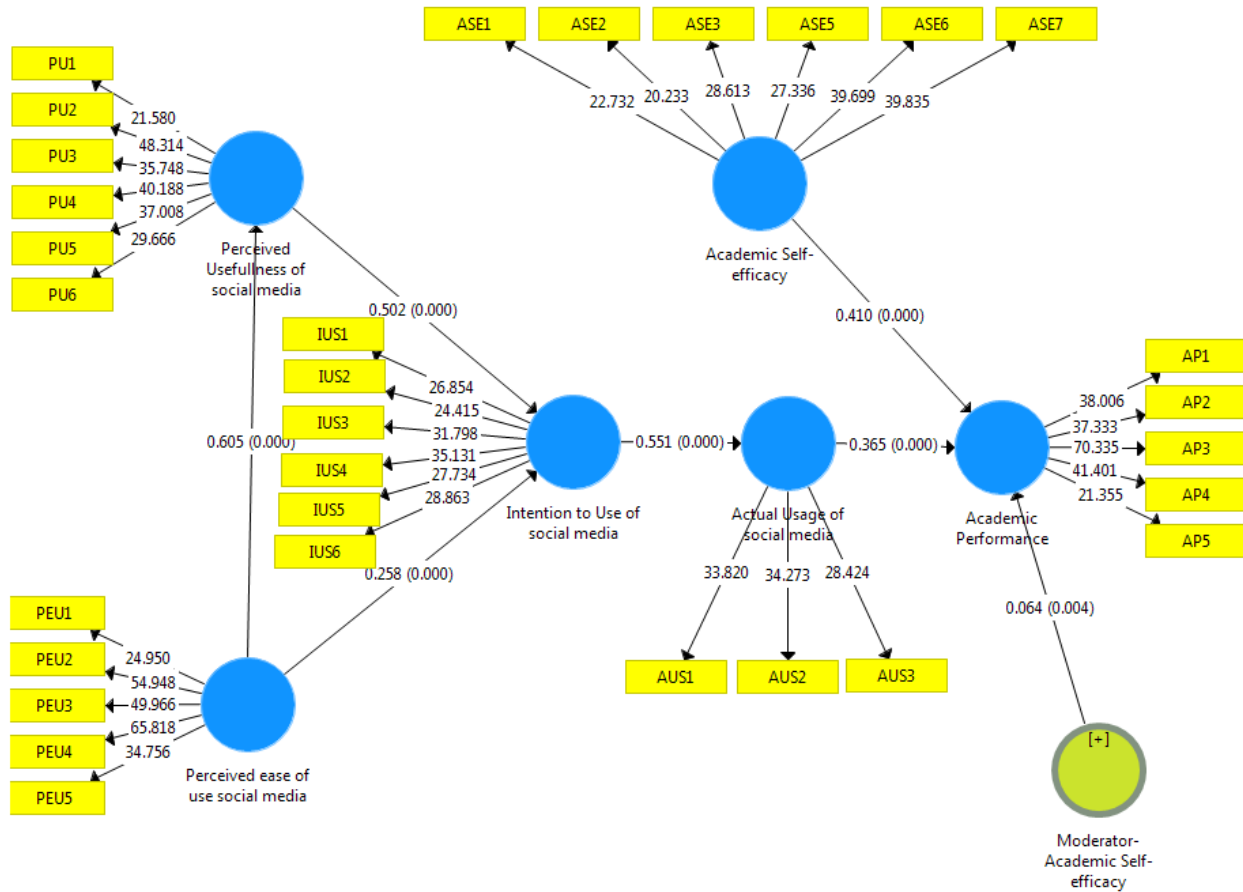|	Original Sample (O)	T Statistics (|O/STDEV|)	P Values	Confidence Interval	
				2.5%	97.5%
Academic Self-efficacy -> Academic Performance	0.410	8.526	**0.000**	0.317	0.506
Moderator-Academic Self-efficacy_ -> Academic Performance (H6)	0.064	2.883	**0.004**	0.018	0.107

***p<0.05

Path Model

Figure 2. Assessment of Path Model

Coefficient of Determination (R^2, $R^2_{adjusted}$)

The most important measure to test the structural model was coefficient of determination (R^2). The present research had good predictive accuracy and adequacy in case of examined R^2 values because R^2 is a measure to test the model predictive adequacy (Joe F. Hair Jr, 2014, **see table 8**). It is calculated by taking square of correlation coefficient of exogenous to endogenous constructs. R^2 values must be 0 to 1 with higher levels demonstrate high level of predictive accuracy (Joseph F. Hair, 2013; Joe F. Hair Jr, 2014). The present study examined R^2 and adjusted R^2. Researchers claim that PLS-SEM is used for predictive purpose (Hair et al., 2013). It provides the threshold values that present the criteria of R^2 values depended upon the type of research or model complexity because there is no rule of thumb for R^2 and adjusted R^2. Marketing scholars argue that R^2 values vary from 0.75, 0.50 to 0.25 which respectively represent strong, moderate

and weak relationship (Hair et al., 2012; Sarstedt et al., 2014; Hair et al., 2013 & Ringle et al., 2012; Joe F. Hair Jr, 2014). The predictive accuracy is presented below:

(1) 'Perceived usefulness of social media' had the good predicted accuracy that represents (R^2=0.366) the moderated impact from predictor variable, 'perceived ease of use of social media'

(2) 'Intention to use of social media' had the good predicted accuracy that shows (R^2=0.475) the moderated impact from predictor variables, 'perceived usefulness of social media' and 'perceived ease of use of social media'.

(3) 'Actual usage of social media' had the good predicted accuracy that shows (R^2=0.304) the moderated impact from predictor variable, 'intention to use of social media'.

(4) 'Academic performance' had the good predicted accuracy that shows (R^2=0.424) the moderated impact from predictor variables, 'actual usage of social media' and 'academic self-efficacy'. However, the predictive accuracy of all the variables were greater and good.

Table 8. R^2, $R^2_{adjusted}$ Statistics

	R Square	R Square Adjusted
Academic Performance	0.424	0.421
Actual Usage of social media	0.304	0.302
Intention to Use of social media	0.475	0.472
Perceived Usefulness of social media	0.366	0.365

Discussion

The present study applied TAM model in higher education surveying postgraduate students of HEC recognized universities. Interestingly, this study introduced academic self-efficacy as a moderator from actual use of social media to student' academic performance. The study contributed to TAM model by introducing moderating variable self-efficacy to see that whether the postgraduate students perform better while using the social media e.g. Facebook, WhatsApp, twitter, Instagram, snap chat, TV channels, google, and messenger etc. especially when the universities provide better infrastructure of social media (self-efficacy). The idea for choosing

education sector is that education has always been considered for two purposes: (1) education is a continuous process and (2) education leads to enhance creativity and innovation. For these, modern technology brought a new set of pressures and challenges for education institutions (Romeo, Lloyd, & Downes, 2013). Therefore, the spiral of this technology has become phenomenal issue. Today, educational institutions in many countries all over the world are living in digital world and these are booming up with modern technologies. Interestingly, modern technology helps us to collect, create and use information and modern knowledge that enables individuals to interact with each other all over the world.

The question remains unsolved to how educational institutions integrate modern technology into learning and teaching. Previous research revealed that the integration of technology in educational institutions is very complex for change, and the technology for school purposes is still exceptionally diverse (Fraillon et al., 2014). Interestingly, the usage of modern technology has recently been increased in educational institutions but technology acceptance and use still to be challenging in education institutions (Straub, 2009). In the literature studies, the question is always remained unspeakable to what factors would be used for technology integration in education institutions however user technology acceptance is a method used to determine the learning outcomes towards using modern technologies in educational institutions (Fraillon et al., 2014).

With the last decade, number of models have been tested in the literature review to analyze the mechanism of factors influencing technology acceptance such as the Unified theory of acceptance and use of technology (UTAUT) and TAM models. These technology acceptance models have been developed from the well-established theories of psychology including the theory of Planned Behavior (Ajzen, 1991) and the theory of Reasoned Action (Fishbein, 1979). UTAUT model of technology acceptance is comprised of four core dimensions of actual use and intention to use of technology, namely social influence, performance, effort expectancy and facilitating conditions (Venkatesh, Morris, et al., 2003). The impacts of above dimensions are theoretically proposed by introducing the moderation of experience, gender, voluntary of using technology and age (Williams, Rana, & Dwivedi, 2015). The purpose of comparing the UTAUT model with TAM was done in the literature study however, dimensions almost contribute the same findings in the conceptualizing (Nistor & Heymann, 2010). Most interestingly, the hypothesized moderating impact in TAM model was more powerful than UTAUT defining technology acceptance criteria.

Finally, TAM and UTAUT models are only two models of technology acceptance however, several cultural extensions and reversions have evolved around the literature (Taherdoost, 2018). Despite the several models of technology acceptance, TAM model has been considered the most widely used model to explore intention to use of technology and actual use of technology (Hsiao & Yang, 2011; Marangunić & Granić, 2015). That's why the present study used the TAM model in educational institutions to describe the usage of social media and its impact on academic performance of the students by introducing the moderating variable self-efficacy.

The present study analyzed TAM (technology acceptance model) by introducing the moderator academic self-efficacy. Firstly, the study collects quantitative data by administering survey questionnaires among the higher class students of educational institutions. Interestingly, this study surveys multi-phase sampling technique by collecting data from the diversified departments of different universities. Moreover, this study employs quantitative research design by following survey design questionnaire. The study introduces the research objectives and wants to implement the research contribution in social media usage of students of the higher institutions.

Limitations and Future directions

Every study has some limitations and future directions. However, this study has also some important directions to future perspectives to do research in the context of social media usage. Based on this study that dealt only with the postgraduate students of the public sector universities in Pakistan however, there is need to capture the public and private sector universities even the future research may include graduate and postgraduate levels of students using social media in their academic year. Additionally, the findings of the study cannot be generalized because this study administered designed survey questionnaires only among the ten public sector universities in Pakistan based on multi-stage sampling technique. One limitation is that the study collects self-reporting data from the postgraduate students so, the data biasness may be common. Moreover, the limitation of study may be drawn from using the cross-sectional study but there will be longitudinal study to find the seasonal variations of students e.g. from graduate to postgraduate class. This study introduced academic self-efficacy as a moderating variable however, university' cultural may be used as moderator between the actual usage of social media to academic performance of the students so that future study may find the cultural differences affecting the perceptions of the students using social media. The future research should be conducted on exploring the TAM-core variables links among the teachers of the universities rather than students.

The dyadic interaction may be applied to test the impact of using social media by academic students on one hand and academic performance of the students could be obtained from their university teachers. Future study may use the broader term in sense of using big data approach using the same topic and TAM-core variables. Finally, the study used TAM-core variable 'intention to use of social media' however, future study may test the different behavioral intentions to see their impacts on actual usage of social media.

Conclusion of the study

Mostly of postgraduate students present the level of academic performance through the use of quantitative and qualitative research methods. The study used quantitative research method to support the quantitative findings of the study on postgraduate students of using social media. Majority of students were evidentially captured in the real environment of using social media. However, this study conducted the research in Pakistan public and private universities where the postgraduate students use social media, You Tube, google search, WhatsApp, WeChat, Instagram, Facebook etc. for their academic purpose and enhance their ability to boost their academic performance. Using social media begins in the age of nursery class however, the purpose of capture postgraduate students is to see the impact of social media on their academic performance. The study used TAM-core variables model to interpret the findings of the study moreover, the study introduced moderator between actual use of social media and academic performance. The students were mature so that they showed the positive impact of social media variables on academic performance. Interestingly, the moderating variable; academic self-efficacy was also found to have moderating role between the usage of social media and academic performance. Moreover, the postgraduate students perform online communities in order to create an international environment, online group discussion and online lectures and blogs. Three TAM-core variables were found to have the greater impact on social media factors. The influence of perceived ease of use of social media on perceived usefulness of using social media, perceived usefulness of using social media on intention to use of social media, and intention to use of social media on actual usage of social media were greater impact. However, the impact of perceived ease of use of social media on perceived usefulness on social media was the strongest impact in TAM-core variables. Finally, the all TAM-core variables are well correlated and had the significant impacts on academic performance with and without the moderating role of academic self-efficacy of the postgraduate students.

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