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Assessing Performance Impact of Digital Transformation for Instructors in the Covid-19

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ABSTRACT

Digital transformation has evolved as the main issue for higher education institutions (HEIs) across the globe due to the Covid-19 outbreak. The purpose of this study is to investigate the performance impacts of digital transformation for instructors of HEIs during the pandemic. The technology-to-performance chain (TPC) model pursues to predict the influence of an information system on the performance of an individual user. Hence, TPC model is used to evaluate the performance of instructors due to digital transformation in the institutions during the Covid-19 pandemic. The data is collected from instructors of higher educational institutions. Recently, partial least squares path modeling (PLS-PM) has found extensive application for causal information systems (IS) research. Hence, Smart-PLS is used to analyze the data. Five constructs (task-technology fit, social norms, facilitating conditions, utilization, and performance impacts) are used to develop the model. The results showed that task technology fit (TTF) has a significant effect on performance impacts whereas utilization does not have an influence on performance impacts. Facilitating conditions and TTF are found to have an influence on the utilization whereas subjective norms do not have influence.
This study contributes to the knowledge on the factors that matter to instructors of HEI in improving their teaching productivity, communication, and co-ordination during the Covid-19 pandemic.

Keywords: Digital transformation, Covid-19, Technology-to-Performance chain

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INTRODUCTION

The Covid-19 pandemic enforced digital transformations on life and work routines, habits, and social and leisure activities. The teachers of educational institutions had to adapt all of their teaching activities distantly from their homes. They had to develop virtual teaching activities (Nemr et al., 2021). The digital transformation i.e., evolution and usage of technologies has considerably affected educational institutions. The performance of digital transformation depends on the teacher's inclination and skills (Núnez-Canal et al., 2021). A new hybrid teaching model evolved due to the pandemic in the education sector where the role of an educator is very important. Higher education institutions (HEIs) include universities, colleges, and other professional schools that provide education in the fields of art, law, medicine, business, and music.

There is a necessity for technical resources and skilled educators to improve the competence of the students in digital learning platforms (Núnez-Canal et al., 2021). Digital education became popular and essential after the Covid-19 crisis.
The current approach of teaching and learning changes from classroom to Gmeet or Zoom, from individual to virtual, and from conferences to webinars.
(Mishra et al., 2020). This digital transformation offers continuity to the learning process but it also aggravates educational gaps among students, mainly those in rural regions with a shortage of basic technological skills (Syahruddin et al., 2021).

Digital transformation is the means of improving the core business operations of an organization to fulfill customer needs proficiently by making use of data and technology (Berman and Marshall, 2014). In the education sector, students, faculty, staff, and alumni are the target customers. Digitization of the education sector can be advantageous for both students and faculty. Digital Transformation focuses on improving student and teacher's experience by allowing students to register for admission online through a mobile app or web app, providing them an extensive range of online learning options,
allowing faculties to use technology for tracking student progress and run intervention protocols and allowing faculties to conduct and organize online classes (Núnez-Canal et al., 2022).

Effective online education depends on factors such as fast and consistent internet connectivity, learning software, digital skills, affordability, and introduction to technology (Mourtzis et al., 2021). The disruption caused by the pandemic forced universities to go for digital transformations in the area of education (Murthy and Madhok, 2020). This study highlights the factors that have an impact on digital transformation in HEI for instructors in the Covid-19 era.

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This research answered two questions: 1) how digital transformation enhances performance of instructors of HEIs during the Covid-19 pandemic? 2) What are the factors that influence utilization of digital technology in the education sectors during the pandemic? Hence, this study used technology-to-performance chain (TPC) model to assess the performance impacts of digital transformation on instructors during the pandemic and identify the factors that influence the utilization of digital technology by the instructors during the pandemic. TPC *model* pursues to predict the influence of an information system on performance of a user (Ohiomah et al., 2015). TPC combines both utilization and task technology fit (TTF) to assess the impact of the technology on individual performance (Staples and Seddon, 2004). Hence TPC is used in this study to answer the above research questions.

This paper is organized as follows: first, summary of related work, addressing the digital transformation during the pandemic, and theoretical foundations on technology to performance chain model and task technology fit model will be discussed. Next, the research model will be presented followed by the hypotheses section. Next, data analysis process followed by its results will be discussed.
The paper will be concluded by its implications and discuss the potential paths for future research.

LITERATURE REVIEW

Impact of digital transformation on educational institutions in Covid-19 pandemic

Due to the pandemic situation, higher educational institutions have already shifted to online education platforms. Universities in almost all parts of the world are offering various courses online after the Covid-19 pandemic (Peters et al., 2020). In the period of COVID-19, teachers are motivated to adapt online teaching platforms such as Google meet, Zoom, Team, Cisco WebEx, etc. Videoconferencing tools like Office 365, Google Classroom are also becoming popular during the pandemic (FutureLearn, 2020; Mishra et al., 2021).

Kazuhiro Hayashi (2021) studied the incremental changes in the education sector and empower them shortly. As per his opinion, Covid-19 had to change the complete education system and hence the society. These changes should be carried forward to get a better future and resist such pandemics ahead. Likewise, Mohammad S. et al. (2020) explained the different strategies applied at Qassim University to achieve an effective teaching-learning process for medical students. They explained the problem-based learning that was conducted online and students'

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feedback is taken to enhance the process. Digitization helps the students to share their knowledge among their friends and explore more about information technology, which can be adopted in near future. Tejedor et al. (2021) worked in the same direction by collecting the teachers' and students' opinions on the digitization of the education system in the pandemic period. Their findings illustrated that there is no change in the teacher-student interaction, and there is an availability of many resources on the internet to clear the exams.

Gandhi (2021) extended the earlier work by analyzing the impact of digitization in India using PESTLE and cost-benefit analysis. PESTLE analysis is used to study the pandemic influence on various factors like political, economic, social, technological, environmental, legal, ethical aspects. As per his observation academician are going through a lot of discrepancies like depression, frustration, and issues in their relationships and the good thing is the awareness of new technologies. Likewise, Dwivedi et al. (2020) expressed the opinion of experts invited for the discussion on pandemic crises. They collected their perspective on various aspects like artificial intelligence, online education system, social interaction, big data, and various advanced technologies that changed the entire world. They suggested creating a classroom environment in the home to give effective delivery.

Working in the same area, Netta Iivari et al. (2020) elaborated on the change in basic education and how educational institutes have opted for online education in the Covid-19 period. They explored the usage of different digital devices for teaching purposes and use of Zoom and google meet to conduct the classes.
They also discussed training given to the teachers and students to use the various online platform. They discussed making the new generation of students empowered by digital transformation happen in a pandemic, to get better jobs and retain them for the future.
This digital transformation made accountable adjustments from the students, their family members, and the school administration people also. Likewise, Hebebci et al. (2020) discussed the students' and teachers' perceptions of distance education.
They conducted a content analysis survey for 16 teachers and 20 students and found that both have positive as well as negative opinions on the digitization process. According to teacher perceptive, teaching can be carried out systematically without any disturbance. At the same time, they concluded that online education should be continued in the future with the improvement in infrastructure and giving necessary exposure to advance technologies.

Apart from highlighting the advantages of digital transformation in education sectors, Jha et al. (2020) discussed the various challenges and issues faced by

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academics, students, and the management due to the digitization of education sectors. The first challenge in digitization is giving online education to students of different caste, gender, and background knowledge. There are many operational issues like the unavailability of internet speed, trained instructors, proper environment, physically developed students, insufficient funds, and so on.
The authors also recommended solutions that the ruling government should take to solve these problems. These solutions are providing good internet connectivity to the rural areas, providing digital infrastructure, tie-up with private internet suppliers, establishing separate departments to handle these issues, and so on. Literature review on digital transformation in different s during the pandemic is given in Table 1.

Table 1. Literature Review on Digital Transformation during the Pandemic

S.No.	Author, Year, Journal	Title of the paper	Objective	Conclusion/ Suggestions	
1	Fletcher and Griffiths (2020) International Journal of Information Management	Digital transformation during a lockdown	The objective of the paper is to analyze the pandemic and lockdown period through a VUCA lens. VUCA is a managerial general acronym for Volatility, Uncertainty, Complexity and Ambiguity for identifying unpredictable external environments.	The authors suggested that organizations with advanced levels of digital maturity are usually more flexible.	
2	Nachit and Belhcen (2020)	Digital Transformation in Times of Covid-19 Pandemic: The Case of Morocco	The objective of the paper is to reconnoiter the impact of Covid-19 pandemic on digital transformation	Investments in digital Infrastructure and democratization of technology and access to digital tools are	

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			implementing process.	the areas which require attention.	
3	Iivari et al. (2020) International Journal of Information Management	Digital transformation of everyday life – How COVID-19 pandemic transformed the basic education of the young generation and why information management research should care?	This objective of the paper is to examine the digital transformation introduced by the COVID-19 pandemic in the basic education of the young generation, also the emerging digital divides.	Digital transformation could empower children during their basic education. In addition, teachers act as leaders of digital transformation of education.	
4	Mohammad S et al. (2020) Informatics in Medicine Unlocked	Digitalization plan in medical education during COVID-19 lockdown	The objective of the paper is to to disclose the different digital procedures implemented by the College of Medicine at Qassim University for better student performance and accomplishment. Novel procedures for online problem-based learning (PBL) sessions were designed.	Collaborative e-learning environment and PBL sessions were accepted by the students.	
5	Donthu and Gustafsson (2020) Journal of business research	Effects of COVID-19 on business and research	The objective of the paper is to address some of the pandemic-related issues that affect society.	The author reviews past 13 papers that cover different industry sectors such as tourism, retail, higher education. These papers	

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				highlighted the pandemic related issues like changes in consumer behavior and businesses, ethical issues, and aspects related to employees and leadership.	
6	Didier et al. (2021) Journal of Financial Stability	Financing firms in hibernation during the COVID-19 pandemic	The objective of the paper is to highlight the four central issues (economic crisis, firms' relationships with key stakeholders, hibernation and existing legal and regulatory infrastructure) that have occurred in the academic and policy debates related to firm financing during the recession due to the pandemic.	Financial sector policies can help channel credit to firms, but they are hard to implement and involve different trade-offs.	
7	Ebersberger and Kuckertz (2021) Journal of Business Research	Hop to it! The impact of organization type on innovation response time to the COVID-19 crisis	The objective of the paper is to provide a deeper understanding of those innovative actors that drive the innovative response to the challenges due to COVID-19 pandemic.	The authors concluded that with a balanced combination of all types of Innovators, the challenges can be addressed resulting from COVID-19 crisis.	

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8	Kaushal and Srivastava (2021) International journal of hospitality management	Hospitality and tourism industry amid COVID-19 pandemic: Perspectives on challenges and learnings from India	The objectives of the papers is to highlight the major challenges that hospitality and tourism industry faces in the pandemic and the learnings for the industry.	The leading sub-themes that arisen out of the qualitative enquiry included need of multiskilling and professional development of the employees, increased sense of hygiene, sanitation and related SOPs, optimism toward revival of the industry, media roles, and need of better crisis preparedness.	
9	Onyema at al. (2020) Journal of Education and Practice	Impact of Coronavirus Pandemic on Education	The objective of the paper is to investigate the influence of COVID-19 on education and highlight the various challenges that obstruct online education during the COVID-19 lockdown.	The author suggested the necessity for all educational institutions, educators, and learners to adopt technology, and improve their digital skills in line with the emerging global trends and realities in education.	
10	Dwivedi et al. (2020) International Journal of Information Management	Impact of COVID-19 pandemic on information management research and practice: Transforming	The objective of the study is to provide an understanding of key issues and complexities affecting organizations and	The author suggested that, organizations must strengthen and transform their IS strategy in order to avoid further	

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		education, work and life	society from COVID-19 through an information systems and technological perspective.	disruption in business due to the pandemic.	
11	Oyediran et al. (2020) Heliyon	Prospects and limitations of e-learning application in private tertiary institutions amidst COVID-19 lockdown in Nigeria	The objective of the study is to investigate compliance with e-learning during COVID-19 pandemic lockdown by the instructors in the private tertiary institutions in Nigeria.	The authors suggested that compliance to e-learning in the tertiary institutions should go beyond the COVID-19 lockdown period while staff training and capacity building on e-learning should be put in place by the institutions' authority.	
12	Rahul De et al. (2020) International Journal of Information Management	Impact of digital surge during Covid-19 pandemic: A viewpoint on research and practice	The objective of the paper is to discuss some of the most persistent issues regarding the post-pandemic digital surge.	The authors concluded that there is a need of new technology for managing secure online interactions – for education, healthcare, and payments.	
13	Alexander Brem et al. (2021) Technological Forecasting & Social Change	Implications of the coronavirus (COVID-19) outbreak for innovation: Which technologies will improve our lives?	The objective of the paper is to analyze the effects of COVID-19 on certain technologies like 3D printing, flexible	The authors concluded that the people use and get benefit from the technologies During the pandemic.	

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			manufacturing systems, big data analytics, and smart healthcare wearables (including smartphones).		
14	Wu He et al. (2021) International Journal of Information Management	Information technology solutions, challenges, and suggestions for tackling the COVID-19 pandemic	The objective of the paper is to examine emerging technologies that are used to mitigate the threats of COVID-19 and relevant challenges related to technology design, development, and use.	This paper suggests that the specific nature of the COVID-19 pandemic needs strong coordination for connected data, people, and systems to enable worldwide collaboration.	
15	Velasquez et al. (2021) Technology in Society	Knowledge management in two universities before and during the COVID-19 effect in Peru	This study offers a collective insight to many of the key issues and underlying complexities affecting organizations and society from COVID-19, through an information systems and technological perspective.	The authors suggested that decision makers should be able to harness the power of technology to overcome the challenges of the COVID-19 pandemic.	
16	Breier et al. (2021) International Journal of Hospitality Management	The role of business model innovation in the hospitality industry during the COVID-19 crisis	The objective of the study is to explore the successful recovery attempts through business model innovation (BMI) by	The study concludes that business secure a higher level of liquidity, with an important role of	

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			conducting a multiple case study of six hospitality firms in Austria.	Stammgasts and BMI.	
17	Maqsooda et al. (2021) Current Research in Behavioral Sciences	The paradigm shift for educational system continuance in the advent of COVID-19 pandemic: Mental health challenges and reflections	The objective of the study is to highlight the educational system using digital solutions.	The authors concluded that during the pandemic, the digital solutions became the primary mean of continuity in the educational activities.	

Technology-to-Performance Chain (TPC)

Goodhue described task-technology fit (TTF) as the extent to which technology supports a person in performing his or her tasks.
More precisely, it is the fit among task needs, individual abilities, and the functionality of the technology (Goodhue, 1997). Technology is related to computer systems (like software, hardware, and data) and support services for users (like training and customer helplines).
Technologies are observed as tools used by people in performing their tasks. Tasks are the activities carried out by people in converting inputs into outputs (Goodhue, 1995). Tasks are actions performed by individuals to attain outputs (Goodhue and Thompson, 1995). Goodhue et al. (1995) proposed the TTF model to test the performance enhancement due to the technology used to complete the task.
They tested the model over 600 distinct samples from two companies and concluded that it has a positive impact on individual performance.
The TTF model is a combination of task and technology features.

Later Goodhue and Thompson (1995) projected a technology-to-performance chain (TPC) model that links both utilization and task-technology fit due to the limitation of the TTF model as shown in figure 1. TPC identifies that technology must be used and fit with the tasks to have an impact on performance impact.
TPC model gives a clearer picture of how technologies, user tasks, and utilization combined influence performance impact (Goodhue & Thompson, 1995).
TPC proposes the factors such as task characteristics, technology characteristics, and individual characteristics that have an impact on TTF. TTF in turn impacts an individual's performance both indirectly and directly by utilization of technology

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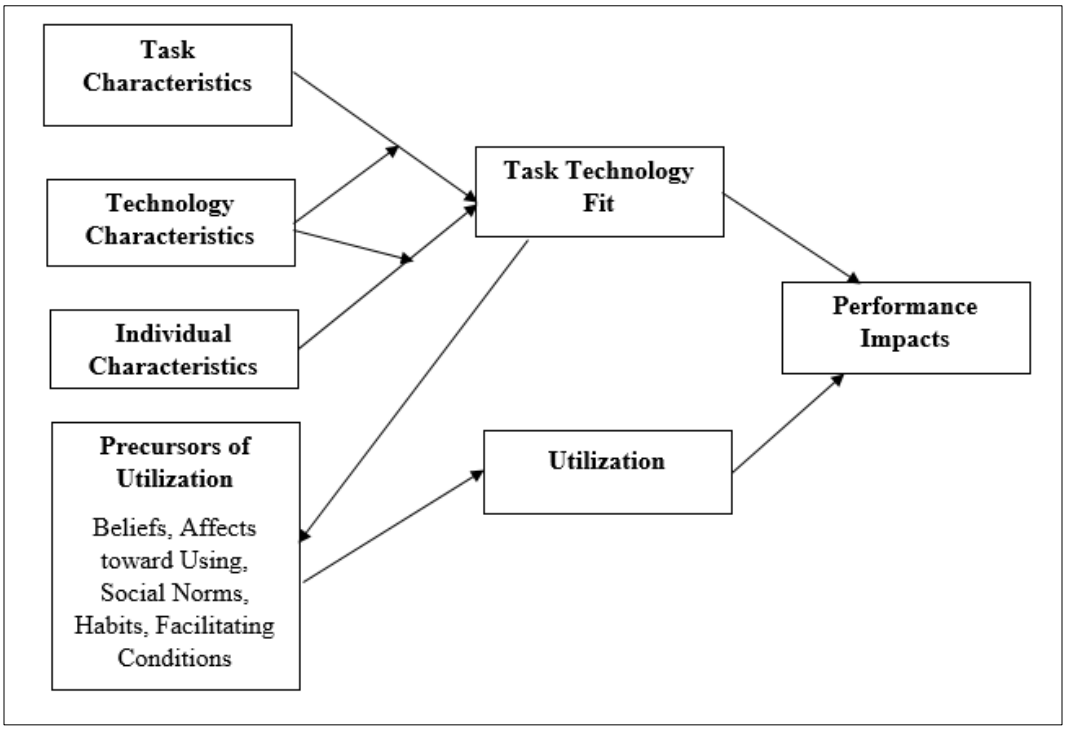
and its precursors like individual beliefs, social norms, affects towards using, habits, and facilitating conditions.

Figure 1. Technology-to-Performance Chain (TPC) Model (Goodhue & Thompson, 1995)



Cane et. al. (2009) analyzed the differences between the application of the TTF concept and the theoretical background of the concept. They highlighted the increase in the performance impact due to the use of technology and another aspect of technology is dependent on the suitability of the task performed.

The TTF theory will help to check the impact of these two factors on individual performance while performing the task. In the world of digitization, various technical tools are used to accomplish the task (Goodhue 1995; Ammenwerth 2006; Dishaw 1998; Howard 2018).

Oliveira et al. (2014) emphasized that TPC measures how technology supports individuals in the performance of their official tasks or duties. Moreover, TPC is an alteration between the task's requirements, abilities of an individual, and functionality of technology. Nouzha Harrati et al (2017) used TPC to figure out the

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association between approaches, the usability of technology, and performance to complete the routine task with the help of digital technology in the education sector. Performance is analyzed by the data collected from 180 university staff and concluded that the information system and TTF play a vital role compared to social norms. On the other side, gender has less influence on the age of individuals. *Abdillah and Saepullah* (2018) examined TPC model in the context of utilization of accrual-based information systems at local government of Indonesia. The authors found that success of information systems is not only determined by quality of information processed by the system, but also by its fitness to the work environment and user tasks.

Earlier researchers explored online learning links with different variables and used the TTF model in various applications, but still, there are some gaps existing in the literature that need to be explored. However few of them focus on analyzing the individual performance due to the technology used and type of task performed in the digital environment. Hence, there is a need to examine other factors that influence the utilization and performance impacts of digital technology on the instructors of the educational institutions during the pandemic.

HYPOTHESIS DEVELOPMENT

The influence of TTF on performance is a key component of the TPC, and its role has been confirmed in previous studies (Goodhue & Thompson, 1995; Littlefield, & Straub, 1997; Goodhue et al., 2000; Goodhue et al., 2004; Staples & Seddon, 2004). Performance impact refers to the effect of the system on the outcomes of use for the user. McGill et al. (2011) highlighted that potential performance impacts include both teaching effectiveness and efficiency or productivity of the instructors. Usage of online collaboration tools increases the efficiency and productivity of the teachers during the Covid-19 period.

McGill et al. (2011) emphasized that low TTF can end up with spending more time on using the technology by the instructors to solve certain problems which in turn has a negative impact on the performance of the instructors. Hence it is hypothesized that:

H1: TTF will positively influence digital technology performance impacts for instructors.

TTF should also have an indirect effect on performance impacts via its influence on the utilization of digital technology. Yueh and Hsu (2008) showed that it is possible to increase usage of digital technology by instructors, by focusing on the

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appropriate design of the digital platform to obtain TTF that meets instructors' needs. McGill et al. (2011) also highlighted that TTF can lead to either low or high utilization of digital technology for teaching. Poor fit discourages some instructors from using the digital platform. Hence, it is hypothesized that:

H2: TTF will positively influence the utilization of digital technology by instructors.

Goodhue & Thompson (1995) highlighted that a key precursor of information system use is subjective norms. According to McGill et al. (2011), senior academics and administrators might influence instructors to use digital technology. If such an influence exists, it would be reflected in social norms for the usage of the digital technology use, that is, instructors' perceptions that use is socially acceptable and using the digital technology will put them in good light with people who are important to them. Venkatesh & Davis (2000) found that subjective norms influence utilization. Van Raaij and Schepers (2008) found that subjective norms did affect intended use, but indirectly via perceived usefulness. Hence it is hypothesized, consistent with the TPC, that:

H3: Subjective norms will positively influence the utilization of digital technology by instructors.

Organizational support for system use such as ease of access to the system, training, relationship of the user with support staff, etc. can influence use and performance. The importance of such facilitating conditions is reflected in the updated model of IS success (DeLone & McLean, 2003). Chang and Cheung's (2001) found the positive impact of facilitating conditions on the utilization of digital technology. Lack of technical and financial support has been cited as an important inhibitor for the instructor to use digital platforms for teaching (Browne et al., 2006; Schifter, 2000). Facilitating conditions are likely to play an important role in determining levels of utilization. It was therefore hypothesized that:

H4: Facilitating conditions will positively influence the utilization of digital technology by instructors.

Earlier researchers (Goodhue & Thompson, 1995; Goodhue et al., 1997; D'Ambra & Wilson, 2004) highlighted the positive influence of utilization on performance. This relationship also coincides with the Information System success model (DeLone & McLean, 1992, 2003). According to McGill et al. (2011), increased use should lead to increased performance impacts of digital technology for instructors. Therefore, it is hypothesized that:

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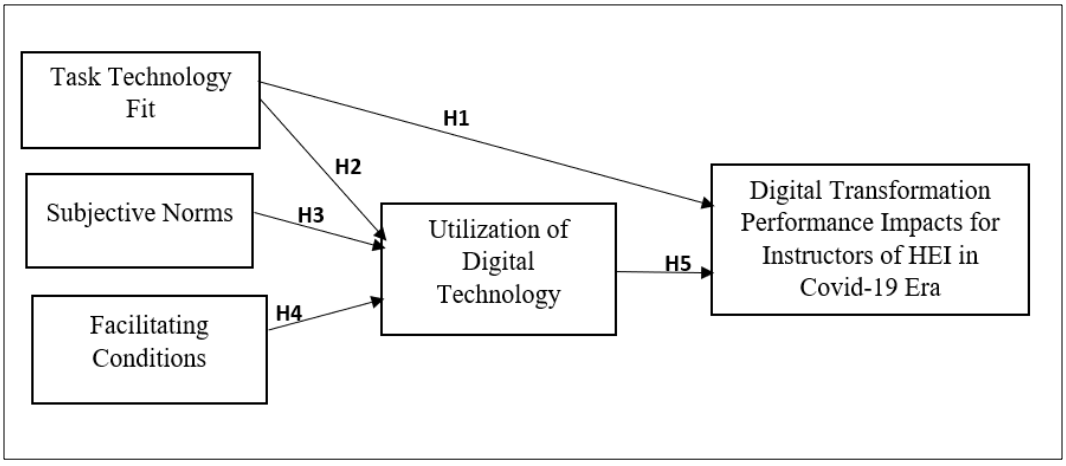
H5: Utilization of digital technology will positively influence its performance impacts for instructors.

RESEARCH MODEL

The research model contains five constructs that are task-technology fit, social norms, facilitating conditions, utilization, and performance impacts a shown in figure 2. Task-technology fit (TTF) is the extent to which technology supports a person in performing his or her tasks. It is the fit between task requirements and the functionality of the technology (Goodhue, 1997). Subjective norms are developed by normative beliefs on whether reference groups of people such as superiors, teachers, etc. think that he/she should execute a behavior
(Venketesh et al., 2003; Seyal and Turner, 2013).

Facilitating conditions are related to the organizational support for system use in the context of such ease of access to the system, training, relationship with technical support staff that can affect use and performance.
The utilization of digital technology has a positive influence on the performance of instructors using the technology (McGill et al., 2011). It may not lead to positive outcomes for instructors using digital technology (McGill et al., 2011). Performance impact denotes the impact of the system on the consequences of use for the user. For instructors, probable performance impacts can include both teaching efficiency and efficiency or productivity of an instructor (McGill et al., 2011).

Figure 2. Research Model



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RESEARCH METHODOLOGY

Context and subjects

Data are collected from the instructors of the higher education institutions of Hyderabad who are involved in online teaching and conducting or attending online conferences/webinars during the Covid-19 pandemic. These instructors are faculty of under-graduate and post-graduate who are teaching conceptual courses. Four main types of institutions are selected for data collection. These are institutions of Information Technology, Business Administration and Accounting, Engineering and Law. The convenience sampling method is adopted to select the respondents where the sample is drawn from a group of people easy to reach. 350 responses collected for the study. Finally sample size come down to 340 after deleting the incomplete responses.

Survey Instrument

A questionnaire-based survey method is used to collect the responses. Questions are measured on a Likert Scale of 1 to 5 where 1=Strongly disagree, 2=Somewhat disagree, 3=Neutral, 4=somewhat agree, and 5=Strongly Agree. A five point Likert scale analysis is used in this study because respondents can effortlessly reply questions in this format. They just merely can choose from previously given answers. The scale is also easy to analyze. The first part of the questionnaire belongs to gather the data about the demographic characteristics of the instructors. The second part belongs to the collection of data regarding the constructs of the Technology-to-Performance Chain model. These constructs are Task Technology Fit (TTF), Subjective Norms (SN), Facilitating Conditions (FC), Utilization (UT), and Performance Impacts (PI). The items used for these constructs are adopted from McGill et al. (2008; 2011). The items of the constructs are given in Appendix 1.

Data Analysis

Smart-PLS will be used to analyze the data, which is a combination of variance-based structural equation modeling (SEM) and partial least squares (PLS) path modeling method. PLS-SEM is considered a suitable approach in the case of exploratory-based research (Hair et al., 2019). PLS algorithm computes measurement and structural model relationships distinctly instead of simultaneously (Sarstedt et al., 2016). PLS is beneficial for structural equation

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modeling in applied research projects particularly for small sample size and skewed data distribution (Wong, 2013).
PLS handles constructs measured with single and multi-item measures (Leguina (2015). According to Benitez et al. (2020), partial least squares path modeling (PLS-PM) is an estimator that has established extensive application for causal information systems (IS) research.
Currently, many improvements are done to this method like consistent PLS (PLSc) for latent variable models, a bootstrap-based test for overall model fit, and the heterotrait-to-monotrait ratio of correlations for assessing discriminant validity.

RESULTS AND DISCUSSION

Descriptive statistics

The sample demonstrates the responses collected from the instructors of HEIs which were 340 in total. Table 2 shows the demographic information of the participants.
The table shows that data contain 74% of the females while males are only 26%. Furthermore, 79% of the instructors are between the age group of 30 to 40 years. In terms of the department, 41% of the instructors belong to Business administration and Accounting followed by 35% belong to Information Technology, 17% belong to Engineering, and 7% belong to the Law department. The data shows that 61% of the instructors are using Google Meet for their online teaching followed by Team 15% followed by Zoom 48% followed by WebEx 27%.

Table 2. Demographic Information

Item	Values	Frequency	Percentage (%)
Gender	Male	88	26
	Female	252	74
Age	30 to 40 years	268	79
	40 to 50 years	41	12
	Above 50 years	31	9
Department	Information Technology	119	35
	Business Administration and Accounting	140	41
	Engineering	58	17
	Law	23	7

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Experience	Less than or equal to 5 years	106	31
	More than 5 but less than 10 years	126	37
	More than 10 but less than 15 years	54	16
	More than 15 years	54	16
Digital Platform used	Google Meet	207	61
	Team	51	15
	Zoom	48	14
	WebEx	27	8
	Others	7	2

The assessment of PLS-Structural equation modeling results involves a two-step approach. These are an evaluation of the measurement models and assessment of structural models (Hair et al., 2017).

Measurement Model Assessment

Henseler et al. (2014) suggested that the square root of the sum of the square variance (SRMR) between the model and the empirical correlation matrix must have a value below 0.10 for a good model fit. In this study, the overall result of SRMR was 0.061, indicating that the model was acceptable. The model developed for the study contains reflective constructs hence measurement model involves the evaluation of indicator reliability and internal consistency reliability. Convergent and discriminant validity of the constructs is also checked.

To measure the reliability of each item, the factor loading should be measured. According to Hair et al. (2019), a threshold value of 0.7 or above for each item's loading is considered reliable. Based on Table 3, all the item's loading is above 0.7. Six items are removed from the model whose factor loading is below 0.7. These items are related to the constructs Task Technology Fit (TTF1, TTF2, and TTF5), Subjective Norms (SN4), and Performance Impacts (PI3).

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Table 3. Factor Loadings

	Facilitating Conditions	Performance Impacts	Subjective Norms	Task Technology Fit	Utilization
FC1	0.809				
FC2	0.892				
FC3	0.707				
PI1		0.876			
PI2		0.883			
SN1			0.824		
SN2			0.929		
SN3			0.707		
TTF3				0.828	
TTF4				0.837	
TTF6				0.815	
TTF7				0.825	
TTF8				0.843	
UT1					0.724
UT2					0.974

To establish internal consistency reliability, Cronbach's alpha and composite reliability (CR) should be higher than 0.7 (Hair et al., 2019). Dijkstra & Henseler (2015) proposed rho_A as an approximately exact measure of construct reliability, which usually lies between Cronbach's alpha and composite reliability.
Table 4 contains the value of all three reliability measures. All the items are reliable and satisfy the set criteria of constructs reliability measures.

Table 4. Measurement Model Results of Constructs Reliability

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Facilitating Conditions	0.731	0.778	0.847	0.650
Performance Impacts	0.707	0.706	0.872	0.773
Subjective Norms	0.772	0.862	0.943	0.680
Task Technology Fit	0.887	0.891	0.917	0.688
Utilization	0.709	0.832	0.846	0.737

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For establishing discriminant validity, the Fornell-Larcker criterion, cross-loadings, and the Heterotrait-Monotrait Ratio should be evaluated. In the case of the Fornell-Larcker criterion, the square root of AVE (diagonal values) should be above the correlation of latent variables, which is met in the current study as shown in Table 5. In the case of cross-loadings, the loadings of each item should be higher than the loading of its corresponding variables' items. This criterion is fulfilled as shown in Table 6. In the case of the Heterotrait-Monotrait Ratio (HTMT), a value less than 0.85 for HTMT should be confirmed (Hair et al., 2018; 2019). Table 7 shows that HTMT criteria are met, thus indicating that discriminant validity is established for all the constructs

Table 5. Fornell-Larcker Criterion Results

	Facilitating Conditions	Performance Impacts	Subjective Norms	Task Technology Fit	Utilization
Facilitating Conditions	**0.806**				
Performance Impacts	0.523	**0.879**			
Subjective Norms	0.002	-0.003	**0.824**		
Task Technology Fit	0.636	0.661	-0.021	**0.829**	
Utilization	0.182	0.116	0.050	0.220	**0.858**

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Table 6. Cross-Loadings Results

	Facilitating Conditions	Performance Impacts	Subjective Norms	Task Technology Fit	Utilization
FC1	**0.809**	0.37	0.753	0.469	0.131
FC2	**0.892**	0.436	0.855	0.525	0.18
FC3	**0.707**	0.475	0.643	0.565	0.118
PI1	0.421	**0.876**	0.441	0.573	0.101
PI2	0.498	**0.883**	0.577	0.59	0.101
SN1	0.782	0.429	**0.824**	0.511	0.101
SN2	0.845	0.511	**0.929**	0.565	0.185
SN3	0.707	0.525	**0.707**	0.609	0.088
TTF3	0.54	0.476	0.56	**0.828**	0.222
TTF4	0.57	0.646	0.606	**0.837**	0.104
TTF6	0.525	0.534	0.548	**0.815**	0.212
TTF7	0.51	0.547	0.517	**0.825**	0.192
TTF8	0.487	0.521	0.503	**0.843**	0.193
UT1	0.083	-0.015	0.067	0.088	**0.724**
UT2	0.192	0.144	0.177	0.237	**0.974**

Table 7: Heterotrait-Monotrait ratio (HTMT) Results

	Facilitating Conditions	Performance Impacts	Subjective Norms	Task Technology Fit	Utilization
Facilitating Conditions					
Performance Impacts	0.736				
Subjective Norms	0.089	0.052			
Task Technology Fit	0.799	0.829	0.049		
Utilization	0.215	0.128	0.046	0.252	

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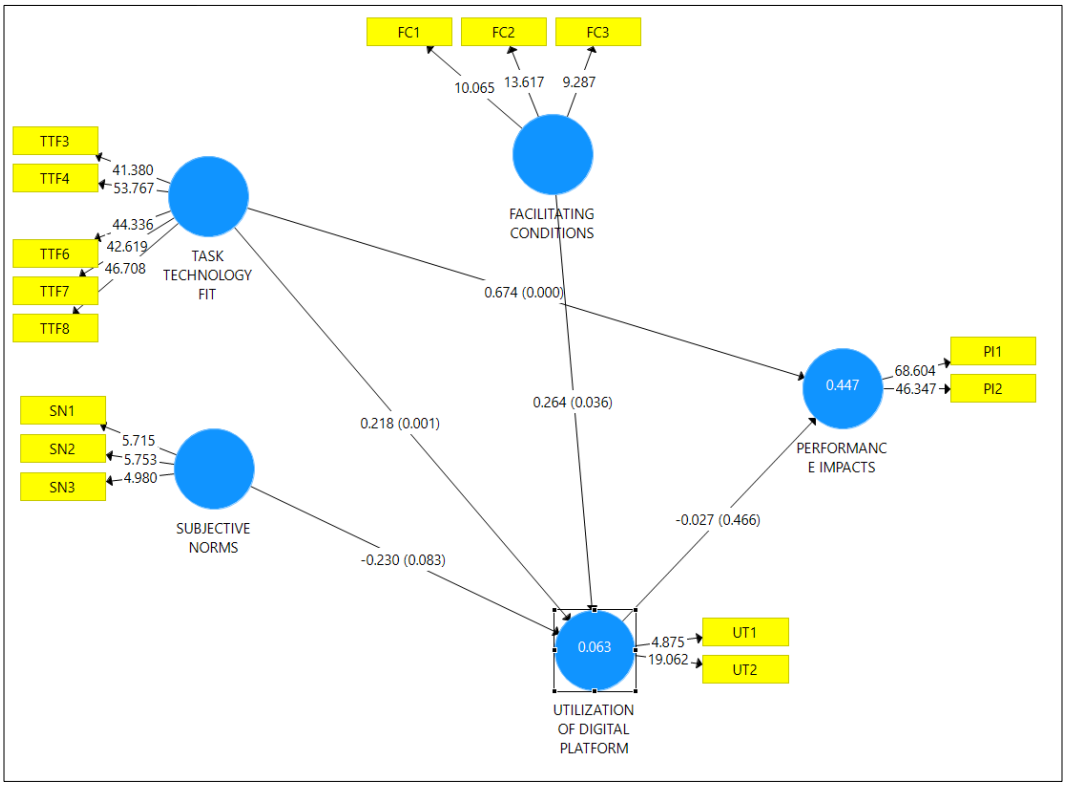
Structural Model Assessment

Structural model assessment includes the coefficient of determination R^2, blindfolding-based cross-validated redundancy measure Q^2 and the statistical significance of path coefficients. R^2 is called a measure of the model's explanatory power which is in-sample predictive power (Rigdon, 2012). R^2 values of 0.75, 0.50 and 0.25 are considered substantial, moderate and weak (Hair et al., 2018; 2019). As shown in Figure 1. The model has R^2 value of 44.7% for PI, 6.3% for UT. This indicate 44.7% of variance in performance impacts (PI) is explained by independent variables (task technology fit, utilization).

Figure 2. Path Analysis Results



Multi-collinearity issue must be examined before assessing the structural relationships to make sure it does not bias the regression results. Variance inflation factor (VIF) values of above 3 indicate probable multi-collinearity problems among

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the predictor variables (Becker et al., 2015, Hair et al., 2018; 2019). VIF values of all the items of the constructs are below 3, hence it is confirmed that data is free from multi-collinearity problem as shown in Table 8.

Table 8. Collinearity Statistics (VIF Values)

Items	VIF
FC1	1.605
FC2	1.737
FC3	1.278
PI1	1.427
PI2	1.427
SN1	1.817
SN2	1.937
SN3	1.367
TTF3	2.303
TTF4	2.167
TTF6	2.042
TTF7	2.354
TTF8	2.536
UT1	1.432
UT2	1.432

Another way to assess PLS path model's predictive accuracy is by calculating the Q^2 value (Stone, 1974) as shown in Table 9. This measure is based on blindfolding procedure that combines aspects of out-of-sample prediction and in-sample explanatory power (Sarstedt et al., 2016). Small differences between predicted and original values gives higher Q^2 values, therefore indicate higher predictive

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accuracy. According to Hair et al. (2019), Q^2 values should be larger than zero for specific endogenous construct to indicate its predictive accuracy in the structural model. Table 8 shows that endogenous construct," performance impacts" has Q^2 value of 0.327, which is moderate and other endogenous construct, "utilization" has Q^2 value of 0.021. Both the values are larger than zero, indicate predictive accuracy of the structural model. Furthermore, the effect size analysis revealed that TTF is the most important factor in determining performance impacts of digital transformation for instructors.

Table 9. PLS path Model's predictive accuracy value ($Q^{2)}$

	SSO	SSE	Q^2 (=1-SSE/SSO)
Facilitating Conditions	1020	1020	
Performance Impacts	680	457.528	**0.327**
Subjective Norms	1020	1020	
Task Technology Fit	1700	1700	
Utilization	680	665.421	**0.021**

In terms of path analysis, Figure 1 and Table 10 demonstrate the path coefficients and p-values for each hypothesis. It is observed that except hypotheses 3 and 5 (H3 and H5), other hypotheses (H1, H2 and H4) are supported. H1 (b= 0.674, $p<0.05$) indicates the path between task technology fit (TTF) and performance impacts is found significant. This finding is coincided with the result of the study done by lçi, & Abubakar (2021) that TTF is all about the extent to which the use of a technology influence performance of users during Covid-19 pandemic. This finding is also coincided with the results of the research performed by Abelsen et al. (2021) that designing the technology platform built on task– technology fit values, people are more susceptible to perform better in their job-related tasks during Covid-19 period.

H2 (b=0.218, $p<0.05$) indicates the path between task technology fit and utilization is found significant. This finding is consistent with Jin et al. (2021) that that task–technology fit would influence willingness to use online learning platform and learning performance during the pandemic.
Their findings also highlighted that if the information system delivers active support, the usage would be improved and' performance of the users could be enhanced. H4 (b=0.0264, $p<0.05$) indicates the significant relationship between facilitating conditions and utilization. This finding is coincided with Tandon (2021) that internal training programs and suitable equipment helps in acquaintance of faculty members with new technologies thus assisting their adoption and usage

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during the pandemic. Camilleri & Camilleri (2021) highlighted that course instructors and students need facilitating conditions like technical support or training and growth to improve their capabilities and skills with the usage of remote technologies during the pandemic.

Facilitating conditions directly and significantly affect the actual use of digital platform like Moodle during the pandemic (Taamneh et al., 2022). H3 (b=-0.23, p>0.05) indicates the in-significant relationship between subjective norm and utilization.

This finding shows that instructors use digital platform for online teaching because of the demand of the pandemic not due to the social pressure from the students and colleagues. This finding is concurred with Ramasamy et al. (2021) that subjective norms do not have significant effect on Intention to use e-learning in Covid-19 emergency because an individual must choose for the e-learning platform forgetting the other opinions. H5 (b=-0.027, p>0.05) indicates the in-significant relationship between utilization and performance impacts. This finding coincides with the results of McGill et al. (2008; 2011) that level of digital technology utilization by instructors is not directly related to performance impact. High TTF leads to higher levels of utilization, but there is perhaps a limit on the volume of usage that is both feasible and valuable. Low TTF allows instructors to spend more time on utilization of the technology to solve certain issues, and this in turn may end in negative influences on their performance. Utilization is not directly influence individual's performance but through TTF.

Table 10. Hypotheses Test Results

Hypothesis	Paths	Path Coefficients	P-Values	Remarks
H1	Task Technology Fit -> Performance Impacts	0.674	**0.000**	Supported
H2	Task Technology Fit -> Utilization	0.218	**0.001**	Supported
H3	Subjective Norms -> Utilization	-0.23	0.07	Not supported
H4	Facilitating Conditions -> Utilization	0.264	**0.036**	Supported
H5	Utilization -> Performance Impacts	-0.027	0.461	Not supported

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CONCLUSION AND EXPECTED CONTRIBUTION

This study determines the factors influencing performance impacts of digital transformation for instructors of higher educational institutions during the Covid-19 pandemic. This study highlighted that online teaching requires a stable network connection and technological setup to conduct classes. Instructors require support from the educational institutions as lack of technical and financial support are the barriers for an instructor to use digital technology during the pandemic.
The study also suggested that instructors should be keen to learn the digital technology and improved features of digital platform increase their performance impacts. Digital platforms like Zoom and Google meet enhance their features during the pandemic because of their extensive usage.

Theoretically, this study contributes to the knowledge on the factors that matter to instructors of HEIs in improving their teaching productivity, communication, and coordination during the Covid-19 pandemic. This study highlighted that digital transformation in HEIs is the beginning during the pandemic and it will continue in the long run for various reasons. The main practical contribution of this study is that it provides an evidence that digital platforms like videoconferencing tools is feasible solution for teaching during the Covid-19 pandemic. The study also highlight the factors that help in improving teaching productivity, communication, and co-ordination of the instructors in digital platform.

This results show that facilitating conditions and TTF influences utilization of the technology. TTF also influences performance impacts of digital technology for instructors. This implies that the technology is used when technological features fit the tasks performed by the instructors in the educational institutions. The result also suggested that the instructors require technical support to learn and use the digital platform for online teaching. To implement the technology practically, HEIs should provide training to the instructors so that they discover the effective and comprehensive features of the technology. During the pandemic, instructors with no or little previous experience of videoconferencing tools can use this technology employing the suitable technical infrastructure and institutional support.

The result indicates that there is no influence of subjective norms on utilization of the technology as instructors utilize digital platform like Gmeet, Zoom due to the demand of the pandemic. This finding is concurred with Ramasamy et al. (2021) that subjective norms do not have significant effect on intention to use e-learning in Covid-19 emergency because an individual must choose for the e-learning platform. The other result shows that there is no influence of utilization on performance of the instructors during the pandemic. McGill et al. (2008; 2011) also

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reported that level of digital technology utilization by instructors is not directly related to performance impact. Utilization influence individual's performance indirectly through TTF.

The limitation of this study is that this study adopts TPC model for exploring the factors of utilization and performance impacts of digital technology with no further extensions. Hence future research should focus on exploring additional factors that may influence the utilization and performance impacts of the technology.
Another limitation of this study is that data was collected from the instructors belong to engineering, law, management and IT department. Future research will be directed to the data collection from the instructors belong to other departments like arts, commerce, science etc.

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Appendix 1. Constructs' Items

Task Technology Fit
TTF1: Digitization fits well with the way I like to work
TTF2: Digital technology is compatible with all aspects of my work in COVID-19 period
TTF3: Digital technology is easy to use
TTF4: Digital technology is user friendly.
TTF5: It is easy to get technology to do what I want it to do in COVID-19 period
TTF6: Digital technology is easy to learn
TTF7: It is easy for me to become more skillful at using Digital technology in COVID-19 period
TTF8: New features are easy to learn in COVID-19 period

Subjective Norms
SN1: The University thinks it is important for me to use Digital technology in COVID-19 period
SN2: My colleagues think it is important for me to use Digital technology in COVID-19 period
SN3: My students think it is important for me to use Digital technology in COVID-19 period
SN4: People respect you if you use Digital technology

Facilitating conditions
FC1: The support staff make it easy to use Digital technology in COVID-19 period
FC2: Technical support is never available when I want it.
FC3: Training on how to use Digital technology is available to me in COVID-19 period
Fc4: Uploading and updating learning materials is fast using Digital technology in COVID-19 period

Utilization of Digital Technology:
UT1: On average, how many hours per week do you use Digital Technology in COVID-19 period
UT2: How many hours a week do you expect to use Digital Technology (for the rest of semester)?

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Performance Impacts

PI1: Digital Technology has a large positive impact on my effectiveness and productivity as a teacher in COVID-19 period
PI2: Digital Technology is an important and valuable aid to me in my teaching
PI3: I teach better with Digital Technology than without it in COVID-19 period

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