Investigating the effect of learning management system transition on administrative staff performance using task-technology fit approach

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CHRONICLE	ABSTRACT
	Educational institutions are adopting learning management systems (LMS) to facilitate teaching and learning processes. During the last few years, many Universities have started upgrading their existing LMS by shifting to advance LMS. This shift requires students, academic as well as administrative staff to get acquainted with the functioning of the new system at the earliest, as any change in the system may impact their performance. The transition from old to new LMS requires time and affects the performance of users, especially administrative staff performance. The present study tries to investigate the effect of the transition on the performance of the administrative staff. The task-technology fit (TTF) model was adopted as the theoretical framework for the study. The data analysis was done using the PLS-SEM, to test the hypothesized relationships. The findings of the study confirm that mere usage of the new technology did not improve the performance rather, the task and technology characteristics need to be coordinated appropriately. © 2021 by the authors; licensee Growing Science, Canada

1. Introduction

The pattern of technology usage among service providers and the consumers is witnessing significant transformations in the present times. The constantly changing nature of technology is challenging the established business models while enticing opportunities for innovative service offerings (Lai, 2017). Advanced information systems are becoming integrated with our day to day activities exposing its massive potential that it has to offer us. Educational organizations are one of the significant setups which have started moving from traditional to digital teaching and learning methodologies. These technological advancements have created new opportunities in the field of education, and are now being realized by the institutions (Buyukbaykal, 2015). Infusion of technology-based learning management systems (LMS) in academics has significantly reformed the activities of educational institutions across the globe (Harrati et al., 2017). These institutions are now getting integrated with information and communication technologies to facilitate the process of teaching, learning, and administrative tasks (Tongkaw, 2013). Apart from teaching and learning, the use of LMS in educational institutions is instrumental in improving the efficiency of administrative tasks, for better management of the activities.

Universities around the globe are spending an ample amount of funds to update existing systems with new information systems to improve overall performance (Harrati et al., 2017). For many of its operations, the universities at present are going digital to get efficient and effective outcomes. On one hand, the implementation of digital technology by the universities has increased overall performance, but on the other hand, it raised issues on its acceptance and adoption by the administrative staff, who works as front liners in using the system. It becomes significant to understand the feasibility of acceptance and adoption of any new online/digital technology by the administrative staff, as they interact with the system and facilitate in devising the strategies for a better quality of teaching and learning outcome (Harrati et al., 2017; Navimipour & Zareie, 2015). Their

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performance will widely depend on how well they accept and adopt any new technology that the institution is implementing. Their acceptability and adoption of the new information system is a must for better management of the institution's resources.

The goal for implementation of LMS by the universities is to integrate and enhance teaching, learning, and administrative tasks in various departments. This further facilitates creating a fully technology-driven ecosystem for the instructors, students, and administrative staff, where, they can effectively manage their teaching, learning, and administrative requirements respectively. There are many LMS that are being implemented and used by universities across the globe in the view of improving their overall performance. It has been agreed that LMS does not hamper the formal teaching-learning process, in addition to the other tasks it performs. Hence, it is now widely used to facilitate the overall management of the academic process and the administrative tasks of the institution (Mott, 2010).

LMS has the advantage of offering automated and centralized administration to the academic institutions, facilitating assessment & testing, content management, and reporting. Due to its automation feature, it is characterized as having intertwined educational, administrative, and technological aspects (Coates et al., 2005). This automated and centralized operational mechanism demands the institutions to develop new procedures, protocols, and controls between academic functions and the administration, for efficient usage and outcome of the LMS. These types of technological adoption become necessary to improve overall user performance following which, there have been many studies linking technology and user performance (Goodhue & Thompson, 1995). For any such technology implementation, the task must be aligned with the technology to achieve better performance among the users (Mumford, 2000). In this line of thought, the present study attempts to adopt the Task-Technology Fit (TTF) model (Goodhue & Thompson, 1995), to understand the administrative staff performance in the university, on the adoption of new technology. TTF model will also be applied to conceptualize and validate the relationship between technology and individual performance, following the fact that the TTF model is influential in predicting the overall performance of the users.

There have been various studies concentrating on the acceptance and adoption of technology and its impact on user performance in educational settings (Harrati et al., 2017; Norzaidi & Salwani, 2009). The majority of these studies focused on students and faculty, as users of the technology adopted and assessments of their performance were done. There is a lack of studies in the literature which focuses on administrative staff as a user and assess their performance on a technology. The investigation of the administrative staff's performance becomes important because they act as the front-line users of any tech-system on the university campus. A positive impact of the technology on administrative staff performance will lead to the efficient functioning of the university. Because of this gap, the present study seeks to assess the effect of Banner LMS implementation on administrative staff performance. Before Banner LMS, the selected university was using Moodle LMS and the users were well equipped with the system functionalities. With a prime objective to assess the impact of the transition from Moodle to the banner LMS on the administrative staff's performance, the present study is carried out. The Banner system is expected to provide a highly integrated interface to record, share, and access a centralized database related to human resources, finance, and student administration. It is also expected to enhance links between students, instructors, and administrative staff to automate, simplify, and manage administrative processes including recruitment, admissions, and financial tasks.

This study bases its theoretical foundation on the Technology to Performance Chain (TPC) and TTF model and attempts to assess the impact of administrative staff performance in an educational setup. To do so, the study explores the relationship status between TTF, utilization of the banner system, and impact on performance. Besides direct relationships, the study attempts to check the indirect effect of utilization on the relationship between TTF and performance. The findings suggest that there is no indirect effect in the proposed model, but supported the strong relationship between TTF and performance impact. In the next section, the paper will formulate the hypotheses based on the arguments and evidence from existing literature followed by the data analysis, results, and discussions for significant policy-driven implications and conclusions of the study.

2. Literature Review

The technology adoption model (TAM) proposed by Davis et al. (1989), had been accepted as one of the most desiring models to measure technology acceptability and adaptability by the users. It had been widely used in many studies to assess the factors influencing the use of technology by individuals (Venkatesh & Davis, 2000). This model aims to measure perceived ease-of-use and perceived usefulness of technology, but the model lacks when the study is focused on measuring the task performance of an individual. This becomes one of the major drawbacks of the TAM model. Previous studies suggest that this limitation can be overcome by applying the TPC model to assess the impact of technology on user performance (Dishaw & Strong, 1999). Since the present study attempts to understand administrative staff's performance on their usage of Banner LMS, the TPC model has been applied, for measuring user performance by understanding the task and technology characteristics (Harrati et al., 2017). It is argued that the technology is used by individuals to complete their tasks, hence, characteristics of the individual, characteristics of the technology, and characteristics of the tasks, need to be somehow synchronized. Individuals' competence needs to be matching the task requirements and the technology functionality needs to be facilitating both, the individual and the task. The TPC model combines utilization and the task-technology fit (TTF) to assess the user performance, where, TTF is the degree of technology utilization to assist a user in performing their tasks (Aguinis et al., 2011). It has been widely used in research studies concerning information systems to understand and measure user performances (Zhou et al.,

2010; Junglas et al., 2008; Lee et al., 2007). TTF assesses how well the system function meets the individual task needs, as well as the relationships between task requirements, individual capabilities, and system functionality. Further, the TTF has been linked to the personal performance criterion, which can be used to consider the effect of IT on individual performance in a meaningful way (Fuller & Dennis, 2009; Zigurs & Khazanci, 2008).

TTF model, proposed by Goodhue and Thomson, (1995) is the core of the present study, which claims that technology needs to be strongly accepted to reflect the performance of users, as well as, to show its usefulness, suit the users and their corresponding tasks. This study takes the TTF perspective as a powerful model for analyzing the adoption of the Banner system and its influence on administrative staff's performance (Benbasat & Barki, 2007). The TTF model has been widely explored as an important model for measuring technology applications and its impact on user performance in the academic domain (McGill et al., 2011; Raven et al., 2010). The TTF model focuses on measuring the fit between a particular technology system and tasks (Robles-Flores & Roussinov, 2012). The fit is characterized by a match between the technology capabilities and task requirements, which implies the degree to which technology helps a person perform his or her task portfolio. (Robles-Flores & Roussinov, 2012). This means that, if information systems have a good fit with the tasks under consideration, they will have a positive impact on the performance of the tasks by the users. TTF acts as an interface between individual capabilities, task requirements, and technology functionality. The antecedents of TTF become the interactions between the technology, tasks, and individuals and constitute the important constructs for the TTF model (Harrati et al., 2017). Individuals carry out actions to get outputs, is known as the task of the user, and the IT tools they use to perform the task is called the technology (Goodhue & Thompson, 1995). Previous studies have successfully investigated the impact of individual characteristics, task characteristics, and technology characteristics in technology usage by users. It has been argued that all of these factors have a direct and significant influence on TTF (Dishaw & Strong, 1999; Goodhue & Thompson, 1995). The acceptance and usability of technology largely depend on the perception of the individual's self-competence and motivation for the system. As well as, the nature of tasks may vary from department to department and from situation to situation. Besides, there may arise a need for technology up-gradation in due course of time, which may influence the users to behave either positively or differently. These notable facts lead us to propose our first set of hypotheses as below:

H_1: *TTF is positively influenced by task characteristics.*

H_2: *TTF is positively influenced by technology characteristics.*

H_3: *TTF is positively influenced by individual characteristics.*

Utilization reflects the behavior of an individual using the technology to complete a particular task and in the present context, it is used as a measure of whether the system is being used by the administrative staff and not a measure of the duration of its use (Tripathi & Jigeesh, 2015). The task-technology fit is known to motivate the users toward using the technology for completing their tasks (Norzaidi & Salwani, 2009) and hence acts as a predictor of technology utilization. The study by Goodhue and Thompson (1995) concludes that TTF and utilization act as a significant predictor of user performance. There has been evidence in the literature that, impact on performance is greater when the effects of TTF and utilization are combined (Goodhue & Thompson, 1995) in technology implementations. Therefore, the present study also attempts to verify the mediation effect of utilization in the relationship between TTF and staff performance. To test these relationships the following hypotheses are proposed:

H_4: *There exists a positive effect of TTF on utilization.*

H_5: *There exists a positive effect of TTF on the performance impact.*

$H_{6\,(a)}$: *There exists a positive effect of utilization on the performance impact.*

$H_{6\,(b)}$: *There exists a significant indirect effect of TTF on performance impact through utilization.*
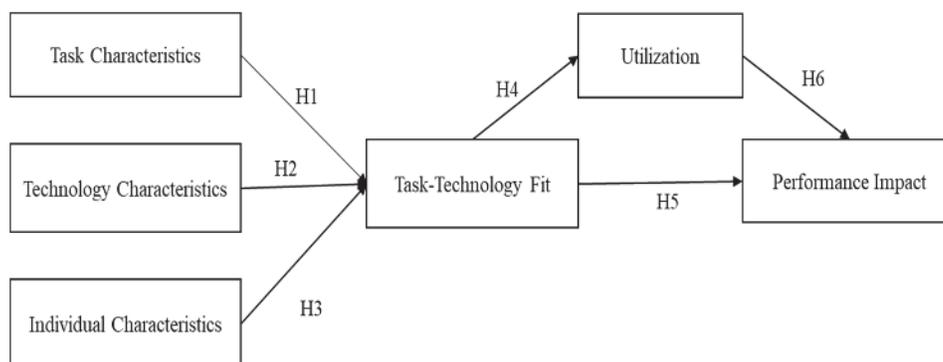
Fig. 1. Conceptual model

3. Methodology

The research sample for the present study involved university administrative staffs, who were using Banner LMS to carry out their administrative tasks. Data were collected from the participants during October – November 2019. The questionnaires were distributed to them for their responses with an assurance of the privacy of their information shared with the researcher. 178 out of 240 distributed questionnaires were received with a response rate of 74.16%, which is acceptable for analysis (Sekaran & Bougie, 2016), and were used for further analysis of the data, fulfilling the minimum requirement of sample size between 100-500 observations (Kline, 2005). The research instrument included all the validated items from past studies. This study used five point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). To ensure the wording, sequencing, and length of questions, the questionnaire was pre-tested. The items of the research instrument were carefully selected to test the relationships between the constructs of the TTF model which is deployed in the study as a theoretical foundation.

The present study attempts to verify the relationships between different proposed TTF variables between Task Characteristics (TaC), Technology Characteristics (TeC), Individual Characteristics IC), Task-Technology Fit (TTF), Utilization (UT), and Performance Impact (PI). Apart from the direct relationships, the indirect relationship of utilization was also tested between task-technology fit and performance impact to verify whether an indirect effect of utilization is present or not. Partial Least Square Structural Equation Modeling (PLS-SEM) was used to examine the causal relationships and to assess the proposed conceptual model. PLS-SEM was applied because the primary purpose of this study is prediction oriented (Hair et al., 2019). Smart PLS (v.3.2.8) was used for data analysis (Ringle et al., 2015).

4. Data Analysis and Results

The present study used PLS-SEM to assess the measurement model and to examine its reliability and validity of the constructs. To examine the significance of the influence on the proposed constructs of the model, PLS with path modeling and 5000 bootstrapping resampling procedure was applied (Hair et al., 2019). The results for the reliability and validity analysis are shown in Table 1. The factor loadings of the items of the constructs are more than the recommended value of 0.7 and hence the indicator reliability is achieved (Henseler et al., 2009). To measure the reliability of the constructs, this study has used composite reliability and Cronbach's alpha. The result shows that the values of all the constructs are more than the prescribed value of 0.70 for composite reliability and more than 0.6 for the Cronbach's alpha (D'Ambra et al., 2013). This puts evidence for the strong reliability of the research instrument used in this study for the further investigation process. The convergent validity of the constructs has been measured by using the average variance extracted (AVE) values which are all more than the prescribed minimum cut-off value of 0.5 (Yi et al., 2016). The discriminant validity is measured and is shown in Table 2, representing inter-correlations between the various constructs. The discriminant validity testing has been done by using two criteria. First being the Fornell-Larcker (1981) criteria and the second being the Heterotrait-Monotrait Ratio Criteria (Henseler et al., 2016). The result of both the tests in Table 2 shows that the discriminant validity is achieved for further analysis. It can be inferred here, that the above statistical data confirms that the proposed measurement model is satisfactory for further testing and analysis.
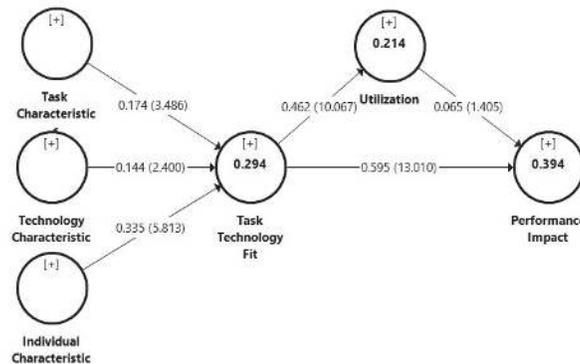
Table 1
Constructs Reliability and Validity

Constructs	Items	Loading	Alpha	CR	AVE
Individual characteristics	IC1	0.904	0.871	0.921	0.795
	IC2	0.915			
	IC3	0.856			
Performance impact	PI1	0.826	0.857	0.903	0.700
	PI2	0.831			
	PI3	0.854			
	PI4	0.835			
Task-Technology Fit	TTF1	0.845	0.941	0.952	0.738
	TTF2	0.832			
	TTF3	0.864			
	TTF4	0.840			
	TTF5	0.874			
	TTF6	0.866			
	TTF7	0.890			
Task characteristics	TaC1	0.889	0.925	0.947	0.817
	TaC2	0.901			
	TaC3	0.914			
	TaC4	0.912			
Technology characteristics	TeC1	0.869	0.885	0.920	0.743
	TeC2	0.807			
	TeC3	0.892			
	TeC4	0.877			
Utilization	UT1	0.900	0.885	0.929	0.813
	UT2	0.887			
	UT3	0.917			

Table 2
Discriminant Validity

	IC	PI	TTF	TaC	TeC	UT
Fornell-Larcker (1981)Criterion						
Individual characteristics (IC)	0.892					
Performance impact (PI)	0.245	0.837				
Technology task fit (TTF)	0.499	0.625	0.859			
Task characteristics (TaC)	0.454	0.249	0.388	0.904		
Technology characteristics (TeC)	0.587	0.223	0.415	0.426	0.862	
Utilization (UT)	0.507	0.340	0.462	0.433	0.443	0.902
Heterotrait-Monotrait Ratio (HTMT)						
Individual characteristics (IC)						
Performance impact (PI)	0.283					
Technology task fit (TTF)	0.549	0.693				
Task characteristics (TaC)	0.506	0.279	0.414			
Technology characteristics (TeC)	0.666	0.251	0.448	0.470		
Utilization (UT)	0.577	0.389	0.505	0.478	0.495	

The testing of the proposed hypotheses and analysis of the proposed model has been done using PLS path modeling to compute the SEM, as shown in Fig. 2. All the constructs are modeled with reflective items. To comprehensively test the quality of the proposed structural model, the significance of path coefficients (β) and coefficients of determination R^2 has been used as indicative measures to analyze the variance of variables. The result shows that the model predicts 21.4 percent of utilization, 29.4 percent of task-technology fit, and 39.4 percent of the performance impact construct. The obtained value of R^2 for the constructs reflects a moderate effect achieved under the proposed model of the current setting. In the structural model, it is observed that all the paths are significant ($p<0.005$), except hypotheses H_{6a} and H_{6b}, which suggests that the causal relationships described in the proposed model are supported. The hypothesis H_{6a} stating a positive relationship between utilization and performance impact is not supported in the data of the sample used in the present study. Also, the mediation effect of utilization in the relationship between TTF and performance impact is not supported in the present context. This makes us conclude that the impact on the performance will be done by the right fit between the task and the technology. The more fit the task and technology will be, the more the performance will be an increase, and the staff becomes more efficient.

Fig. 2. Structural model test results

Table 3
Hypothesis Test Results

Hypothesis	Cause & Effect	β	SD	t-value	p-value	BCa-CI	Decision
H1	TaC → TTF	0.174	0.049	3.486	0.000	[0.076; 0.270]	Supported
H2	TeC → TTF	0.144	0.059	2.400	0.015	[0.026; 0.257]	Supported
H3	IC → TTF	0.335	0.057	5.813	0.000	[0.217; 0.442]	Supported
H4	TTF → UT	0.462	0.046	10.067	0.000	[0.365; 0.543]	Supported
H5	TTF → PI	0.595	0.046	13.010	0.000	[0.496; 0.677]	Supported
H6a	UT → PI	0.065	0.047	1.405	0.166	[-0.025; 0.157]	Not Supported
H6b	TTF → UT → PI	0.03	0.022	1.359	0.174	[-0.011; 0.076]	Not supported

The results confirm that among the precursors of the task-technology fit (TTF), the constructs task characteristics (TaC) with $\beta=0.174$ and technology characteristics (TeC) with $\beta=0.144$ shows a relatively weak effect on TTF than the construct individual characteristics (IC) with $\beta=0.335$. Although, all three constructs show a positive influence on TTF, supporting the hypotheses H_1, H_2, and H_3. The TTF has a positive impact on the utilization (UT) of technology, Banner in the present case, with $\beta=0.462$, supporting the hypothesis H_4. Similarly, TTF has shown a greater positive impact on performance impact (PI) with $\beta=0.595$, supporting the hypothesis H_5, but a weak relationship is observed between utilization of technology and performance impact, with beta coefficient, $\beta=0.065$ in the present setup. Statistically, all the proposed hypotheses are significant

except hypothesis H_{6a}/H_{6b} (Table 3), suggesting there will be a better performance impact on the administrative staff if the task and technology are matched and fits properly. Among the precursors of TTF, individual characteristics show relatively more influence on TTF suggesting technical know-how of the individuals are to be taken in priority, and training sessions may be necessary for improving their capabilities to make them efficient in technology acceptance and adoption.

5. Discussion

The present study fundamentally revolves around the issues of administrative staff performance on the usage of the LMS in a university setting, with a core focus on its relationship with task-technology fit. The study investigates the causal relationship between the TTF, utilization of the technology, and impact of technology on user performance for a LMS. This is a contribution to the literature on technology adoption in university-level educational settings. Also, hypotheses were proposed to assess the antecedents of TTF and found that task, technology, and, individual characteristics puts a significant impact on task-technology fit construct. This is concurrent with previous studies (Bozaykut et al., 2016; D'Ambra et al., 2013). The novelty of this study is that it attempts to assess the performance impact on one of the major stakeholders of an educational setup i.e. administrative staff, in light of the Banner LMS usage. Besides, the model proposed and validated in the present study shall help the policy-makers to understand and explore the relationships between the factors in different research settings. These factors have been less explored in educational settings and, particularly with the participants of the present study i.e. administrative staff.

The present study put forth a few theoretical implications on the subject from its analysis. It is explored that in higher educational settings, the task-technology fit is significantly influenced by task characteristics, technology characteristics, and, individual characteristics. Among these antecedents of TTF, the individual characteristics were found to be a decisive influential factor, followed by task characteristics and, the technology characteristics. The findings are concurrent with previous studies (Widagdo et al., 2016), and infers that the administrative staff characteristics (information on technology, skills, peer support, and assistance) are more important when they try to adopt a new LMS technology like 'Banner' for an effective outcome. This is followed by the characteristics of the task to be completed. Technology characteristics show a significant influence, however, in comparison to individual and task characteristics, it stands last in the influence queue. The explanation for this result is that, for any new technology to get implemented, the administrative staff need to be trained and motivated for its usage. They are the one who deals with the handling and operation of the technology platform. Therefore, their acceptance of the user becomes important for technology in teaching and learning to get functional and influential in a proper way. That is why user characteristics play a crucial role in task-technology fit.

Further, the findings of the study conclude that the task-technology fit positively influences the utilization of technology and user performance impact. The findings of the study are consistent with previous studies (Widagdo et al., 2016; Aljukhadar et al., 2014) on the performance of individuals in using information technology. The degree of influence of TTF is found to be more on user performance, but there is no significant effect of utilization on performance impact. It is to infer from the findings that, mere utilization of the technology by users will not influence their performance. This finding of the study, is also in consensus with previous studies, stating, there exists no relationship between the level of utilization and performance (Osang, 2015; McGill et al., 2011). The study also attempted to assess the indirect influence of TTF on performance impact through utilization, which resulted in a non-significant relationship, allowing to infer that, neither the utilization directly influence performance, nor it plays any role in mediating the relationship between TTF and performance impact. It leaves the task-technology fit construct, a very crucial variable, in determining and improving the user performance, concerning technology adoption, and if the task and technology fit well, the performance of the individual will increase in an educational setup (Aljukhadar et al., 2014; Staples & Seddon, 2004).

The finding of a weak and non-significant relationship between utilization and performance impact, which may be because of the newness of Banner LMS for the university understudy, as it was implemented recently and is still new for many users. This can be managed by increasing the utilization and suitability of technology to the task that will result in improving the performance of an individual (Widagdo et al., 2016; D'Ambra & Wilson, 2004).

The study highlights few policy implications, for instance, before adapting to any new technology in an educational setup, the university management should understand the characteristics of the users and plan appropriate training and motivational sessions for the technology accordingly. This will facilitate in attaining better performance by the staff during the usage of the technology and hence better return on investment for the university. Second, any technology adoption should be based on the requirements and nature of the task, because, this study suggests that task characteristics are also a significant influencer when it comes to having a task-technology fit. Third, the task-technology fit will only influence the proper utilization of the technology, when the user is given enough time and training to understand the intended usage. Fourth, the user performance can be achieved as desired, after technology implementation, when the task and technology requirements fit well.

6. Limitation and future scope of the study

Although the present study makes significant contributions to the literature of technology adoption and its impact on user performance, it has few limitations as well. First, the data for this study were collected from the administrative staff of one University, and therefore, the findings cannot be generalized. In future studies, the researchers should attempt to extend the

geographical area including more educational setups, and increasing the size of samples to get more insights towards generalizing the findings of the present study. Second, the study is carried out using self-report data, hence, response bias may exist. Future studies may consider using a mix-method study to get more insightful results. The third limitation of the study is that it may be too early to assess the impact of any new technology adoption in a year interval. In the future, similar studies may consider having more than one year of the time frame for assessment of the performance of the technology among users.

7. Conclusion

In this research study, an attempt has been done to investigate the impact of new technology adoption and utilization i.e. Banner LMS, on the performance of the administrative. The study utilized the task-technology fit model to assess the impact of the adoption of new technology on administrative staff performance in a university setup. This study utilized census data, and results of data analysis revealed that performance impact is influenced primarily by task technology fit which is significantly influenced by individual characteristics followed by task characteristics and technology characteristics. This provides excellent insights for policymakers on the adoption of any new technology. They must consider users' characteristics before adopting new technology. Also, the task-technology fit has a strong, positive, and statistically significant impact on performance impact, which lets us infer that if task and technology fit together, the overall result in terms of performance will be higher. In this research, the direct relationship between the utilization of technology and user performance was found to be insignificant. The reason for this insignificant relationship is the time frame of the adoption which is recent of around one year and lack of hands-on-experience on the tool. The utilization will impact performance, provided the users are trained and motivated well in advance and during the usage.

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