Personality Trait and ICT Adoption in Higher Education: Review

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Abstract: Information and Communication Technology (ICT) in the context of education is the mode of education that uses technology to improve the learning process and enhance interaction with the students. The Covid 19 pandemic has made the usage of technology in imparting knowledge more crucial in the last two years. There has been continuous investment in ICT in the higher education, however the adoption rates have not been very promising. On further investigation into poor technology adoption rates, it was revealed that even though teachers play a very crucial role in the ICT adoption in education, but there is a considerable gap between the expectations and how ICT is used in their daily teaching and learning processes. It has become the need of the hour to study and analyse why few teachers are more prone to adopting technology in their work area. The integration of technology into education is found to be significantly dependent on the attitude and personality traits of the teachers. The objective of the article is to understand why certain people in academics adopt technology more than others and the investigate on the possibility of a relationship between the individual personality trait and the adoption behavior of teachers in higher education.

The paper concludes with hypothesis around the relationship between personality traits and ICT adoption in academics along with studying the impact of moderating elements that would influence the relationship.

1. Introduction

Information and Communication Technology (ICT) is an amalgamation of Information Technology (IT) and communication technologies related tools that is used to help in the access, storage, transmission and updating of the information for effective communication and usage[1] . In the context of education, ICT is the usage of all the technology related tools that helps in improving the learning process and also makes it efficient and interactive. ICT usage helps in pacing out the learning process, for the teachers as well as for the students. The importance of ICT has further been emphasized by the Covid-19 pandemic that has forced educational institutions to impart learning remotely. To make the learning process ongoing without any disruption due to lockdown, education sector had to integrate ICT into the process and can no longer continue to use only the traditional methods of imparting knowledge. It is highly expected that ICT will continue to receive special attention due to its potential even after the end of pandemic cause by Covid-19[2].

It was observed across educational institutes that they continue to use conventional and old methods of teaching-learning even though there has been a significant investment in ICT and numerous benefits that ICT offers[3]. Prior studies have shown that not only the students, but even teachers have struggled to adopt digital technologies in their teaching process resulting in limited ICT adoption in education system[4].

It is observed that teachers are a very critical part and strongly affect the adoption of ICT in classroom teaching by integrating technology tools into their own teaching and by influencing the students into creating a more digitally capable learning process[5]. This in turn implies that to understand and improve technology integration into education, it is important to study the behavior of teachers with respect to technology acceptance. In academics, the successful integration of technology is influenced by the teacher's attitude and beliefs towards technology[6], [7]. According to the popular Theory of Reasoned Action, attitude is influenced by beliefs and the evaluation of the outcomes[8]. The beliefs of every individual is a factor of their personality trait and

personality traits are an amalgamation of people's thoughts, feelings and behaviour that influence the actual individual behaviour[8].

A review of literature suggests that although the importance of a teacher's role in ICT adoption is well-emphasised but the underlying reasons 'why' certain teachers adopt technology differently than the others and association of such diverging behaviours with the individual's personality traits is still underexplored. Hence, the aim of the current study is to find the association and relationship between personality traits of academicians and their adoption behaviour towards ICT tools for usage in higher education. The paper also aims to find the impact of select moderating variables in the relationship between ICT adoption and personality traits. Resultantly, the research proposes a model that incorporates a relationship between distinct personality traits of teachers and their impact on the ICT adoption in the domain of education.

2. Theoretical Underpinning

2.1. Theory of Reasoned Action (TRA)

The theory of reasoned action states that human in most of the circumstances usually behave in a realistic and sensible manner. Before taking any action, people make use of all the information available to them and consider the implications of their actions, implicitly as well as explicitly. The actual behavior of the person can be strongly determined by measuring the intention to perform the behavior. The theory laid down the ground rule wherein intention is considered a direct determinant of the actual behavior.

Fishbein and Ajzen (1977) had proposed the theory and since then has been used as a major source of measurement of actual behavior.

The theory states that intention is significantly dependent on the person's attitude and subjective norm[9]. Subjective norm is measured in terms of a person's perception of what others who are important to them think and whether they should perform the behavior based on other's perception. Attitudes in turn are determined by individual

beliefs regarding the result of displaying the mentioned behaviour and evaluations of those outcomes thereafter.

Ajzen (1985) observed a significant relationship between attitude and personality traits. He defined personality trait as a combination of people's thoughts, feelings and behavior. He established that personality trait influences attitude which in turn influences intention.

2.2. Innovation Diffusion Theory (IDT)

The theory of Innovation diffusion views the dispersal of an innovation and how the dispersal happens through the various segments in a given social system. It has been observed that everyone doesn't adopt innovation in the same way and at the same time. Diffusion is the method that explains how an innovation is adopted by concerned members of the community. Potential adopters use the information related to the innovation to create perceptions about the features of the innovation, which in turn help in their subsequent adoption by the adopters. Based on the works of Rogers (1995), the decision to embrace the usage of an innovation is predicted, in part, by the assumed features related to the innovation, and the personality trait of the potential adopter who is going to use the innovation.

The theory of Individual Innovativeness emphasises that the tendency of the adopter to adopt an innovation is strongly influenced by their distinct personality traits. Based on that observation, Rogers (1995) segregated adopters into 5 major categories namely: innovators, early adopters, early majority, late majority and laggards.

2.3.Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is grounded on the concept of TRA that tries to define how potential users would accept and thereby use a technology. It was introduced by Fred Davis in 1989. TAM states that there are two important reasons: Perceived Usefulness and Perceived Ease of Use that affects a user's resolve to accept and use a particular technology[10]. Perceived usefulness is measured as the level to

which the usage of a system would be useful to the individual and will lead to the improvement in their job performance. The individual would have an intention to accept a technology based on their impression of the usefulness of the system in carrying out their task. The more useful a technology is perceived to be, the higher the chances of its acceptance by the user.

Perceived ease-of-use is defined as the level up to which the user thinks that the usage of the system is going to be easier with respect to effort, time and investment[10]. The tendency of the user to accept a technology would be hassle free if they find it easier to use the technology.

The early model of TAM[10], observed that perceived usefulness and perceived ease of use are the strong influencing factors of attitude which in turn drive intention. The relationship between the variables in TAM model is shown in fig 1.
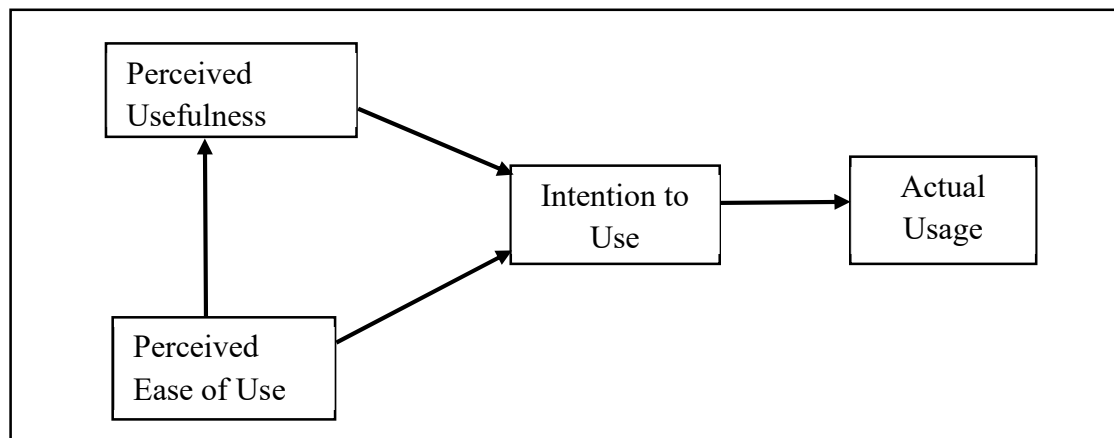

Fig. 1. Technology Acceptance Model

After the development of TAM, there have been many models and frameworks developed to understand technology acceptance behavior like TAM 2[11], TAM3[12] and Unified Theory of Acceptance and Use of Technology[13]. TAM has been one of the most cited and popular models to study technology acceptance due to its robustness, reliability, effectiveness, and high validity[14], [15]. TAM has found to be a valid model to study technology acceptance across diverse situations, cultures, samples, and domains, including education domain[16], [17]. Due to the generalizable,

reliable, verifiable, and effective nature of TAM, this study has been developed on TAM as the underlying conceptual model.

3. Literature Review

3.1. ICT in Education

ICT in the context of education domain is defined as the usage of all the technology related tools that helps in improving the learning and also makes it interactive. With the seepage of ICT in almost all the sectors, the Education domain has also felt its tremendous impact. The pandemic has only fast forwarded the ICT adoption and has forced the educational institutions to spend, encourage and adopt technology at a very organic level. ICT in the domain of education has been a very significant development playing an important role in the lives of academicians, professionals, and students[18]. While we know that ICT plays a very important enabler of education, it is important to note that teachers play a very crucial role in its adoption[5]. Teachers help in setting the tone of how students will react to ICT enabled changes in the classroom. Hence, when it comes to understanding the factors affecting ICT adoption, it is very crucial to look into the individual traits of the teachers as they play the role of a major change agent in the domain of education as well as the lives of the student.

It has been observed that despite the effort, in most of the countries, the usage of ICT by the teachers has not been optimum[19]. Teachers are not adopting technology in the teaching process in a way that would completely overhaul the learning process[4], [20]. They continue to use traditional methods in their classroom and have minimal usage of digital tools to enhance academic learning[21]. A national survey by University Management System on Online Examination System (2021) reveals that 84% of teachers face challenges in delivering education digitally in India. Therefore, there is a necessity to understand the determinants of technology adoption in education by teachers to create strategies that would help in increasing the use of ICT in imparting of the teaching within the confines of the classroom [22].

When it comes to technology adoption, there are three dimensions to it. The first

factor is the adopter, the 2nd factor is the level of the innovations, and the third factor relates to the contextual parameters[23]. Among these dimensions, when we consider the dimension of the adopter, the intention of the technology adoption majorly depends on the internal characteristics defined by their attitudinal orientation, belief system, behavioural characteristics and feelings[24].

It has been observed that the attitude of the faculty is very crucial with respect to the discussion of ICT within a classroom – both quantitatively and qualitatively[25]. The beliefs of every individual is a factor of their individual personality trait. Personality traits also have influence on the behavioral intention through attitude. This leads us to the observation that personality trait has an influence on actual usage through its impact on behavioral intention.

3.2. Personality Traits

Consistent with the TRA, intention to perform a task is a strong indicator of a person's actual behavior. This plan to initiate a task is dependent and influenced by the attitude of the person. Attitude can be defined as a relationship between beliefs and the evaluation of the outcome. Further, beliefs have been noted to be influenced by personality traits. It is noted that early adopters, adopt technologies little earlier than others and this early adoption tendency is attributed to their personality trait[26]. From the theories and the past researches, it has been observed that personality trait plays a strong role in the intention of technology acceptance and adoption. With respect to the teacher's role, the stress is on their personality trait that would determine and influence adoption behavior.

There have been many personality traits that have been studied in the context of ICT adoption namely anxiety[27], lack of confidence, competence and fear[28], **social influence**[29], **image**[30], **trust**[31], performance expectancy and effort expectancy[13], **Personal Innovativeness in Information Technology**[32], self-efficacy[33] and commitment[34]. The scope of this study is restricted to understanding the role of a teacher's personality traits social influence, image, propensity to trust and PIIT for ICT adoption in the domain of education.

3.3. Social Influence

In the context of education, social influence is the level to which the adopter believes that the ICT acceptance in academics is approved and encouraged by others who are important to the adopter[35]. Social influence is a psychological factor that interfaces between self-interest and approvals from others[36]. This trait is grounded on the fact that not all behavior affecting intention are self-motivated, many are affected by what important referents think about the behavior. The initiation for this trait was laid in the TRA by Ajzen (1995), where he termed it as subjective norm. In the IDT as well, Rogers (1995) mentions that potential adopters are influenced in their adoption intention by influencers in their personal network. Kelman (1958) further elaborated on the trait and used three different constructs to define the process of social influence in terms of **compliance**, **identification**, and **internalization**.

Majority of the studies used compliance based social influence and studied its impact on ICT adoption. In such situations, it has been noted to have a positive impact on adoption intention[13]. Social influence has a strong relationship with the perceived usefulness of a technology and also the intention towards ICT adoption[37]. However, some studies also concluded that social influence that is based on compliance has a negative impact on ICT adoption in a voluntary set up and acts as a deterrent[38]. In other studies, compliance based social influence remained insignificant in ICT adoption behaviour[39]. When the context of Internalization based social influence was used to study ICT adoption, it was found to have positive impact on adoption intention, both in voluntary and mandatory environments with the effect more pronounced in voluntary context[40]. The impact of social influence on perceived usefulness and adoption intention needs deeper investigation. With these observations, the first hypothesis that is proposed in the current research is:

H1: S*ocial influence will have a positive impact on Perceived Usefulness for ICT Adoption in Higher Education*

H2: S*ocial influence will have a positive impact on Behavior Intention for ICT Adoption in Higher Education*

3.4. Propensity to Trust

Trust is explained in terms of eagerness of an individual to be susceptible to other's actions and establish a relationship of dependency between the two parties[42]. Initial trust in a service is affected by the person's trust propensity trait[43]. Trust propensity is the tendency to believe or not believe in others or their services[42]. Trust in terms of a technology adoption is the level to which the adopter of the technology considers the technology to be safe and trustworthy. There have been many studies to study the impact of trust in ICT adoption and trust is found to have an impact on ICT adoption[45]. Trust becomes very important in an online set up where the trustee and the trustor are not in each other's physical presence[46]. In few more studies, it was observed that trust has a negative relationship with perceived usefulness and usage intention[31]. When it comes to technology related application, the association between trust and intention is found to be insignificant[47]. However, in separate studies, trust is noted to have positive relationship with perceived usefulness[48]. When the adopter's behavior was studied, it was observed that trust does influence the behavior of innovators and early adopters[49]. It was observed from the study that there is a considerable impact of Trust on ICT adoption intention but the nature of that impact has not always been consistent across domains and medium. Keeping this in consideration, we delve to further investigate the relationship between Trust and ICT adoption in education through our second hypothesis that states:

H3: *Propensity to Trust will have a positive relationship with Perceived Usefulness for ICT Adoption in Higher Education*

3.5. Personal Innovativeness in Information Technology (PIIT)

Personal Innovativeness in Information Technology (PIIT) was first introduced by Agarwal and Prasad (1998). PIIT reflects the tendency of a person to experiment with new technologies irrespective of the opinion of others. A person might illustrate different levels of innovativeness based on their interest domains. With this hypothesis, the construct of PIIT which measures innovativeness in the domain of IT

was developed. Individual possessing high levels of PIIT will develop strong intention towards the usage of the technology[32]. This has been corroborated across various research papers that have observed that PIIT has a significant relationship with perceived usefulness[50]. Few papers also noted that PIIT has a positive association with both perceived usefulness and perceived ease of use for ICT adoption[51]. However, in some of the studies, it was observed that PIIT influences perceived ease of use of a technology but doesn't have any effect on the perceived usefulness when the teacher is adopting ICT tools in his teaching process [52]. Few studies have also observed that PIIT has no impact on perceived usefulness when it comes to ICT adoption[51].

From the existing literature, we note that the impact of PIIT on ICT adoption intention is significantly important. The impact of PIIT on perceived usefulness and perceived ease of use was not very clear and was not consistent across the education domain. Based on the review of literature this study proposes to further investigate the relationship between PIIT and the TAM constructs through the following hypotheses:

H4: *PIIT will have a positive impact on Perceived Usefulness for ICT Adoption in Higher Education*

H5: *PIIT will have a positive impact on Perceived Ease of use for ICT Adoption in Higher Education*

3.6. Image

Image is measured in terms of the belief of a technology adopter wherein he/she thinks that the use of the ICT would improve his/her status in the social system and in the eyes of significant people. Image as a construct was introduced by Moore & Benbasat (1991). In certain cases of innovation, the social prestige that would result from the adoption of technology is a strong motivator for the adopter[53]. In a separate study, it was noted that image has a strong impact on perceived usefulness of a technology adoption [54]. Venkatesh and Davis (2000) observed the effect of image on perceived usefulness is applicable only in mandatory settings. However, few more studies revealed a different observation. When it comes to ICT adoption in education, image

has a negative impact on ICT adoption intention for faculty[55]. Review of literature therefore suggests that the impact of Image on ICT adoption intention has provided contradicting results on the impact as well as the nature of the impact and hence requires more examination. There also needs to be a study to establish the nature of relationship between image and perceived usefulness for ICT adoption. Using the above learning, the following hypothesis is proposed for the purpose of the study:

H6: *Image will have a positive impact on Perceived Usefulness for ICT Adoption for Higher Education*

3.7. Moderating variable

In the study of the relationship between technology adoption and personality trait, Venkatesh and Morris (2003) identified the role of gender, age and experience as primary moderating variables influencing the relationship between TAM constructs and intention of technology acceptance.

There have been existing research that has shown that gender has a significant influence in initial technology adoption and continuous usage decision. Men are more oriented towards individual task achievement than their women counterpart[56]. This leads to the understanding that gender will moderate the relationship between perceived usefulness as well as behavior intention throughout the adoption cycle[57], [58]. However, a contrasting observation has been noted in a research paper that says that gender has no significant role to play in ICT adoption[25].

Past studies indicate that that women are more compliant than men and are more inclined towards pleasing others. This observation suggests that gender could be affecting and impacting the association between social influence as well as perceived usefulness. Social influence was also found to be more strong factor among women in early stages of experience and also among older workers[59]. The effect of social influence will have a negative relationship with experience[60]. Experience was also found to have a negative relationship on the adoption behavior of ICT tools[25]. The more the experience of the adopter, the lesser are the intention and effectiveness of the adoption.

Considering the study of the moderating variables in the literature of ICT adoption, this research proposes the sixth and the seventh hypothesis:

H7: *Gender will moderate the relationship between personality trait and perceived usefulness*

H8: W*ork experience will moderate the relationship between personality trait and perceived usefulness*

3.8 Conceptual Model

Based on the literature review, we propose the conceptual model. We propose that Social influence, Image, Propensity to Trust and PIIT will have positive relationship with the perceived usefulness, which in turn will impact the intention to use ICT in education by the teachers. PIIT will also have an impact on the perceived ease of use. The relationship between personality trait and ICT adoption will be moderated by the gender and work experience of the teachers in the higher education sector.
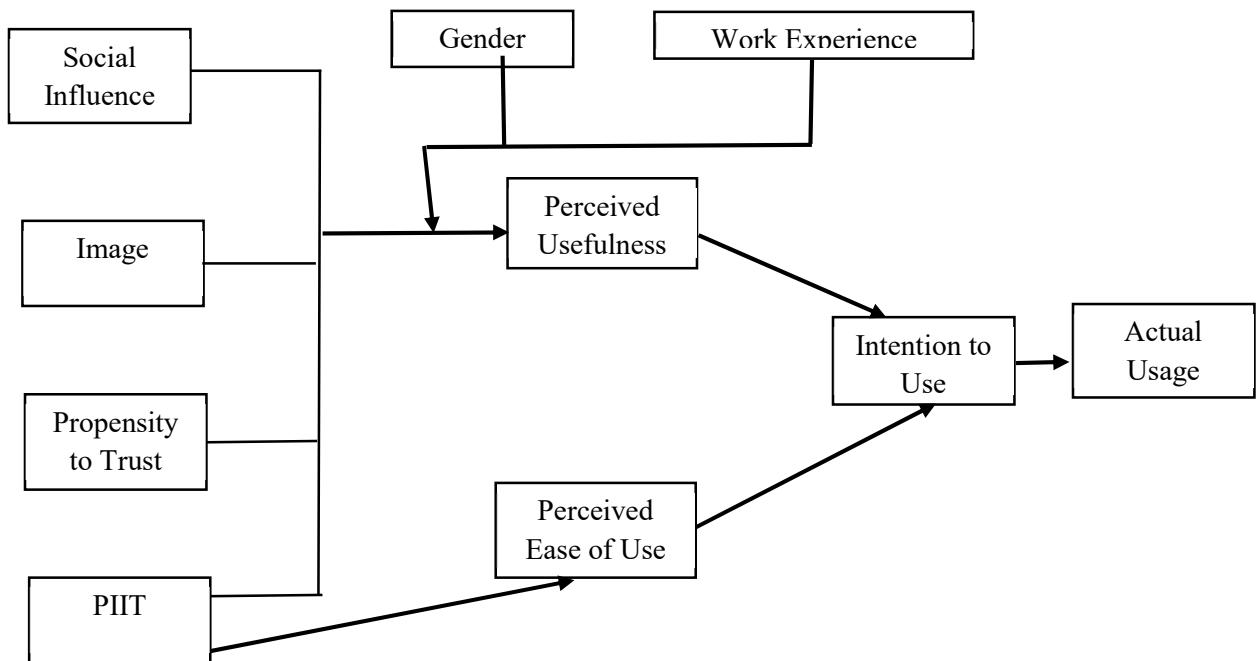

Fig. 2. Proposed Conceptual Model using TAM

4. Conclusion

While TAM is a very powerful and popular model used in technology acceptance behavior studies, social influence, propensity to trust, image and PIIT have been important influencer those have been left out of the model. This paper studies the relationship and associations between the constructs of personality trait and adoption behavior towards technolog. In the past studies, many of the constructs have given contrasting conclusion on their influence in the technology acceptance decision. The current study looks into these findings and delves deeper to understand their effect in technology acceptance in the education domain. The study suggests that social influence, propensity to trust, image and PIIT will have a significant impact on perceived usefulness, but the relationship will be affected and influenced by gender and work experience. The study also tries to further investigate whether there exists a relationship between PIIT on both the TAM constructs, i.e. perceived usefulness and perceived ease of use or only one of them. Finally, the research integrates all the hypotheses and proposes a unified conceptual model that can be used for better understanding of ICT adoption in education. The proposed conceptual model can also be the starting point for empirically validating the role of the identified constructs in adoption of technology in the education field.

4.1 Managerial Implications

The present research is significant both for management as well as administration in educational institutes. The determinants of TAM constructs will help in identifying the interventions based on personality trait that would lead to effective and efficient technology adoption in academics by teachers. It is important to recognise the attitudinal and emotional consequences of introducing a new technology and the study will help in the same. The study will also help in understanding the effect of diversity in technology usage in academics and provide evidence for individual and collective decision making.

4.2 Limitation of the Study

The limitation of the study is that it measures the initial ICT adoption tendency of teachers. The study does not measure the tendency of continuous usage over a longer and regular frequency. The future study can include longitudinal study to understand the behavior over a period of time and study the impact on continuous usage.

5. Acknowledgement

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