Personality Trait and ICT Adoption in Higher Education: Review

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Abstract:

Information and Communication Technology (ICT) in the realm 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.

Keywords: Personality Traits, TAM, ICT Adoption, Perceived Usefulness, Gender, Work Experience, Adopters

1. Introduction

Information and Communication Technology (ICT) is a combination Information Technology (IT) and communication technologies that uses all the IT tools to help in the access, storage, transmission and updating of the information for effective communication and usage[1]. ICT in the field of education is the usage of all the technology related tools that helps in improving the learning process and also makes it efficient and interactive. It has become a necessary skill in the 21st century for everyone in the field of education and has the potential to change the way of teaching and learning in a very constructive way [2]. The importance of ICT has further been emphasized by the ongoing 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 [3].

It has been noted that educational institutes continue to use traditional methods of teachinglearning even though there has been a significant investment in ICT and numerous benefits that ICT offers [4]. 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 [5].

It is observed that teachers play a very critical role in 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[6]. 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. 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 [7].

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 this study is to find the relationship between personality traits of academicians and their adoption behaviour of ICT for 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. We approach the study by first considering the theoretical underpinnings that would establish a relationship between personality traits that influence adoption behavior. Subsequently, the research investigates the role of relevant moderating variables that would affect the relationship.

2. Theoretical Underpinning

2.1. Theory of Reasoned Action (TRA)

Theory of reasoned action states that human beings usually behave in a 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 further states that intention is significantly dependent on the person's attitude and subjective norm [7]. Subjective norm is defined as one's perception that people who are important to them think that whether they should perform the behavior or not. Attitudes in turn are determined by beliefs concerning a behaviour's likely outcomes and evaluations of those outcomes.

[7] observed a significant relationship between attitude and personality traits. He established that personality trait influences attitude which in turn influences intention.

2.2. Innovation Diffusion Theory (IDT)

Innovation diffusion theory views the diffusion of an innovation and the dissemination of information through a social system. It has been observed that everyone doesn't adopt innovation in the same way and at the same time. Diffusion is the process by which an innovation is adopted by members of a certain community. Potential adopters use the information to form perceptions about the characteristics of the innovation, which assist in their subsequent adoption [8]. The decision to adopt an innovation is predicted, in part, by the perceived attributes of an innovation, and the personality of the potential innovator. It further explained that there are four major theories dealing with the diffusion of innovation. These include the innovation-decision process theory, the individual innovativeness theory, the rate of adoption theory, and the theory of perceived attributes [8].

Among these, the individual innovativeness theory emphasises on the characteristics of the adopter. It specifies who adopts an innovation and when and further suggests that the difference is due to the distinct personality traits. Based on that observation, adopters were segregated into five categories based on the degree of individual innovativeness (from earliest to late in the timeline): innovators, early adopters, early majority, late majority and laggards [8]. The innovation diffusion theory has been a pivotal theory in the study of technology diffusion for the past two decades [9].

2.3. Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is based on TRA that tries to define how users will come to accept and use a technology. TAM has been one of the most influential and used model to define adoption behavior in the domain of information systems or technology adoption. It states that there are two important factors: Perceived Usefulness and Perceived Ease of Use that influence a user's intention to accept and use a technology [10]. Perceived usefulness is defined as the degree to which the usage of a system would be useful to the individual and will lead to the improvement in their job performance. It is based on the outcome of their

experience. 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 degree to which the usage of the system is perceived to be free from effort, time and investment [10]. It tries to find out how easy it is to use a system. The easier it is to use the technology, the lesser would be the barriers of acceptance.

The early model of TAM [10], observed that perceived usefulness and perceived ease of use are the determinants of attitude which in turn drive intention. However, the later models of TAM [11] found out that perceived usefulness and perceived ease of use have a direct influence on behavior intention. The role of attitude turned out to be weak as a mediator between the constructs and the intention to use and hence was dropped from the model [11].



Figure 1. Technology Acceptance Model [11]

After the development of TAM, there have been many models and frameworks developed to understand technology acceptance behavior. The notable among these are TAM 2 [12], TAM3 [13] and Unified Theory of Acceptance and Use of Technology [14]. However, TAM continues to be the most commonly used technology acceptance model to study the individual and social factors influencing IT adoption and usage [15]. TAM has been one of the most cited and popular models to study technology acceptance due to its robustness, reliability, effectiveness, and high validity [16], [17]. TAM has found to be a valid model to study technology acceptance across diverse situations, cultures, samples, and domains, including education domain [18]. 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 field of education is defined as the usage of all the technology related tools that helps in improving the learning and also makes it interactive. With the advent of the new ICT tools, the concept of anywhere anytime learning has become imperative. The learning has also been paced out, both for the learner and the teachers. With the seepage of ICT in almost all the sectors, the Education domain has also felt its tremendous impact. The ongoing 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 [19]. Hence, today ICT has become a necessary skill to acquire knowledge as well as gain employability, for the teacher as well as the student.

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 [6]. Teachers are not only important for integrating technology in their daily classroom, but are also relevant in creating a digitally enabled learning environment and encouraging the students to do the same. For an organization that considers online learning a crucial part of education, it is very important that teachers accept technology in teaching process [20]. 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.

To keep pace with the changing environment and to take maximum advantage of technology, there has been continuous investment in ICT in higher education. However, in spite of the best of efforts, the adoption rates have not been very promising. Teachers are not adopting technology in the teaching process in a way that would completely overhaul the learning process [5]. They continue to use traditional methods in their classroom and have minimal usage of digital tools to enhance academic learning [21]. Studies have shown that in both developed and developing country, there has been concern regarding ICT integration in the teaching process [22]. 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. Teachers were willing to use ICT for their personal use and were reaping benefits from it, but were unable to use it effectively in their classroom teaching [23]. There is a necessity to understand the determinants of technology adoption in education by teachers to create strategies that would help in enhancing the usage of ICT in the teachinglearning process [24]. Literature review has shown that there has been a lack of studies to understand the theoretical grounding for ICT adoption and developing strategies for the same in the education field [25]. When it comes to technology adoption, there are three dimensions to it. The first dimension is the adopter, the second dimension is the level of the innovations, and the third dimension relates to the contextual parameters [26]. 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 [27].

The attitude of the teacher plays a very crucial role in the ICT adoption within a classroom – both quantitatively and qualitatively [28]. Attitude is considered a combination of a person 's inclinations, feelings, prejudices or bias, conceived notions, ideas, fears and other convictions about any specific objects or products [28]. The beliefs of every individual is a factor of their individual personality trait. Personality traits is an amalgamation of people's thoughts, feelings and behavior which in turn might have influence on their actual behaviour [29]. 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, the immediate determinant of a person's attempt to perform a behavior is his intention to take the action and this intention in turn is a function of attitude. The theory notes that behavior intention is influenced by attitude and subjective norm. Attitude is a function of 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 [8]. 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. The present research aims to focus on the factors at the teacher level, because as noted earlier, academic literature suggests that teachers play a very crucial role in the ICT adoption [6]. 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 [30], lack of confidence, competence and fear [31], **social influence** [32], **image** [33], **trust** [34], performance expectancy and effort expectancy [14], **Personal**

Innovativeness in the domain of Information Technology [35], self-efficacy [36] and commitment [37]. The scope of this study is restricted to understanding the role of a teacher's personality traits like social influence, image, propensity to trust and PIIT for ICT adoption in the domain of education.

3.3. Social Influence

Social influence in the domain of education is the degree to which the adopter believes that the ICT acceptance in academics is approved and encouraged by others who are important to the adopter [38]. Social influence is a psychological factor that interfaces between self-interest and approvals from others [39]. 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 [29], where he termed it as subjective norm. The theory of IDT [8] mentions that potential adopters are influenced in their adoption intention by influencers in their personal network.

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 [14]. Social influence has a significant relationship with the perceived usefulness of a technology and also ICT adoption intention [40]. However, studies also concluded that compliance based social influence has a negative impact on ICT adoption in voluntary environment and acts as a deterrent [41]. In some studies, social influence was found to have no impact in ICT adoption in universities [42]. The study of the impact of social influence on ICT adoption. 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: Social influence will have a positive impact on Perceived Usefulness for ICT Adoption in Higher Education
H2: Social influence will have a positive impact on Behavior Intention for ICT Adoption in Higher Education

3.4. Propensity to Trust

Trust is defined as the willingness of a party to be vulnerable to the actions of others and establish a relationship of dependency between the two parties [43]. Trust is a psychological expectation that the trusted party will behave as per the mutual understanding and will not be opportunistic. Initial trust in a service is affected by the person's trust propensity trait [44]. Trust propensity is the tendency to believe or not believe in others or their services [43]. Trust in terms of a technology adopter is the extent to which the adopter considers the innovation as trustworthy. The level of trust in a service affects the adopter's intention to use the service or the innovation [45]. There have been many researches to study the impact of trust in ICT adoption and it is found to have an impact on the ICT adoption [46]. Trust becomes even more important in web-based environments where the trustee and the trustor are not in each other's physical presence [47]. Some studies found that trust is found to have a negative relationship between perceived usefulness and usage intention [34]. When it comes to technology related application, the relationship between trust and adoption intention is found to be insignificant [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 next 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) reflects the tendency of a person to experiment with new technologies irrespective of the opinion of others [35]. Adopters have different levels of adoption tendency based on their characteristics and levels of innovativeness [8]. The concept of innovativeness was analysed and was emphasized that it is important to classify innovativeness and needs to be viewed in conjunction with the behavioural context [35]. A person might illustrate different levels of innovativeness based on their interest domains. With this hypothesis, they developed the construct of PIIT which measures innovativeness in the domain of IT and would help to understand how willing a person is to accept and adopt technology related changes. Individual with higher levels of PIIT will develop positive intentions towards the usage of the technology [35]. This has been corroborated across various research papers that have observed that PIIT has a significant positive relationship with perceived usefulness [50]. Few papers also noted that PIIT has a direct relationship 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 but not perceived usefulness in the context of ICT adoption in education [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. However, there have been many instances where PIIT does have an influence on behavior intention, their impact on perceived usefulness and perceived ease of use was not very clear and consistent across 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 defined as the degree to which an individual believes that the use of the ICT would improve his status in the social system and in the eyes of significant people [53]. There have been many studies to understand the relationship between image and behavior intention [12]. In certain cases of innovation, the social prestige that would result from the adoption of technology is a strong motivator for the adopter [54]. In a separate study, it was also noted that image has a strong positive impact on perceived usefulness [55]. The effect of image on perceived usefulness is applicable only in mandatory settings [12]. 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 [56]. 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. Hence, this study proposes the following hypothesis:

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, the construct of gender, age and experience act as primary moderating variables influencing the relationship between TAM constructs and intention of technology acceptance [14]. Given the premise, the present paper explores the different moderating variables and how they would affect the relationship between the constructs proposed in the paper.

There have been existing research that has shown that gender has a significant influence in initial technology adoption and continuous usage decision. Men rate career advancement and earning higher than women, which in turn suggest that gender has a moderating influence on the relationship between perceived usefulness and adoption intention. This phenomenon has been corroborated by the seminal works of [57]. Therefore, gender will moderate the relationship between perceived usefulness and behavior intention throughout the adoption

cycle [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 [28].

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 moderating the relationship between social influence and perceived usefulness. Social influence was found to be more significant 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 moderating effect on ICT adoption [28]. 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 and will moderate the relationship between personality trait and perceived usefulness

H8: Work experience will moderate the relationship between personality trait and perceived usefulness

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 a significant relationship with 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.



Figure 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 between the constructs of personality trait and technology adoption. 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 moderated 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.

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.

The limitation of the study is that it measures the initial ICT adoption tendency of teachers. The future study can include longitudinal study to understand the behavior over a period of time.

5. References

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