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Autonomous Motivation and Individual-Technology Fit: Exploring ICT Adoption in Higher Education Teaching

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ABSTRACT

Purpose The rapid advancement of information and communication technology (ICT) necessitates a comprehensive examination of the determinants influencing its adoption. This study integrates Self-Determination Theory (SDT), the Theory of Planned Behaviour (TPB), and the Task-Technology Fit (TTF) framework to explore the psychological and social variables that shape user engagement with ICT. The primary objective was to assess how autonomy, competence, relatedness, subjective norms, perceived behavioural control, and the alignment between technology and task collectively affect individuals' behavioural intentions and actual adoption of ICT. **Methodology** The research employed a quantitative methodology, analysing structured survey data collected from 430 respondents. Using SmartPLS 4, structural equation modelling (SEM) was conducted to investigate the interrelationships among the study variables. **Results** The findings confirm that perceived autonomy, competence, and relatedness significantly enhance autonomous motivation, which in turn influences perceived behavioural control and attitudes, while also shaping subjective norms in accordance with the TPB framework. ICT adoption is shown to be strongly influenced by subjective norms, although alignment between user requirements and technological capabilities (TTF) facilitates adoption. Conversely, a poor fit between task demands and technological features presents a substantial barrier to adoption. **Implications for Research and Practice.** This study contributes meaningfully to the literature by presenting an integrative model that synthesises psychological theory, behavioural intention constructs, and technological fit dimensions to explain ICT adoption. The implications are practical and far-reaching, offering strategies for organisations to develop ICT utilisation skills, and providing policy makers and educators with actionable recommendations to enhance implementation and promote effective task-technology integration.

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Introduction

Higher education institutions have increasingly recognised ICT integration as a cornerstone for enhancing teaching quality, enriching student learning experiences, and advancing digital transformation within academia (Leenknecht et al., 2020). Globally, universities have adopted digital learning platforms, transitioning from conventional instructional methods to more interactive pedagogical tools, blended learning strategies, and data-driven educational models. In alignment with policy directives, higher education institutions are encouraged to adopt digital technologies that foster both instructional quality and student engagement (Alowayr & Al-Azawei, 2021). Nonetheless, despite substantial improvements in ICT infrastructure and supportive educational policies, the extent to which university lecturers effectively adopt and utilise ICT remains uneven.

The decision-making process concerning ICT integration among lecturers is shaped by multiple variables, including individual attitudes, social influences, and both technological and psychological considerations (Bin et al., 2020). Within this context, TPB serves as a robust theoretical framework, elucidating how attitudes, social norms, and perceived behavioural control collectively influence ICT-related behaviours among educators (Bai et al., 2020). In parallel, SDT identifies three primary psychological needs—autonomy, competence, and relatedness—as core factors that influence behavioural intention. However, a more comprehensive understanding of ICT adoption necessitates a detailed examination of how these motivational and psychological dimensions interact with technological variables (Wang & Cheng, 2020). This study explores ICT usage behaviours among university lecturers by synthesising TPB and SDT with TTF and individual-technology fit (ITF). Although extensive literature has addressed ICT adoption in higher education, much of it has concentrated on extrinsic barriers such as institutional resources, infrastructure, and policy frameworks. In contrast, limited attention has been paid to the psychological and motivational mechanisms influencing lecturers' adoption choices. While TPB effectively explains behavioural intention, it does not fully capture the role of intrinsic motivation in voluntary technology use. Although SDT has been widely applied to analyse student motivation, its application to faculty ICT engagement remains underexplored. Moreover, behavioural intention alone does not suffice to ensure actual technology adoption; the mediating roles of TTF and ITF require further scrutiny. Existing studies have rarely integrated TPB, SDT, and technology fit theories into a unified framework for understanding ICT utilisation among lecturers (Irawan et al., 2022). By addressing this gap, the present study offers a holistic theoretical model that informs institutional policy, instructional design, and professional development aimed at optimising ICT adoption in higher education.

Research Question and Objectives

The research questions and objectives presented in Table 1 have been formulated to examine the principal determinants that shape university lecturers' decisions to adopt ICT within their teaching practices.

This research is significant as it delivers a comprehensive examination of the factors influencing lecturers' adoption of ICT, grounded in the frameworks of TPB and SDT. By analysing psychological needs in conjunction with motivational drivers and behavioural

intention, the study yields critical insights into lecturers' ICT engagement. The findings highlight the pivotal function of TTF and ITF in accounting for the frequent disconnect between intention and actual ICT usage. These results offer practical implications for institutional administrators, policymakers, and educators, supporting the formulation of targeted strategies to strengthen ICT integration across higher education and thereby enhance instructional effectiveness. Furthermore, the study addresses a notable research gap by elucidating the mediating role of psychological factors in the interaction between social context and technological attributes during the ICT adoption process. It identifies both supportive and inhibiting variables, contributing to the development of a robust theoretical and applied framework aimed at facilitating enduring digital transformation within university-level teaching environments.

Table 1

Research Question and Objectives

Research Questions	Research Objectives
To what extent do university lecturers' perceptions of autonomy, competence, and relatedness foster autonomous motivation?	To investigate how perceived autonomy, competence, and relatedness are associated with autonomous motivation.
Does autonomous motivation among university lecturers influence their attitudes, subjective norms, and perceived behavioural control?	To explore the relationship between autonomous motivation and attitudes, subjective norms, and perceived behavioural control.
To what degree do attitudes, subjective norms, and perceived behavioural control shape university lecturers' behavioural intentions to utilise ICT in teaching?	To assess the influence of attitudes, subjective norms, and perceived behavioural control on behavioural intention to adopt ICT.
Does behavioural intention to utilise ICT in teaching predict actual ICT usage among university lecturers?	To determine the relationship between behavioural intention and actual ICT usage behaviour.
Does behavioural intention to adopt ICT mediate the relationship between attitudes, subjective norms, perceived behavioural control, and ICT usage behaviour among university lecturers?	To examine whether behavioural intention mediates the influence of attitudes, subjective norms, and perceived behavioural control on ICT usage behaviour.
Does perceived task-technology fit mediate the relationship between behavioural intention to adopt ICT and actual usage behaviour among university lecturers?	To analyse the mediating role of task-technology fit in the relationship between behavioural intention and ICT usage behaviour.
Does perceived individual-technology fit mediate the relationship between behavioural intention to adopt ICT and actual usage behaviour among university lecturers?	To evaluate whether individual-technology fit mediates the relationship between behavioural intention and ICT usage behaviour.

Literature Review

The perception of control over one's actions significantly influences the development of intrinsic motivational tendencies. As outlined in SDT (Deci & Ryan, 1985), autonomy

constitutes a fundamental psychological requirement that fosters heightened motivation and active involvement in tasks (Xiao, 2019). Empirical evidence suggests that individuals who perceive themselves as autonomous are more likely to exhibit autonomous motivation, characterised by the internal drive to engage in activities out of genuine interest and personal fulfilment rather than external rewards. Findings drawn from empirical settings indicate that such individuals tend to display elevated levels of commitment, sustained dedication, and enhanced creativity in their problem-solving efforts. When applied to technological contexts, individuals who perceive freedom in their engagement with digital tools are more inclined to incorporate these technologies effectively into their professional practices (Humida et al., 2021).

H1: *There is a positive relationship between perceived autonomy and autonomous motivation.*

Within the framework of SDT, perceived competence refers to an individual's self-assessed ability to perform tasks successfully. This belief in one's effectiveness fosters internal motivation, driving individuals to engage in behaviours that showcase and further develop their skills (Gurer, 2021). Numerous studies across various domains—including education, employment, and digital innovation—consistently highlight that confidence in one's abilities promotes autonomous motivation. In the context of technological engagement, individuals who consider themselves proficient in ICT are more likely to adopt and integrate digital tools into their routine practices. This perceived expertise plays a pivotal role in shaping one's motivational disposition towards utilising ICT platforms (Falloon, 2020).

H2: *There is a positive relationship between perceived competence and autonomous motivation.*

Perceived relatedness, within a given context, emerges when individuals experience meaningful social bonds and interpersonal connection. As outlined in SDT, this sense of connectedness constitutes a fundamental psychological need that directly influences both motivational orientation and active engagement (Huang et al., 2020). Empirical findings indicate that the presence of social affiliation and emotional support facilitates the development of autonomous motivation. In digital contexts, the successful adoption of ICT systems is often enhanced when users feel socially supported, fostering a belief in reciprocal relational dynamics. Environments characterised by collaboration and a collective digital ethos tend to encourage more effective utilisation and positive perception of ICT tools among individuals (Frolova et al., 2020).

H3: *There is a positive relationship between perceived relatedness and autonomous motivation.*

Individuals who exhibit autonomous motivation driven by internal values and genuine interest may still be influenced by social expectations when making behavioural decisions. Within the framework of the TPB, subjective norms are recognised as a significant determinant of behavioural intention. The intensity of autonomous motivation often compels individuals to align with favourable subjective norms present within their social and professional circles (Nunes et al., 2022). Empirical studies suggest that those who are intrinsically driven are more likely to internalise and respond to the expectations of peers, mentors, and colleagues. In the context of ICT adoption, individuals motivated by self-endorsed autonomy tend to conform to digital practices that mirror socially accepted

standards, as these behaviours resonate with their personal convictions and professional self-concept (Luo, 2023).

H4: *There is a positive relationship between autonomous motivation and subjective norms.*

Individuals form evaluations about specific behaviours based on their attitudes, which subsequently influence the likelihood of engaging in those behaviours. When individuals are driven by autonomous motivation, they tend to develop highly favourable attitudes towards both routine actions and innovative practices, as these align closely with their personal interests and internalised values (Gökçearslan et al., 2022). Such motivation often fosters a more constructive outlook on learning, professional tasks, and the adoption of digital technologies. When technology use resonates with an individual's intrinsic aspirations, they are more inclined to incorporate it effectively into their practices. In this context, autonomous motivation enhances the strength of positive attitudes, thereby facilitating greater engagement with ICT tools (Joshi et al., 2020).

H5: *There is a positive relationship between autonomous motivation and attitude.*

Perceived Behavioural Control (PBC) refers to an individual's belief in their ability to carry out a specific action. Within the Theory of Planned Behaviour, PBC plays a central role by linking an individual's autonomous motivation to their sense of self-regulated capability (Al-Emran, 2021). When individuals are autonomously motivated, they tend to develop stronger self-efficacy, which reinforces their confidence in managing and executing tasks independently. In digital contexts, those with internalised motivation perceive ICT systems as accessible and useful, increasing their readiness to embrace and utilise such technologies in pursuit of their objectives (Lavidas et al., 2022).

H6: *There is a positive relationship between autonomous motivation and perceived behavioural control.*

Behavioural intentions are heavily influenced by perceived social expectations, as individuals interpret their surroundings through the lens of social approval or disapproval. Empirical findings indicate that people are more inclined to commit to certain behaviours when they perceive either encouragement or pressure from others. Within the context of ICT adoption, subjective norms play a decisive role, shaping how individuals integrate digital technologies into both their professional routines and personal tasks. Employees who perceive strong endorsement of ICT usage from supervisors and peers are more likely to develop firm intentions to engage with and depend on such technological systems (Maatuk et al., 2021).

H7: *There is a positive relationship between subjective norms and intentions.*

Attitudes, whether favourable or unfavourable, represent key psychological drivers that influence individuals' behavioural planning, particularly in the context of ICT utilisation. According to TPB, attitudes are pivotal in shaping behavioural intentions, which subsequently act as predictors of actual conduct (Donitsa-Schmidt & Ramot, 2020). Individuals form these evaluative judgments through a combination of cognitive, affective, and behavioural mechanisms. When people develop a positive perception of ICT, they are more inclined to form firm intentions to incorporate it into their routine activities (Li, 2021). A substantial body of literature confirms the existence of a strong association between

attitude and intention across domains such as digital transformation, e-learning, and technology implementation. Within the framework of UTAUT, developers posit that users' perceptions of usefulness and ease of use are central to shaping positive attitudes, which in turn foster the intention to adopt emerging technologies (Hu et al., 2021). Individuals who perceive ICT tools as effective, pleasurable, and functionally advantageous in their professional roles are more likely to exhibit favourable attitudes, thus reinforcing their intent to utilise such technologies. The general disposition toward ICT in organisational settings is frequently shaped by factors such as prior exposure to technology, institutional support structures, and access to targeted training (de Wit & Altbach, 2020). Employees who recognise ICT as a tool that boosts productivity are more inclined to adopt it actively within their professional tasks. Likewise, students who hold positive perceptions of digital learning platforms demonstrate increased engagement and motivation in using these resources (Huang, 2022). A wide range of studies affirms that attitudes significantly drive behavioural intentions. Consequently, it is essential for institutions, educational bodies, and policymakers to implement awareness-building measures, structured training initiatives, and technology-centred frameworks to cultivate a constructive climate for ICT adoption (Rahman et al., 2022).

H8: *There is a positive relationship between attitudes and intentions.*

PBC represents individuals' perception of their ability to undertake specific actions, shaped by both internal competencies and external limitations. Within TPB, it operates as a core determinant of intention, alongside attitudes and subjective norms. Individuals who perceive themselves as capable of managing ICT applications are more inclined to express strong intentions to integrate these tools into their professional or academic routines (Dhir et al., 2018). Empirical findings in the domain of technology integration indicate that perceived control over digital behaviour plays a crucial role in determining participation levels. The interplay between self-efficacy and resource accessibility serves as a fundamental mechanism that facilitates technology adoption in the workplace (Humida et al., 2021). Employees with the required digital skills, sufficient time, and consistent organisational backing are more likely to develop robust commitments to ICT use. Likewise, students with high confidence in their digital capabilities tend to engage more actively with online platforms (Tas et al., 2018). When users trust their technical abilities and feel prepared to resolve digital challenges, their intention to participate in virtual learning environments significantly increases. In contrast, individuals who perceive ICT demands to be beyond their control, despite acknowledging potential advantages, tend to avoid its use (Ma et al., 2020). The presence of supportive infrastructure and accessible assistance directly influences PBC. Organisational initiatives that ensure user-friendly systems, structured training, and reliable technical support enhance control beliefs, thereby strengthening ICT-related intentions (Park et al., 2021). Public institutions and regulatory agencies must also promote inclusive digital literacy schemes while removing structural barriers. PBC remains a pivotal force in determining ICT adoption, necessitating institutional strategies that reinforce user confidence and minimise constraints (Bin-Hady & Al-Tamimi, 2021).

H9: *There is a positive relationship between perceived behavioural control and intentions.*

Behavioural intention offers a reliable indicator of subsequent conduct, particularly in the context of ICT engagement. Within the frameworks of TPB and TAM, a clear intention towards a particular action significantly heightens the probability of its realisation (Chae & Lee, 2022). Individuals who express a deliberate commitment to utilise ICT are more inclined to integrate digital tools into their daily routines. Substantial empirical evidence identifies behavioural intention as a primary determinant in predicting ICT use. In professional environments, employees with clear plans to embrace digital technologies often display higher levels of practical adoption. Similarly, students who exhibit a firm resolve to use online platforms typically engage more actively and maintain higher levels of participation (Bin-Hady & Al-Tamimi, 2021). Nevertheless, the translation of intention into action can be moderated by external influences such as system availability, ease of use, and prevailing organisational norms. Barriers like technological inefficiencies, insufficient institutional support, or unsatisfactory user experiences can weaken the pathway from intention to behaviour (Sanchez-Acedo et al., 2023). Hence, synchronisation between technological infrastructure, user training, and continuous support mechanisms is essential to ensure users can follow through on their intentions effectively. Findings that link intention with behavioural outcomes offer practical insights for institutional and policy-level interventions aimed at fostering digital adoption. Facilitating environments that provide user-friendly platforms, responsive systems, and motivational incentives can significantly enhance the likelihood that stated intentions materialise into actual ICT utilisation (Moinnereau et al., 2022).

H10: *There is a positive relationship between intention and ICT usage behaviour.*

The relationship between attitudes and ICT usage behaviour is primarily shaped through an essential mediating component, namely behavioural intention, which strengthens this connection. Within the TPB framework, attitudes influence behavioural intentions, which in turn lead to actual behavioural outcomes (Kapidani et al., 2020). This model implies that even when individuals possess a favourable attitude towards ICT, they may not proceed to use it unless their intention to adopt it reaches a significant level of conviction. Numerous studies on technology integration highlight the central role of intention as a mediating factor. In the context of TAM and its subsequent adaptations, users may perceive ICT as beneficial and engaging, yet such perceptions do not result in actual adoption unless they are translated into strong behavioural commitments (Zvi & Lavi, 2025). Empirical evidence indicates that individuals who hold positive views towards digital technologies are more likely to form determined intentions, which in turn support widespread ICT implementation. Studies conducted in organisational settings confirm that employees with proactive attitudes towards ICT are more inclined to incorporate digital tools into their workflows when their intent to do so is clearly defined (Zabeli & Gjelaj, 2020). Therefore, the link between attitudes and ICT usage is contingent upon the mediating influence of intention, with stronger individual intentions being consistently associated with higher levels of technology adoption (Bin-Hady & Al-Tamimi, 2021).

H11: *There is a mediating role of intention on the relationship between attitude and ICT usage behaviour.*

Subjective norms, understood as perceived social pressures, shape individual engagement in specific behaviours. According to TPB, these norms significantly influence

behavioural intentions, which subsequently guide actual behaviour. In the context of ICT adoption, social influences exert their impact primarily by shaping an individual's motivation to conform to perceived expectations (Bin-Hady & Al-Tamimi, 2021). Studies on technology integration illustrate that peer evaluations, organisational standards, and prevailing societal practices considerably affect users' intentions to embrace ICT. Evidence from employer-based research indicates that when managerial personnel express active endorsement of digital tools, employees are more inclined to develop a determined intention to implement ICT, which often results in practical system usage (Wang et al., 2024). Within educational settings, students frequently express willingness to engage in digital learning approaches when they observe their peers actively interacting with e-learning platforms. For social influence to translate into actual ICT utilisation, a strong behavioural intention is essential (Llamas-Díaz et al., 2022). The strength of such social influence is often reinforced by organisational culture, digital trends, and policy directives. Institutional frameworks, including formal policies and structured training schemes, have been shown to enhance individuals' intention to utilise technology, thereby increasing the probability of adoption (Paolanti et al., 2023). However, the transition from intention to actual behaviour can be hindered by obstacles such as inaccessible infrastructure or technical complications. Hence, for social norms to effectively influence ICT behaviour, they must operate through the intermediary of intention. When institutional encouragement is combined with peer support and positive reinforcement, individuals are more likely to convert behavioural intentions into actual technology usage (Vincent & Frewen, 2023).

H12: *There is a mediating role of intention on the relationship between subjective norms and ICT usage behaviour.*

PBC reflects individuals' confidence in their capacity to execute particular behaviours, which is shaped by their competencies, available resources, and environmental limitations. Within the TPB structure, PBC contributes significantly to the formation of behavioural intentions, which subsequently predict actual behaviour (Chuang, 2020). In the realm of ICT usage, individuals who believe they possess the necessary competence are more inclined to form robust intentions prior to adopting the technology. Empirical research supports the mediating function of intention between PBC and ICT adoption. Those who perceive themselves as technologically proficient tend to cultivate stronger intentions to engage in ICT-related activities (Pérez-Seijo et al., 2020). However, the successful transition from intention to actual ICT implementation depends on the absence of external barriers, including infrastructural inadequacies and insufficient organisational support. In professional contexts, the willingness of staff to embrace digital tools reaches its peak when they exhibit firm intentions supported by a strong sense of behavioural control (Choudhary & Sahu, 2023). Similarly, students' academic outcomes within digital learning environments are strongly associated with their perceived capability to navigate such platforms, which enhances their intentions and, in turn, their level of engagement. Conversely, unanticipated challenges such as technical faults or a lack of instructional support weaken the mediating role of intention (Mafabi et al., 2017). Individuals with high perceived ICT competence may still fail to adopt such technologies if they do not receive adequate encouragement or external facilitation. Therefore, for organisations to increase ICT uptake, efforts must focus on bolstering users' confidence in their technological

abilities, while simultaneously reinforcing behavioural intentions through targeted training, incentives, and constructive feedback mechanisms (Ma et al., 2020).

H13: *There is a mediating role of intention on the relationship between perceived behavioural control and ICT usage behaviour.*

Empirical studies indicate that the successful implementation of technology is strongly influenced by the extent to which digital solutions correspond with the functional demands of the work environment. This perspective suggests that actual ICT usage is not solely driven by behavioural intention, but also by the compatibility between technological features and task-related requirements. Even when individuals express a clear intention to adopt ICT, the actual usage tends to occur only when the technology supports and enhances job performance (Park et al., 2021). In organisational settings, employees tend to utilise digital systems when these tools are seen to improve operational efficiency, thereby reinforcing prior intentions to adopt them. Effective ICT adoption, therefore, necessitates both a strong behavioural intention and a functional alignment between the system's capabilities and the specific tasks it is intended to support. In cases where there is a mismatch—such as when the technology is overly complex, lacks relevance, or fails to address the practical needs of the job—the presence of intention alone proves insufficient for adoption. To overcome these barriers, organisations must ensure that digital technologies are integrated into workflows in ways that are responsive to users' actual operational needs (Chae & Lee, 2022).

H14: *There is a mediating role of task-technology fit on the relationship between behavioural intention and ICT usage behaviour.*

The ITF theory asserts that the adoption of digital systems is influenced not only by alignment with task demands, but also by the extent to which the technology corresponds with users' personal competencies, preferred features, and anticipated outcomes. Unlike the task-technology fit perspective, ITF highlights the importance of user-specific characteristics, such as technological familiarity, cognitive abilities, and comfort with digital interfaces. Within the Unified Theory of Acceptance and Use of Technology, behavioural intention is identified as a critical driver of ICT adoption (Berhanu & Raj, 2020). However, the mere intention to engage with a technology does not guarantee its actual usage. Compatibility between the individual and the system plays a decisive role in translating intention into real application. Users are more likely to overcome external constraints and proceed with adoption when the system reflects their skill level and desired functionalities (Lábadi et al., 2021). Conversely, when a lack of alignment exists between personal capabilities and the system's demands, even strong intentions may not culminate in actual ICT engagement. Numerous empirical studies validate this relationship by demonstrating that employees show greater willingness to adopt technologies that accommodate both their roles and competencies. Similarly, student participation in e-learning platforms increases when these tools are perceived as aligned with their individual learning styles. Furthermore, personal attributes such as technological self-efficacy, digital proficiency, and perceived cognitive load significantly affect ITF outcomes (Rzymski et al., 2021).

H15: *There is a mediating role of individual-technology fit on the relationship between behavioural intention and ICT usage behaviour.*

Figure 1 outlines an integrated conceptual model combining SDT and TPB, illustrating how the fulfilment of core psychological needs—autonomy, competence, and relatedness—serves to stimulate autonomous motivation. This motivation unfolds sequentially, initially reinforcing individuals' attitudes, subjective norms, and perceived behavioural control, which subsequently enhances the strength of their behavioural intentions. These intentions act as the proximal predictor of actual ICT usage. Within this structure, TTF is applied to evaluate the extent to which technological tools are aligned with specific task requirements and individual user capabilities, thereby facilitating the transition from intention to actual adoption behaviour.

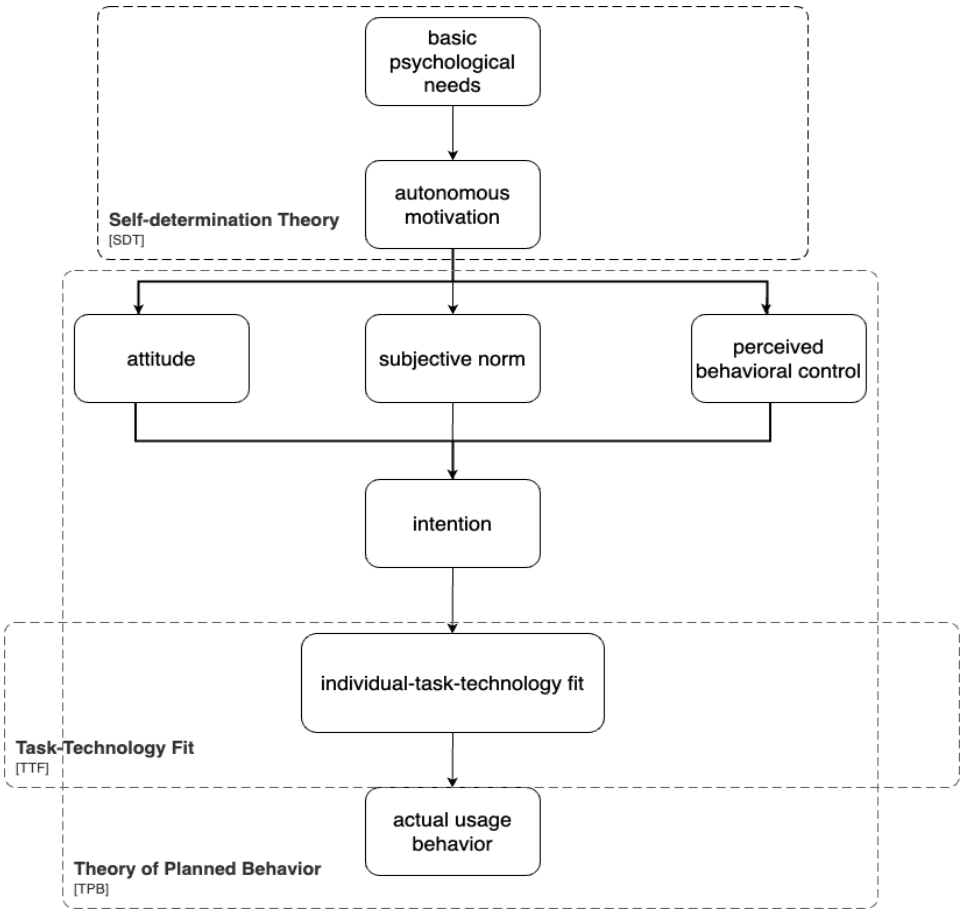

Figure 1: Theoretical Framework of this Research

Figure 2 presents the conceptual model, which visualises the hypothesised relationships derived from the underlying theoretical frameworks. The model depicts how the three dimensions of perceived autonomy, together with elements of competence and relatedness, collectively shape autonomous motivation. This motivation subsequently informs individuals' attitudes, subjective norms, and perceived behavioural control. These

psychological constructs, in turn, influence ICT usage through the dual mediating pathways of TTF and ITF. The configuration offers a structured foundation for conducting empirical validation of the proposed associations.

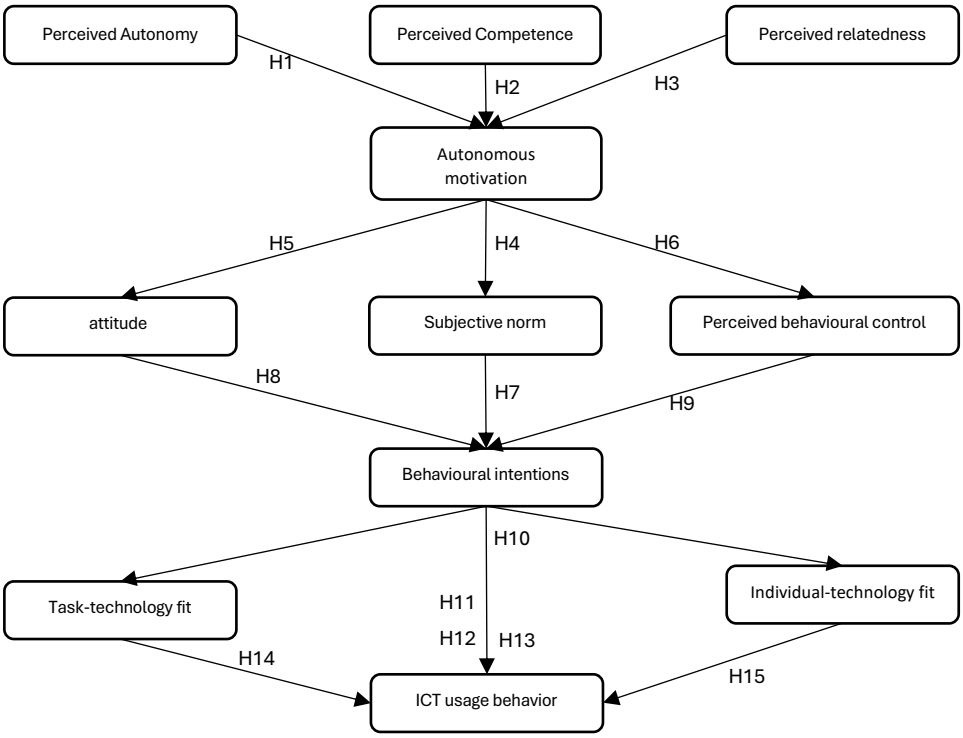

Figure 2: Conceptual Framework

Methodology

This study employed a cross-sectional survey-based quantitative research design to examine the hypothesised relationships among perceived autonomy, competence, relatedness, autonomous motivation, subjective norms, attitude, perceived behavioural control, behavioural intention, TTF, ITF, and ICT usage behaviour. The research instrument was developed using previously validated measurement items sourced from established studies to ensure content validity and enhance reliability. The final questionnaire was structured into three sections, encompassing demographic data, psychological constructs, and behavioural indicators. All items were measured on a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The study targeted a sample of 430 individuals engaged in technology-oriented roles across education and ICT domains. A random sampling technique was adopted to strengthen the generalisability of findings. A pilot study with 30 participants was conducted to ensure the reliability of the measurement tool. Data were collected both online and in person, achieving a high response rate. Participants were informed of the

study's purpose, confidentiality, and their right to withdraw, adhering to ethical standards. SEM analysis using SmartPLS 4 followed a two-stage process, beginning with measurement model assessment through Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). Subsequently, the structural model was examined to estimate path coefficients, R^2 values, and the significance of relationships through bootstrapping procedures. The study further explored the mediating roles of behavioural intention, TTF, and ITF in predicting ICT usage behaviour. Ethical integrity was maintained throughout the research by securing informed consent, ensuring participant anonymity, and protecting data confidentiality. The methodological rigour reflected in the structured survey instrument, PLS-SEM application, and systematic sampling approach contributes to the generation of robust empirical insights into the interplay between psychological constructs and technological factors influencing ICT adoption.

Measure

Perceived Autonomy: The construct of perceived autonomy support scale was examined using a four-item instrument (PA1, PA2, PA3, PA4), adopted from Chatzisarantis et al. (2007). The internal consistency of the scale was found to be robust, with a Cronbach's alpha value of 0.881.

Perceived Competence: This variable was measured using four items (PC1, PC2, PC3, PC4) adapted from the validated scale developed by Williams et al. (1998). The scale demonstrated satisfactory reliability, as indicated by a Cronbach's alpha coefficient of 0.836.

Perceived Relatedness: Perceived relatedness was assessed through a four-item scale (PR1, PR2, PR3, PR4) based on the work of Sevari (2017). The internal reliability of the instrument was high, with a Cronbach's alpha of 0.900.

Autonomous Motivation: Autonomous motivation was measured using six items (AM1, AM2, AM3, AM4, AM5, AM6), derived from the established scale presented by Koestner et al. (2008). The instrument yielded a Cronbach's alpha value of 0.792, confirming acceptable internal consistency.

Subjective Norms: This construct was evaluated using a three-item measure (SN1, SN2, SN3). The reliability analysis showed a Cronbach's alpha of 0.732, suggesting a reasonable level of internal consistency.

Attitude: Attitude was operationalised using three items (ATT1, ATT2, ATT3), drawn from the instrument developed by Likert (2017). The scale's internal reliability was confirmed by a Cronbach's alpha value of 0.800.

Perceived Behavioural Control: Perceived behavioural control was assessed through three items (PBC1, PBC2, PBC3) taken from the scale introduced by Sheeran et al. (2003). The reliability of this construct was supported by a Cronbach's alpha of 0.787.

Behavioural Intention: The behavioural intention construct was measured using a five-item scale (INT1, INT2, INT3, INT4, INT5) as utilised in the study by Egelman et al. (2016). The scale exhibited strong internal consistency, with a Cronbach's alpha of 0.899.

Task-Technology Fit: Task-technology fit was examined using four items (TTF1, TTF2, TTF3, TTF4), drawn from the validated scale developed by Howard and Rose (2019). The internal consistency of the instrument was substantiated by a Cronbach's alpha score of 0.839.

Individual-Technology Fit: This construct was evaluated using a four-item measure (ITF1, ITF2, ITF3, ITF4), derived from the scale provided by Parkes (2013). The reliability assessment yielded a Cronbach's alpha coefficient of 0.851.

ICT Usage Behaviour: ICT usage behaviour was assessed using an eight-item instrument (UB1, UB2, UB3, UB4, UB5, UB6, UB7, UB8), adapted from the validated measurement developed by Bhat and Bashir (2017). The scale demonstrated excellent internal reliability, with a Cronbach's alpha of 0.908.

Results

Table 2 confirms the measurement model's reliability and validity, with all constructs showing strong internal consistency (Cronbach's alpha > 0.70) and composite reliability (CR > 0.80). Autonomous motivation, assessed via six items, reflected high internal consistency (α = 0.881, CR = 0.910, AVE = 0.627), supported by factor loadings all above 0.756, reaching a maximum of 0.851, and VIF values remaining below 2.50, indicating no multicollinearity concerns. Attitude, measured through three items, also exhibited excellent reliability (α = 0.836, CR = 0.901, AVE = 0.753), with strong factor loadings ranging from 0.829 to 0.891 and acceptable VIF values between 1.758 and 2.120.

Table 2

Construct Reliability and Validity

Variables	Items	Loadings	Cronbach's Alpha	rho_A	C R	AVE	VIF
Autonomous Motivation	AM1	0.786	0.881	0.883	0.910	0.627	1.960
	AM2	0.851					2.496
	AM3	0.795					2.045
	AM4	0.760					1.816
	AM5	0.801					2.373
	AM6	0.756					2.109
Attitude	ATT1	0.829	0.836	0.845	0.901	0.753	1.758
	ATT2	0.891					2.120
	ATT3	0.882					2.096
Behavioural Intention	INT1	0.836	0.900	0.902	0.926	0.715	2.176
	INT2	0.845					2.522
	INT3	0.887					3.042
	INT4	0.872					2.682
	INT5	0.785					1.851
Individual-Technology Fit	ITF1	0.761	0.792	0.798	0.864	0.614	1.416
	ITF2	0.814					1.756
	ITF3	0.762					1.807
	ITF4	0.794					1.943
Perceived Autonomy	PA1	0.712	0.732	0.765	0.828	0.548	1.556
	PA2	0.830					1.643
	PA3	0.640					1.366
	PA4	0.765					1.374

Table 2 (continued)

Construct Reliability and Validity

Variables	Items	Loadings	Cronbach's Alpha	rho_A	C R	AVE	VIF
Perceived Behavioural Control	PBC1	0.791	0.800	0.804	0.883	0.716	1.445
	PBC2	0.856					2.027
	PBC3	0.889					2.177
Perceived Competence	PC1	0.782	0.787	0.790	0.862	0.611	1.643
	PC2	0.825					1.880
	PC3	0.759					1.642
	PC4	0.759					1.528
Perceived Relatedness	PR1	0.870	0.899	0.901	0.929	0.767	2.411
	PR2	0.867					2.894
	PR3	0.908					3.438
	PR4	0.858					2.295
Subjective Norms	SN1	0.902	0.839	0.883	0.902	0.754	2.168
	SN2	0.785					1.712
	SN3	0.912					2.427
Task-Technology Fit	TTF1	0.881	0.851	0.859	0.900	0.693	2.663
	TTF2	0.859					2.426
	TTF3	0.756					1.612
	TTF4	0.828					1.849
ICT Usage Behaviour	UB1	0.799	0.908	0.911	0.926	0.610	2.130
	UB2	0.789					2.461
	UB3	0.767					2.304
	UB4	0.823					2.502
	UB5	0.809					2.247
	UB6	0.691					1.724
	UB7	0.797					2.602
	UB8	0.764					2.252

The behavioural intention construct, captured through five items, recorded high reliability indices (α = 0.900, CR = 0.926, AVE = 0.715). Factor loadings ranged from 0.785 to 0.887, with a maximum VIF of 3.042. The four-item individual-technology fit construct yielded satisfactory consistency (α = 0.792, CR = 0.864, AVE = 0.614), with factor loadings falling within 0.761 to 0.814. Perceived autonomy showed adequate reliability, with α = 0.732, CR = 0.828, and AVE = 0.548. Its factor loadings varied between 0.640 and 0.830. Perceived behavioural control, measured using three items, demonstrated high consistency (α = 0.800, CR = 0.883, AVE = 0.716), with factor loadings between 0.791 and 0.889. Perceived competence, evaluated through four items, displayed reliable metrics (α = 0.787, CR = 0.862, AVE = 0.611), with corresponding factor loadings from 0.759 to 0.825. The construct of perceived relatedness, measured with four items, revealed excellent internal reliability (α = 0.899, CR = 0.929, AVE = 0.767), with factor loadings ranging from 0.858 to 0.908. Subjective norms, evaluated using three items, demonstrated high consistency (α = 0.839, CR = 0.902, AVE = 0.754), with factor loadings between 0.785 and 0.912.

Task-technology fit, assessed through four items, showed strong internal reliability (α = 0.851, CR = 0.900, AVE = 0.693), supported by factor loadings ranging from 0.756 to 0.881. ICT usage behaviour, measured via eight items, demonstrated superior internal

consistency (α = 0.908, CR = 0.926, AVE = 0.610), with factor loadings spanning from 0.691 to 0.823. Overall, the psychometric assessment confirms that all constructs satisfy the criteria for internal consistency, convergent validity, and low multicollinearity, thus supporting their application in the subsequent structural analysis.

Table 3 presents the assessment of discriminant validity using the Heterotrait-Monotrait (HTMT) ratio of correlations within the SEM framework. The diagonal of the matrix contains the square root values of AVE for each construct, verifying convergent validity, while the HTMT values are positioned in the off-diagonal cells to evaluate the distinctiveness between constructs. Discriminant validity is confirmed when HTMT values remain below the thresholds of 0.85 (conservative) or 0.90 (liberal). The constructs AM, ATT, and INT exhibit strong discriminant validity, as their HTMT values remain well beneath the 0.85 benchmark. The correlation observed between ITF and TTF is moderate (HTMT = 0.832), yet remains within the acceptable limit, confirming their conceptual separation. The relationship between PC and PA is also moderate (HTMT = 0.727), which supports their discriminant validity. Moreover, SN and PR display a weak correlation (HTMT = 0.302), further reinforcing their independence. UB shows relatively strong relationships with both INT (HTMT = 0.710) and TTF (HTMT = 0.724), suggesting conceptual proximity while still retaining distinct construct identities. Overall, all constructs fulfil the necessary criteria for discriminant validity, as none exceed the recommended HTMT thresholds. This ensures that the constructs are sufficiently distinct, validating their appropriateness for subsequent structural analysis.

Table 3

HTMT Ratio

	AM	ATT	INT	ITF	PA	PBC	PC	PR	SN	TTF	UB
AM											
ATT	0.764										
INT	0.756	0.699									
ITF	0.504	0.565	0.654								
PA	0.543	0.454	0.435	0.597							
PBC	0.536	0.456	0.590	0.746	0.471						
PC	0.718	0.549	0.542	0.671	0.727	0.616					
PR	0.439	0.421	0.283	0.250	0.301	0.427	0.370				
SN	0.597	0.603	0.621	0.641	0.466	0.716	0.540	0.302			
TTF	0.693	0.707	0.789	0.832	0.407	0.680	0.580	0.262	0.714		
UB	0.615	0.657	0.710	0.738	0.462	0.642	0.569	0.297	0.628	0.724	

Table 4 presents the correlation matrix outlining the interrelationships among the principal constructs, where values range from -1 to 1. A coefficient approaching 1 reflects a strong positive relationship, whereas values nearing -1 denote a strong negative association. Correlation coefficients close to zero indicate negligible or non-significant relationships. The analysis reveals a robust positive association between INT and TTF (r = 0.789), suggesting that individuals with stronger behavioural intentions tend to perceive a higher alignment between tasks and technological resources. Similarly, a notable relationship exists between AM and PC (r = 0.718), indicating that individuals who are

autonomously motivated are more likely to feel competent within the technological learning environment.

The correlation between TTF and ATT (r = 0.707) further implies that favourable task-technology alignment corresponds with more positive user attitudes. A comparable level of association is observed between INT and UB (r = 0.710), highlighting that those with strong behavioural intentions tend to engage more consistently in technology usage behaviours. Conversely, the relationship between PR and TTF is relatively weak (r = 0.262), as is the link between PR and INT (r = 0.283), suggesting limited influence of social relatedness on both technology fit and behavioural intentions. These weaker correlations imply that social connectivity may not play a prominent role in shaping perceptions of task-technology alignment or intention to engage with technology in this context. Overall, the correlation matrix offers valuable insights into the varying strengths of associations among the study constructs, supporting a nuanced understanding of their interrelations and guiding further statistical examination.

Table 4

Correlation Matrix

	AM	ATT	INT	ITF	PA	PBC	PC	PR	SN	TTF	UB
AM		0.655	0.487	0.276		0.455			0.533	0.338	0.315
ATT			0.420	0.237						0.291	0.271
INT				0.565						0.693	0.645
ITF											0.322
PA	0.163	0.107	0.080	0.045		0.074			0.087	0.055	0.051
PBC			0.225	0.127						0.156	0.145
PC	0.445	0.292	0.217	0.123		0.203			0.237	0.151	0.140
PR	0.215	0.141	0.105	0.059		0.098			0.115	0.073	0.068
SN			0.206	0.117						0.143	0.133
TTF											0.187
UB											

Table 5 presents the R-square and adjusted R-square values, reflecting the proportion of variance in the dependent variables that can be attributed to the respective independent variables. The model accounts for 54.2% of the variance in UB, as indicated by an R-square value of 0.542 and an adjusted R-square of 0.539. This suggests a strong explanatory capability in relation to actual usage outcomes. Substantial predictive accuracy is also observed for INT and TTF, with corresponding R-square values of 0.484 and 0.481, and adjusted R-square figures of 0.481 and 0.480 respectively. The variance explained in UB (0.542) is the highest among the constructs, while ATT and AM follow with R-square values of 0.429 and 0.428, highlighting meaningful levels of explanation by their associated predictors. The model further accounts for 32.0% of the variance in ITF, suggesting a moderate level of predictive influence. SN and PBC register R-square values of 0.284 and 0.207 respectively, indicating that these constructs also contribute significantly to explaining behavioural determinants, albeit to a lesser extent. The consistency between R-square and adjusted R-square values across all constructs illustrates the model's internal reliability and overall stability. These findings reinforce the notion that the strength of

influence exerted on the dependent variables differs by construct, thereby supporting the nuanced structure of the proposed theoretical model.

Table 5

R-Square and Adjusted R-Square Values

	R-Square	R-Square Adjusted
AM	0.428	0.424
ATT	0.429	0.428
INT	0.484	0.481
ITF	0.320	0.318
PBC	0.207	0.205
SN	0.284	0.283
TTF	0.481	0.480
UB	0.542	0.539

The F-square values presented in Table 6 evaluate the magnitude of predictive influence exerted by independent variables on dependent constructs within the proposed model. SN and INT display the highest predictive strength, as reflected by an F-square value of 0.926, signifying that SN acts as a primary determinant of INT within the structural framework. A substantial effect size is also evident between AM and ATT, with an F-square value of 0.752, denoting a strong and meaningful contribution of AM to shaping ATT. In addition, ITF exerts a moderate influence on INT, as indicated by an F-square value of 0.470, reinforcing its significant, albeit not dominant, role in prediction. Further analysis reveals that PC demonstrates a moderate effect on its associated construct, with an F-square of 0.232. In contrast, PBC and ATT yield comparatively smaller effect sizes of 0.063 and 0.247 respectively. The predictive contributions of PR and SN towards other constructs are minimal, with F-square values of 0.072 and 0.045, suggesting limited influence in these specific interactions. PA and TTF account for only minor variations in UB, as their F-square values are 0.032 and 0.029 respectively. These results underscore the model's differentiated structure, where some variables play a more central predictive role while others exert marginal influence, reflecting the nuanced interplay of factors governing behavioural outcomes.

Table 6

F-Square Effect Size Analysis

	AM	ATT	INT	ITF	PA	PBC	PC	PR	SN	TTF	UB
AM		0.752				0.261			0.397		
ATT			0.247								
INT				0.470						0.926	0.123
ITF											0.114
PA	0.032										
PBC			0.063								
PC	0.232										
PR	0.072										
SN			0.045								
TTF											0.029
UB											

Figure 3 illustrates the structural model, which employs analytical findings to validate the conceptual framework by presenting both path coefficients and factor loadings. The analysis supports the hypothesised sequence of interrelationships whereby PA, PR, and PC collectively contribute to the development of AM. This motivational construct subsequently influences ATT, SN, PBC, and ultimately INT. INT itself is shaped by multiple behavioural antecedents, preceding the influence of TTF and ITF on UB. The visual model differentiates theoretical constructs using blue-coloured nodes, while yellow boxes signify the observed measurement items. The strength and significance of associations within the model are depicted through the combined display of path coefficients and factor loadings, which together indicate the robustness of the relationships among constructs.

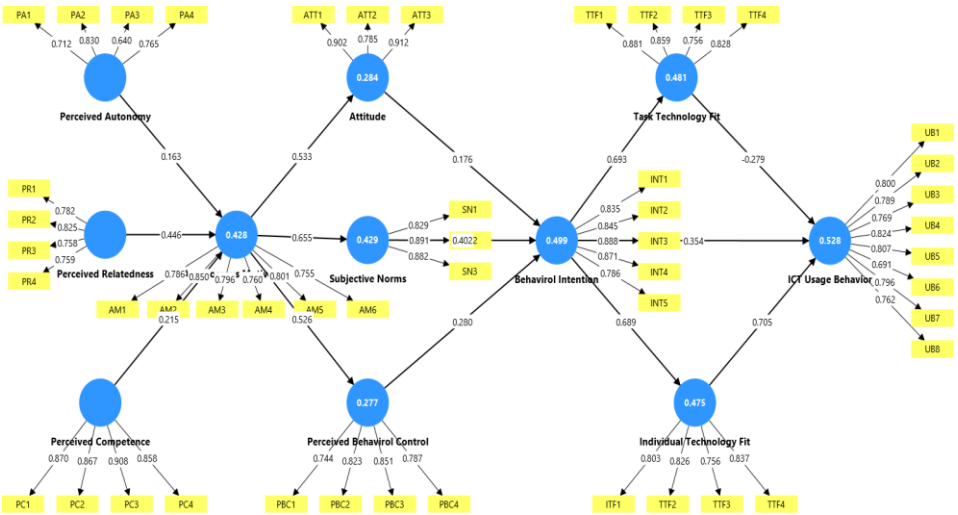

Figure 3: Structural Model

Table 7 presents the model fit indices comparing both the saturated and estimated models. The Standardised Root Mean Square Residual (SRMR) value for the saturated model is reported at 0.063, indicating a superior fit compared to the estimated model, which records a higher value of 0.128. Regarding the d_ULS (squared Euclidean distance), the saturated model exhibits a stronger indication of model adequacy, with a value of 4.665, which is markedly lower than the estimated model's 19.393. The Geodesic Distance (d_G) also demonstrates better alignment in the saturated model, with a value of 2.152 as opposed to 2.547 in the estimated model, suggesting only a slight deviation in the congruence between model and data. Furthermore, the Chi-square value associated with the saturated model stands at 4932.196, whereas the estimated model records a higher value of 5395.598, reflecting a greater discrepancy between observed and theoretical covariance matrices. Lastly, the Normed Fit Index (NFI) supports the superior performance of the saturated model, with a score of 0.685 in contrast to 0.655 reported for the estimated model.

Table 7

Model Fitness

	Saturated Model	Estimated Model
SRMR	0.063	0.128
d_ULS	4.665	19.393
d_G	2.152	2.547
Chi-Square	4932.196	5395.598
NFI	0.685	0.655

The interconnections among the core constructs of the model are outlined in Table 8. AM is significantly and positively influenced by perceived autonomy (β = 0.163, p = 0.001), perceived competence (β = 0.215, p < 0.001), and perceived relatedness (β = 0.446, p < 0.001). Furthermore, AM positively affects ATT (β = 0.533, p < 0.001), SN (β = 0.655, p < 0.001), and PBC (β = 0.526, p < 0.001), thereby highlighting the central role of motivation in shaping individual perceptions. The analysis confirms INT as the key determinant in ICT usage behaviour, showing a direct significant influence (β = 0.354, p < 0.001) and receiving input from ATT (β = 0.121, p < 0.001), SN (β = 0.277, p < 0.001), and PBC (β = 0.280, p < 0.001). INT, in turn, exerts an indirect effect on ICT adoption through ATT (β = 0.062, p = 0.002), SN (β = 0.142, p < 0.001), and PBC (β = 0.099, p < 0.001), thus illustrating three distinct mediating routes. The study further examines the moderating roles of TTF (β = -0.194, p = 0.024) and individual-technology fit (β = 0.486, p < 0.001) in shaping ICT usage. Individual-technology fit strengthens the linkage between INT and ICT use, while the influence of TTF appears diminished, potentially reflecting a lack of compatibility between tasks and the technology employed. Overall, the findings reinforce the validity of the conceptual framework by demonstrating that AM and INT, along with fit-related constructs, are critical drivers of ICT adoption.

Table 8

Path Coefficients and Hypothesis Testing Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Results
PA>AM	0.163	0.165	0.048	3.418	0.001	Accepted
PC>AM	0.215	0.215	0.046	4.671	0	Accepted
PR>AM	0.446	0.445	0.047	9.473	0	Accepted
AM>ATT	0.533	0.534	0.036	14.855	0	Accepted
AM>SN	0.655	0.656	0.031	20.936	0	Accepted
AM>PBC	0.526	0.528	0.037	14.211	0	Accepted
ATT>INT	0.121	0.122	0.031	3.859	0	Accepted
SN>INT	0.277	0.277	0.034	8.19	0	Accepted
PBC>INT	0.28	0.281	0.04	6.982	0	Accepted
INT> ICT UB	0.354	0.353	0.056	6.309	0	Accepted
ATT>INT> ICT UB	0.062	0.063	0.02	3.165	0.002	Accepted
SN>INT> ICT UB	0.142	0.142	0.029	4.849	0	Accepted
PBC>INT>ICT UB	0.099	0.099	0.02	4.853	0	Accepted
INT>TTF>ICT UB	-0.194	-0.193	0.086	2.252	0.024	Accepted
INT>ITF>ICT UB	0.486	0.487	0.083	5.852	0	Accepted

Discussion

The findings of this research offer strong empirical confirmation for the proposed theoretical framework, illustrating how psychological drivers, INT, and technology fit variables collectively influence ICT adoption. All hypothesised associations are substantiated, thereby supporting the applicability of SDT and TPB in explaining ICT usage behaviour. Specifically, perceived autonomy (H1: $\beta = 0.163$, $p = 0.001$), perceived competence (H2: $\beta = 0.215$, $p < 0.001$), and perceived relatedness (H3: $\beta = 0.446$, $p < 0.001$) were found to significantly enhance AM. Among these, perceived relatedness exerted the most substantial influence, indicating that social bonds and interpersonal support are critical in motivating ICT engagement. Perceived competence and autonomy also contribute positively, implying that individuals are more inclined to adopt ICT when they feel competent and autonomous in their actions.

Consistent with expectations, AM significantly affects ATT (H4: $\beta = 0.533$, $p < 0.001$), SN (H5: $\beta = 0.655$, $p < 0.001$), and PBC (H6: $\beta = 0.526$, $p < 0.001$). These results underscore the importance of AM in shaping how individuals perceive ICT. When motivation is high, users are more likely to form positive evaluations, receive social encouragement, and feel confident in managing ICT use. The study further verifies the influence of ATT (H7: $\beta = 0.121$, $p < 0.001$), SN (H8: $\beta = 0.277$, $p < 0.001$), and PBC (H9: $\beta = 0.280$, $p < 0.001$) on INT. Among these constructs, SN exhibits the strongest effect, suggesting that social pressure and peer expectations significantly affect decisions to adopt ICT. This is especially pertinent in contexts such as education or workplaces, where ICT use is either promoted or mandated. The direct influence of INT on ICT usage behaviour (H10: $\beta = 0.354$, $p < 0.001$) confirms that individuals with stronger intentions are more likely to engage in actual usage. Moreover, the study identifies mediating effects of ATT (H11: $\beta = 0.062$, $p = 0.002$), SN (H12: $\beta = 0.142$, $p < 0.001$), and PBC (H13: $\beta = 0.099$, $p < 0.001$) in the pathway from INT to ICT use, thereby revealing multiple indirect routes that reinforce behavioural outcomes.

Additionally, the moderating functions of TTF (H14: $\beta = -0.194$, $p = 0.024$) and individual-technology fit (H15: $\beta = 0.486$, $p < 0.001$) are assessed. While individual-technology fit enhances the association between INT and ICT behaviour, TTF negatively moderates this relationship. This implies that even when users intend to adopt ICT, a misalignment between technology and task requirements may hinder successful implementation. In conclusion, all hypothesised paths were statistically supported, thereby affirming the integrative model combining SDT, TPB, and TTF for understanding ICT adoption. The results emphasise the significance of motivation, social context, and the compatibility between technology and task requirements as determinants of ICT usage. These findings contribute meaningfully to theoretical discourse and offer practical insights for enhancing ICT implementation strategies.

Conclusion

This study explored the fundamental determinants of ICT usage behaviour by integrating SDT, TPB, and TTF. The findings confirm that both user intention and actual engagement with ICT are significantly shaped by psychological motivation, social influence, and the alignment between users and technological tools. The results support SDT by demonstrating that perceptions of autonomy and competence, along with a sense

of relatedness, substantially enhance autonomous motivation. Individuals who feel capable, autonomous, and socially connected are more likely to engage with ICT proactively. In line with TPB, the results validate that attitude, subjective norms, and perceived behavioural control significantly predict behavioural intentions to adopt ICT. The strong effect of subjective norms highlights the critical role of social expectations in guiding ICT usage decisions. Through the inclusion of TTF and ITF, the study further extends the theoretical model, offering deeper insights into the mechanisms influencing ICT adoption. While ITF positively moderates the relationship between intention and ICT usage, TTF demonstrates a negative moderating effect, indicating that misalignment between technology and task requirements can hinder adoption, even when intention is strong. These findings underscore the importance of ensuring that ICT tools are appropriately tailored to user needs and contexts. The study achieved its objectives by identifying the motivational and behavioural drivers of ICT usage and assessing how technology-task alignment influences this relationship. By integrating SDT, TPB, and TTF, the study presents a unified explanatory framework for ICT adoption behaviour. The statistical results confirmed all hypothesised relationships, highlighting the influence of intrinsic motivation, social influence, and technology-task compatibility.

Implications

This research provides significant insights by integrating SDT, TPB, and TTF into a unified framework for understanding ICT adoption. The findings confirm that intrinsic motivation factors—namely autonomy, competence, and relatedness—positively influence behavioural intentions, which in turn drive actual ICT usage, consistent with SDT. The results also corroborate the TPB, demonstrating that attitude, subjective norms, and perceived behavioural control strongly predict intentions to use ICT, emphasising the importance of social norms and user capabilities in adoption decisions. Technology-task alignment emerges as a critical theoretical element influencing the adoption process. While individual-technology fit positively supports ICT usage, task-technology fit exhibits a counter effect, highlighting the necessity for appropriate technology design to ensure full adoption. These new contributions enrich existing ICT adoption models by incorporating both individual and task-related perspectives, thereby advancing understanding of factors affecting digital technology utilisation. The study identifies essential considerations for enhancing ICT adoption strategies, which organisations, educational institutions, and policymakers should adopt as foundational guidelines.

The combined influence of autonomy, competence, and relatedness strengthens motivation for technology use, suggesting that organisations should cultivate supportive digital environments. Training programmes designed to improve user competence and digital literacy can increase confidence and facilitate full ICT adoption. The findings also reveal that subjective norms have a significant impact on ICT acceptance, as individuals respond positively to peer support, leadership endorsement, and interactions within digital communities. Social influence mechanisms enable organisations to foster a culture of digital transformation by implementing mentorship schemes, collaborative platforms, and incentive initiatives centred on technology engagement. Moreover, the research emphasises that ICT tools must be suitably aligned with user needs and work demands to succeed. Even highly motivated users encounter difficulties adopting ICT when

technologies do not adequately fit their tasks. Therefore, organisations need to conduct thorough usability testing of digital solutions, incorporating user feedback to refine and optimise these tools. Achieving such alignment enhances operational efficiency and maximises the benefits of digital transformation.

Limitations and Future Suggestions

Despite the significant findings, certain limitations within this study warrant consideration. The principal analytical method employed utilises cross-sectional data, capturing relationships between variables at a single point in time. Consequently, the model does not permit establishing direct causal inferences among the investigated variables. Future research should adopt longitudinal designs to observe the temporal evolution of motivation, social influence, and task-technology fit, as well as their enduring effects on ICT adoption. The generalisability of the results is limited due to the study's focus on a specific cultural and organisational context. Different industries and cultural settings may exhibit varied motivational drivers, behavioural intentions, and unique technology acceptance patterns. Therefore, subsequent studies should explore industry-specific and cultural differences to enhance understanding of variable interrelations across diverse environments.

Although the study integrates SDT, TPB, and TTF, it does not consider external factors such as technological infrastructure, organisational support, or regulatory frameworks. These external elements critically influence ICT adoption, especially within large enterprises and government institutions. Future investigations should incorporate these environmental variables to develop a more comprehensive interactional model explaining ICT usage behaviours. Subsequent research should complement self-report instruments with objective data sources, such as system usage logs or direct behavioural observations, to enhance data robustness. A thorough understanding of how these novel technologies affect motivational constructs and task-technology fit is essential for guiding effective digital transformation strategies in the future.

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