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FinTech Adoption Intention Among Gen Z in Saudi Arabia: Examining the Serial Mediation of User Innovativeness, Perceived Ease of Use, Trust, and Usefulness

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ABSTRACT: The current study advanced and checked a conceptual model which sought to explore the ways that User Innovativeness (UI), Perceived Ease of Use (PEOU), Perceived Usefulness (PU), and Perceived Trust (PT) interplay in a serial mediation model leading to a better understanding of the predictors affecting the FinTech adoption intention (FAI) of Gen Z students in Saudi Arabia by combining the Individual Innovativeness Theory (IIT) with the Extended Technology Acceptance Model (ETAM). The study focused on this youth segment in particular, acknowledging its importance as a driver of the future of digital finance in the kingdom. For this purpose, a purposive sample of 205 university students from a public university in Saudi Arabia was included in the study. The sample consisted of 143 males and 62 females, which was representative of the Gen Z student body. The statistical analysis tool used to test and validate the proposed theoretical framework was Structural Equation Modelling (SEM) with the help of SPSS-AMOS (Version 27.0), which provides a strong platform for an in-depth understanding of the complex associations between the determinants. The analysis results indicate several essential insights. First, it was found that UI had a positive and statistically significant effect on FAI ($\beta = 0.199$, $p = 0.015$), suggesting that innovative students are more likely to adopt FinTech products. Furthermore, PEOU ($\beta = 0.117$, $p = 0.001$) and PU ($\beta = 0.054$, $p = 0.020$) mediated partially between UI and FAI, indicating that such perceptions are essential in facilitating innovativeness to behavioral intention. Second, PT was found not only to mediate the relationship between UI and FAI partially ($\beta = 0.051$, $p = 0.040$), but also to mediate the relationship between PEOU and PU ($\beta = 0.059$, $p = 0.045$). Finally, the present study revealed that serially, PEOU, PT, and PU intervened in the relationship between UI and FAI ($\beta = 0.006$, $p = 0.022$), indicating a manifold, contiguous progression toward usage. These results carry important policy and strategic implications. They align with the overall objectives of Saudi Vision 2030, which aim to drive digital transformation, financial inclusion, and a sustainable digital economy. These findings for FinTech companies and public agencies suggest that target-oriented programs can increase trust, ease of use, and perceived usefulness of FinTech platforms, ultimately leading to greater adoption among young people.

Keywords: fintech adoption intention, perceived ease of use, perceived trust, perceived usefulness, serial mediation, user innovativeness.

I. INTRODUCTION

The new competitive environment for value generators will prompt financial management to confront new challenges, driven by the so-called consumer demand for sustainability and the accelerated digital

transformation [1]. With the progress of ICT, the financial industry has become increasingly efficient and innovative [2]. Further, advancements in technology and customer expectations have transformed payment systems [3].

The importance of what is referred to as "Fintech" in digital technology cannot be overstated [4]. FinTech is a relatively new term and concept that refers to the financial technology industry, encompassing a broad array of operations that enable companies or businesses to enhance IT-driven service quality [5, 6]. FinTech is transforming conventional financial activities through disruptive innovations, which are reshaping the economic system and fostering sustainable financial ecosystems [7, 8]. It revolutionizes business processes and financial markets by enhancing efficiency, performance, and customer experience [4, 9- 11]. FinTech is attractive to individuals who appreciate efficient, transparent, and digital services [12]. It encompasses more than just essential services, such as payments and credit; however, it also comprises financial advisory, crowdfunding, cybersecurity, virtual currencies, P2P platforms, blockchain, augmented reality (AR)/ virtual reality (VR), Bitcoin, and more [4, 13- 15].

Fintech is considered an enabler of sustainable economic growth due to its unique traits against the traditional financial industry [16]. It achieves environmental and sustainability goals [17] by building a more inclusive, ESG (Environmental, Social, and Governance) focused financial system conducive to sustainable growth [18]. Initiatives such as the G-20's work on "Sustainable Digital Finance" and the UN's research since 2016 reinforce this association. Fintech facilitates sustainable development by creating a more efficient allocation of financial resources through new business models, policies, and regulations. This is evident in the case of the expansion of ESG investments, socially responsible finance, and ESG-related finance in jurisdictions such as the EU, China, and Japan [1, 19, 20].

As one of the Arab states, Saudi Arabia holds a unique status due to its geography, history, and its significance in the oil trade. Explosive technological development accelerates companies' need to transform digitally, increasing the efficiency and quality of their products. The Kingdom is pouring money into FinTech, backed by government investment and growing demand [21]. Taking the cue from the SDGs, Vision 2030 utilizes FinTech under the Financial Sector Development Program (FSDP) to promote innovation and economic growth [21-23]. Its e-government efforts have been well acclaimed internationally, with the UN congratulating the country on its strong infrastructure for FinTech ecosystems [24].

Saudi Arabia is an essentially young nation, with 36.7% of its population falling within the 15–34 years age range [25]. For those young persons from university referenced in this research, i.e., Generation Z, their reality is distinctly different in this case. Despite strong governmental support and rapid digital transformation efforts under Saudi Arabia's Vision 2030, FinTech adoption in the country still faces notable real-world challenges. These include concerns about data privacy and cybersecurity, low trust in digital financial services, and a cultural preference for traditional banking methods. In the backdrop of progress in FinTech, it is imperative to grasp the intuition behind the components that influence its use among Gen Z, as outlined in the Vision 2030 agenda [26]. Service providers cannot afford to be without this insight, or they risk inefficiencies and misallocation of resources [27].

In Saudi Arabia, past studies utilized the Technology Acceptance Model (TAM) [28- 30] , the Extended TAM [31, 32], the Unified Theory of Acceptance and Use of Technology (UTAUT) Model [33, 34], the Expanded UTAUT [9], a blend of the UTAUT 2 Model with DeLone and McLean's IS Success Model [35], merging the UTAUT 2 with the Value-Based Adoption Model (VAM) [36], and combining the Theory of Reasoned Action (TRA) with the Theory of Planned Behaviour (TPB) [4] to forecast fintech adoption. However, the following research gap has been identified:

- TAM, Extended TAM, and UTAUT may be insufficient for explaining FAI, as they often overlook personal traits such as innovativeness and contextual factors like trust, which are crucial in this setting.
- Minimal studies have examined the fintech adoption behavior among Generation Z in Saudi Arabia [35, 37].
- No previous studies have investigated the impact of UI on FAI via serial mediation in the Saudi Arabian context.

Precisely, there is a lack of comprehensive research on consumers' perceptions and adoption behavior of FinTech applications, particularly among Generation Z in Saudi Arabia, with no prior studies examining the

impact of UI on FAI through serial mediation in this context. This study addresses the lack of understanding of how UI influences FinTech Adoption Intention among Saudi Gen Z, including its serial mediation through PEOU, PT, and PU. This study draws on the Individual Innovativeness Theory (IIT) [38] and the Extended Technology Acceptance Model (ETAM) [39] to investigate their joint effect on Gen Z's FAI in Saudi Arabia through a comprehensive framework (FIGURE 1).

This research has multiple implications for the existing literature. First, one of the trailblazers used ETAM (PEOU, PU, PT). With IIT (UI) to evaluate their impact on FAI. Second, while the relatively recent studies on Fintech [40, 41] tend to acknowledge a positive linkage between UI and FAI, the connections between UI and FAI are not yet clearly established. This study empirically examines the serial mediating roles of PEOU, PT, and PU in the link between UI and FAI. Third, the opinions of this study will be helpful to fintech app developers and policymakers in KSA. This can complement Saudi Arabia's fintech ambitions, as outlined in Vision 2030.

Serial mediation is more effective in predicting FinTech adoption intention among Generation Z in the Saudi context because it captures the step-by-step influence of psychological traits and contextual factors. This multi-layered mediation process provides deeper insights into decision-making within Saudi Arabia's distinct socio-economic and cultural context. This study aims to address the underexplored relationship between UI and FAI among Generation Z in Saudi Arabia by empirically testing the serial mediating roles of PEOU, PT, and PU, thereby extending the ETAM with IIT to support Saudi Arabia's Vision 2030 and offer actionable insights for FinTech developers and policymakers.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Davis originally proposed the TAM [42] as an up-gradation of the Theory of Reasoned Action by including constructs from late 1970s expectation and self-efficacy theories to explain technology adoption behavior. It also posits PEOU and PU as two significant antecedents of individuals' willingness to use technology [43, 44]. PEOU is indicative of users' perceptions of system simplicity, and PU indicates its value for daily work. TAM is still highly utilized in IT adoption research due to its flexibility and explanatory power [45], and new extended models have been developed to overcome its primary limitations [46]. Researchers extended the TAM model by incorporating trust, demonstrating that it plays a crucial role in predicting behavior, particularly in uncertain situations [39, 47, 48]. According to the IIT [38] , people react differently to change depending on specific characteristics, including risk readiness and readiness to learn quickly [49, 50]. These individuals are early adopters of innovations, who are open and ready for new ideas ahead of their peers [38, 50- 55]. The theory also advocates that few people are naturally creative, which leads to early adoption [54]. Researchers emphasize its utility in strategic technology integration planning, for instance, in higher education [50, 54].

UI is a state of mind that gives birth to new ideas [56]. UI characterizes the degree of a user's eagerness to try a new apparatus [57]. In this work, user innovativeness is interpreted as the level to which people are inclined to accept and apply early innovations and demonstrate their willingness to try new types of products, or apply new services and technologies that are introduced to. Highly innovative individuals are better equipped to cope with uncertainty and, thus, more accustomed to dealing with innovations. That is to say, they will not see risks as threats and are more likely to be open to technological change [58- 60]. Early adopters, who are individuals who accept and adapt to technological development trends, will adopt Fintech services [60]. Past research has displayed a positive link between UI and FAI [40, 41, 61- 64].

An individual's insight into the effort required for using a technology is termed PEOU in TAM [44, 65]. Scholars widely recognize it as a critical factor influencing technology acceptance: people will accept a setup that is perceived as low-effort and time-saving [66, 67]. PEOU represents the ease of and comfort with Fintech, precisely the ease of accessing information, comparing prices, and simplifying transactions among students in this study [68]. Fintech enhances user experience and supports banks in meeting user requirements, while PEOU facilitates fintech adoption by simplifying the service usage process [69]. Ease of use is an essential antecedent of adoption [59, 70, 71]. Recent studies reinforce its impactful influence on FAI [31, 56, 72-76]. Additionally, creative people will perceive Fintech as user-friendly and are more inclined to explore it [40]. Their less aversion to complexity, due to the comfort of experimenting, allows users to adapt to complexity,

which will have an optimistic ramification on UI and PEOU [77- 79]. Therefore, early adopters are likely to embrace Fintech as it is seen as user-friendly.

PU is characterized as an insight that using a set-up would enhance work quality [42]. PU is impacted by how technology helps reduce task time, effort, and cost to enhance efficiency [67, 80].In this study, PU is an indication of the extent to which online transactions facilitate information, price comparisons, and faster processes [68]. If students perceive positive consequences, their FAI will increase [81]. Several academic works have found a supportive relationship between PU and FAI [40], [74, 75, 82- 85]. TAM states that UI affects PU through the cognitive process of exploration and openness to novel financial instruments. Early adopters of innovation quickly understand Fintech features, enjoy the convenience they offer, and are aware of the benefits of features such as automation and AI [40, 59]. They are also more confident in technology and are more likely to perceive it as applicable. Previous studies also disclosed that there is a strong association between UI and PU [60, 79, 86] and between UI and FAI [40, 41, 61, 62]. Therefore, for highly innovative individuals, the perceived usefulness and adoption of Fintech is more probable.

PT is a complex, multi-dimensional construct that plays a critical role in user interaction with technology [87, 88]. It creates an emotional state where agents depend on these activities to be produced in their favor [89], and incredibly trust in service providers to act with equity and avoid harmful actions [90]. Trust is a critical issue for acceptance and use of technology [89], [91], which contributes to system credibility and perceived security. Fintech is emerging due to confidence limits in conventional financial services, as well as other factors such as cultural shifts, smartphone availability, secure payments, and institutional trust [92]. Trust mitigates the anxiety of promoting adoption when users believe that their data is secure [93, 94]. A plethora of examinations support the influence of PT on FAI [75, 93, 95- 99]. In addition, more innovative individuals with a greater willingness to take risks are more likely to trust technology, such as mobile phone apps for banking, more quickly, while less innovative individuals may be inclined to wait with distrust [100, 101]. Earlier studies have also linked UI with FAI [40, 41, 61, 62]. In conclusion, users characterized by high levels of innovation are more likely to trust fintech services, which increases their chances of adopting such services.

The association between PEOU and PU is fundamental to TAM, as proposed by the investigators [44]. PEOU has a positive effect on PU [102], which means that a setup that is simple to use will be distinguished as applicable by users [44]. This link has been demonstrated in several studies [103-108]. Furthermore, PEOU has been identified as a key antecedent to trust [79, 109]. One would think that people will build confidence and trust when a technology platform is easy to use and simple [110]. Secondly, the issue of trust was also investigated and found to be a mediating factor in the effect of prejudice, expectation, information quality, and source credibility on perceptions of usefulness [39]. Users' belief in the capability and integrity of the planned system has a significant impact on their PU [47]. To sum up, if the fintech set-up is considered simple to use by the users, the trust will grow, contributing to its perceived usefulness.

We have found in the previous section that UI is positively associated with people's FAI [40, 41, 61, 62]. Furthermore, PEOU may act as the mediator between UI and FAI, and PT and PU may also act as mediators. Additionally, it was found that PT could behave as a mediator in the relationship between PEOU and PU. Therefore, UI influences FAI through the sequential mediating roles of PEOU, PT, and PU. First, more innovative users will believe fintech is easier to use. This PEOU increases trust in the technology and reinforces their perception of its usefulness. In turn, an increased intention to use fintech is furthered by the perceived usefulness.

Table 1. Key findings and model's overview.

Sl No	Research	Country	Model/Theory Used	Key Findings
1	[32]	Saudi Arabia & Palestine	Extended TAM	The results indicate that religiosity has a more substantial influence on the intention to use Paytech than on its actual use. In contrast, social influence has a more direct impact on actual use than on intention.

2	[34]	Saudi Arabia	TPB +UTAUT	The research findings indicated that perceived usefulness, perceived benefits, and policy interventions are key drivers of the adoption of Robo-advisory in the Kingdom of Saudi Arabia.
3	[35]	Saudi Arabia	UTAUT + DeLone and McLean's IS Success Model	The results show that performance expectancy, effort expectancy, and social influence significantly enhance the intention to continue using buy now, pay later (BNPL) apps. At the same time, service quality, system quality, and information quality have a substantial impact on customer satisfaction.
4	[9]	Saudi Arabia	Extended UTAUT	The results showed that significantly positive effects are found of performance expectancy, effort expectancy, facilitating condition, and privacy enablers on users' behavioral intention to engage in the FinTech service. The findings also indicated that social influence and privacy concern were not statistically significant on users' behavioral intention to use FinTech services.
5	[29]	Saudi Arabia	TAM	The two TAM constructs, i.e., PEU and PU, show positive and significant marginal effects on the adoption of digital banking, while trust has a negative but significant marginal effect, with a limited impact from age and the education levels of the consumer.
6	[30]	Saudi Arabia	TAM	The four key constructs, PEOU, PU, ATT toward use, and intent to use, were the main factors and were found to be predictors of actual use of the standpoint blockchain technology.
7	[33]	Saudi Arabia	Extended UTAUT	Performance expectancy, social influence, PT, and perceived risk significantly influenced the intention of young Saudi entrepreneurs to use crowdfunding, while effort expectancy, facilitating conditions, and trialability showed no significant effect, contrary to expectations.
8	[31]	Saudi Arabia	Extended TAM	The findings demonstrate that PU and social influence are the key factors affecting FAI.
9	[40]	Indonesia	Extended TAM	The results show that UI is the key predictor of FinTech adoption in Indonesia, influencing it both directly and indirectly, while user attitude emerges as the most impactful factor. In contrast, financial literacy appears to be the least significant, challenging previous assumptions.

According to the above literature, it is evident that although the ETAM has been commonly used to investigate FinTech adoption in Saudi Arabia, no known study has focused on examining the effect of UI on the FAI in Saudi Arabia using the integrated ETAM-IIT framework.

In light of the existing literature, this research is designed to explore the following question:

- What is the impact of UI on FAI?
- Does PEOU mediate the relationship between UI and FAI?
- Does PU act as a mediator in the relationship between UI and FAI?
- Does PT mediate the association between UI and FAI?
- Does PT mediate the relationship between PEOU and PU?
- Do PEOU, PT, and PU sequentially mediate the relationship between UI and FAI?

Drawing from the preceding research question, this study recommends the following hypotheses:

- H 1: UI will significantly and positively influence FAI.
- H 2: PEOU mediates the relationship between UI and FAI
- H 3: PU mediates the relationship between UI and FAI
- H 4: PT mediates the relationship between UI and FAI.
- H 5: PT mediates the relationship between PEOU and PU
- H 6: PEOU, PT, and PU sequentially mediate the relationship between UI and FAI.

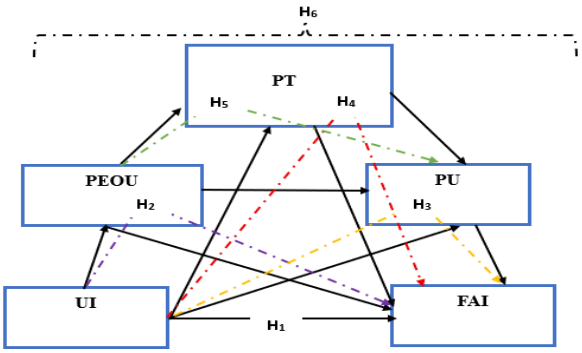

FIGURE 1. Conceptual framework.

III. METHOD

1. RESEARCH DESIGN

A research design serves as an organized system that relates theory to research practice, informing method design [111]. Its conceptual framework was tested through a quantitative cross-sectional survey, which focused on descriptive and correlation analyses [112]. A cross-sectional study is used to evaluate data at a single time point to determine the prevalence in a population [113]. Although qualitative methodologies based on other epistemological and ontological traditions are often employed to develop or refine theories, a significant amount of management research aims at developing existing theoretical frameworks [114].

2. PARTICIPANTS AND DATA COLLECTION

Generation Z is the earliest generation to be raised exclusively with smartphones and social media [115] and is identified as the primary influencer. for the adoption of FinTech products [116]. Proficient in using digital tools, Gen Z utilizes mobile apps for various transactions, bill payments, banking, and personal finance management [112, 116, 117]. We targeted Gen Z business students who expressed intentions to adopt FinTech, using purposive sampling to select the participants. Self–administered questionnaires were distributed through Google Forms from October 2024 to February 2025. Participants received a link and a reminder email, along with a statement of confidentiality and an explanation of the study's academic purpose. The survey began with a definition of FinTech, as per the literature, to ensure understanding. Before analysis, the data were cleaned and coded to handle missing values, maintain consistency, and ensure the dataset was ready for reliable statistical analysis. Out of 217 responses, 12 inattentive responses were removed after screening for non-participation. Additionally, 12 statistical outliers (Cook's distance > 1) were identified and deleted [118], resulting in a final sample of 205 for analysis. A power test was conducted to assess the adequacy of the study samples. GPower software has been used to estimate the test power. This software represents the most effective tool for analyzing power in various types of statistical tests in the behavioral and managerial sciences [119], [120]. A GPower analysis indicates that to test this model with four predictors, the minimum sample size required is 129 respondents. Moreover, for structural equation modelling (SEM), a minimum of 200 is suggested [121- 123], with 5 to 10 observations per item considered optimal [124]. A sample size of 210 would comply with all conditions, considering the questionnaire contained 16 items. The mean participant age was 21.068 years, and participant demographics are provided in Table 2.

Table 2. Demographic profile of the participants (N = 205).

Dimensions	Category	Frequency	Percentage
Age	19–21	138	67.300
	22–24	66	32.200
	25	01	0.500
Gender	Male	143	69.800
	Female	62	30.200
Employment	Full-time student	180	87.800
	Part-time job	20	9.800
	In-campus job	03	1.500
	Full-time job	02	1.000
Enrollment Status	Freshman	22	10.700
	Junior	56	27.300
	Sophomore	47	22.900
	Senior	80	39.000
Student Type	International	07	3.400
	Domestic	198	96.600
Monthly Family Income	Less than 2000 SR	07	03.400
	2000–5999 SR	08	03.900
	6000–9999 SR	20	09.800
	10,000–15,000 SR	30	14.600
	More than 15,000 SR	140	68.300

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Among the participants, 138 (67.3%) were aged 19–21, 66 (32.2%) were 22–24, and 1 (0.5%) was 25. Gender-wise, 143 (69.8%) were male and 62 (30.2%) were female. Employment status showed 180 (87.8%) full-time students, 20 (9.8%) part-time, 3 (1.5%) campus workers, and 2 (1.0%) in full-time jobs. Academic standing included 22 (10.7%) freshmen, 47 (22.9%) sophomores, 56 (27.3%) juniors, and 80 (39%) seniors. Student types were 198 (96.6%) domestic and 7 (3.4%) international. Monthly family income: 7 (3.4%) below 2,000 SR, 8 (3.9%) in 2,000–5,999 SR, 20 (9.8%) in 6,000–9,999 SR, 30 (14.6%) in 10,000–15,000 SR, and 140 (68.3%) above 15,000 SR. The average age of the participants was 21.07 years. Demographics are presented in Table 1.

3. MEASURES

Before data collection, the research had two primary aims: to identify the drivers of FinTech adoption and to develop the survey protocol. Items were adapted based on a literature review of FinTech and online banking adoption [84]. and were modified from recognized and thoroughly validated measurement scales. They were refined, and their wording was tailored to suit the context of the current study. FAI was operationalized using three items from [125]. Three items for PEOU were adapted from [126] and [127]. For PU, we also used four items from [128, 129]. PT was measured by three items collected from [2, 59,130, 131]. UI was assessed by three items from [40] and [42] . Participants were instructed to rate each element using a five-point Likert scale varying from 1 (strongly disagree) to 5 (strongly agree), and to give their demographic information using a nominal scale (Table 3).

Table 3. Measurement tools applied in the primary study.

Variable	No of Items	Source	Item Example
Fintech Adoption Intention	3	[125]	"I intend to continue using FinTech services in the future."
Perceived Ease of Use	3	[126, 127]	"It is easy to use FinTech services."

Perceived Usefulness	4	[128, 129]	"Using FinTech can meet my service needs."
Perceived Trust	3	[2, 59, 130, 131]	"I trust FinTech services to be reliable."
User Innovativeness	3	[40, 42]	"When I hear about a new product, I look for ways to try it."

4. CONTROL VARIABLES

Control variable: A variable that is held constant so that it does not interfere with the analysis, so that any results that are observed can be credited to the independent variable rather than the extraneous variable [132]. Control variables increase the internal validity of experimental and observational studies. Because they can be related to important factors, researchers tend to control for them to cancel out the confounding effect of the true ones [133]. This study controlled for demographic factors (age, gender, and family income) as they have been documented to affect technology adoption [85, 125, 134, 135].

5. DATA SCREENING

Data screening involves reviewing and refining data before analyzing by eliminating errors, handling missing values, and addressing any breaches of statistical assumptions to increase the precision of the results.[136]. SPSS 29.0 and AMOS 29.0 were used to analyse the data. Beginning screening detected a missing data rate of 2%, which is less than the threshold of 10% [122, 137- 139].Missing responses were corrected through regression imputation with median substitution, which is suitable for Likert scales [139, 140] .The assumption of normality was satisfied as the skewness and kurtosis values were less than ±2 [141]. Since this was self-report data, the presence of Common Method Bias (CMB) was tested before analysis through Harman's single-factor test. The outcome, a 36.192% variation (Table 4), was lower than the 50% limit, indicating that there was no serious CMB [35, 142]. Anonymity also minimized social desirability bias [143], [144]. The data were subsequently analyzed through covariance-based structural equation modelling (SEM) in AMOS 29 to investigate the relationships between the observed and latent constructs [139, 145]. In line with [146], a two-step method was employed, consisting of one step for validating the measurement model and another for inspecting the structural model and hypotheses.

Table 4. Overall variance accounted for (Harman's single factor test).

Component 1	Extraction sums of squared loadings		Cumulative %
	Total	% of variance	
	5.791	36.192	36.192

IV. RESULT

1. MEASUREMENT MODEL

In SEM, a model exists that describes the associations between latent variables (constructs) and their observable indicators (manifest variables). It is essentially a confirmatory factor analysis (CFA) that explains the extent to which the observed variables accurately reflect the latent variables. The measurement model is the backbone of SEM, and it must precede testing the structural model, which is coupled to the linkage among the latent variables [141].

In this study, we first conducted a confirmatory factor analysis (CFA; Figure 2) to determine whether the defined groups of variables exhibited the hypothesized relationships. Next, we examined the factor loading of each item to check its reliability. One item from PU (PU_1) had low factor loadings (less than the acceptable cutoff value of 0.6) [139]. It was, therefore, excluded, and CFA was conducted with the remaining measurement items. The CFA resulted in an excellent model fit (refer to Table 5). As a result, it can be inferred that the measurement model demonstrated an adequate fit with the data.

Table 5. CFA model fit indices.

Fit Indices	Recommended Value	Source	Obtain Value
CMIN/df	1–4	[147]	2.071
GFI	>0.90	[148]	0.906
TLI	>0.90	[149]	0.924
CFI	>0.90	[149]	0.942
RMSEA	<0.08	[150]	0.072

Note: " CMIN/DF: Minimum discrepancy divided by degrees of freedom, GFI: Goodness of the Fit Index, TLI: Tucker–Lewis's Index, CFI: Comparative Fit Index, RMSEA: Root Mean Square Error of Approximation ".

Composite Reliability (CR) and Cronbach's alpha (α) were used to test construct reliability. CR > 0.6 is acceptable. [151], and $\alpha > 0.7$ indicates good internal consistency [152]. For this study, the range of CR is 0.803 to 0.862, while α was 0.801 to 0.860 (Table 6), indicating the strong reliability values across all constructs. Convergent validity was verified based on the AVE, and all the constructs in this study were found to have AVEs higher than 0.5 [153, 154]. Discriminant validity was checked according to [155]., such as , by the fact that the square root of the AVE of each construct must be higher than the respective correlation to other constructs, as verified in the diagonal values in Table 7. Moreover, all HTMT values are below 0.85, indicating that discriminant validity is satisfactorily established [156].

Table 6. Results of the CFA.

Construct	Item	Factor Loadings	CR	AVE	Cronbach's α
PT	PT_1	0.813	0.857	0.667	0.857
	PT_2	0.851			
	PT_3	0.785			
PEOU	PEOU_1	0.866	0.862	0.677	0.860
	PEOU_2	0.827			
	PEOU_3	0.774			
PU	PU_2	0.898	0.816	0.601	0.804
	PU_3	0.753			
	PU_4	0.657			
FAI	FAI_1	0.828	0.833	0.625	0.833
	FAI_2	0.795			
	FAI_3	0.747			
UI	UI_1	0.829	0.803	0.577	0.801
	UI_2	0.699			
	UI_3	0.747			

Table 7. Discriminant validity Fornel-Larcker Criterion.

Constructs	PT	PEOU	PU	FAI	UI
PT	0.816				
PEOU	0.466	0.822			
PU	0.371	0.407	0.775		
FAI	0.542	0.520	0.556	0.790	
UI	0.337	0.363	0.358	0.487	0.759

Note: "The diagonal values in the table show the square roots of the AVE, whereas the values in the lower portion represent the inter-construct correlations ".

Table 8. HTMT Criterion

Constructs	PT	PEOU	PU	FAI	UI
PT	—				
PEOU	0.475	—			
PU	0.366	0.437	—		
FAI	0.534	0.532	0.521	—	
UI	0.339	0.368	0.351	0.496	—

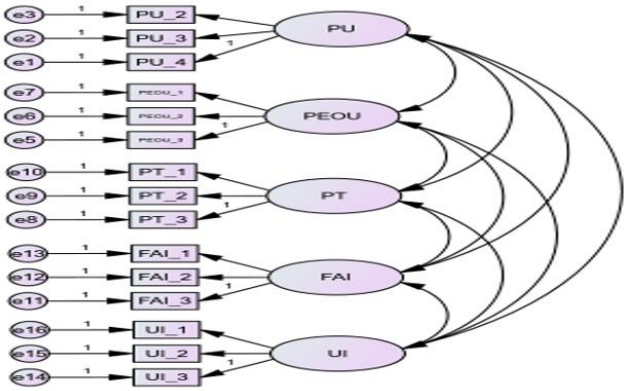

FIGURE 2. Measurement model.

2. STRUCTURAL MODEL AND HYPOTHESIS TESTING

We employed a structural model to test the importance of the hypothesized paths and to verify the correctness of our model's predictions. All goodness-of-fit indices of the hypothesized model corresponded well with those of the data used to validate the construct (Table 9). Therefore, it can be concluded that the measurement model achieved a satisfactory fit with the data.

Table 9. Structural model fit measures

Fit Indices	Recommended Value	Source	Obtain Value
CMIN/df	1–4	[147]	1.939
GFI	>0.90	[148]	0.901
TLI	>0.90	[149]	0.906
CFI	>0.90	[149]	0.932
RMSEA	<0.08	[150]	0.068

We tested all hypotheses by including the anticipated paths in the measurement model. We adopted the MLE approach to approximate the proposed pathways because it is a popular method that could achieve accurate estimation of the results without being affected by stable conditions [141, 157]. The magnitude of the association between the two constructs was assessed using the path coefficient, also known as the beta weight (β). A p-value < 0.05 was appraised as statistically substantial [158].

2.1 Direct Effects

H_1 focused on analyzing the direct impact of UI on FAI. The analysis results showed that UI has a positive effect on FAI (β = 0.199, p = 0.015), supporting H_1. Regarding the control variables, we found that age, gender, and family income level did not affect FAI.

2.2 Indirect Effects

To test the remaining hypotheses, the research employed a bootstrap resampling strategy with 5000 iterations and a 95% bias-corrected confidence interval to determine the importance of indirect effects [159] . We examine a process in mediation, where we test the mediator, explaining how one independent variable affects a dependent variable [160]. It also proposed that a serial mediation model is needed to explore the causal relationships in an integrated model [161]. Testing these mediating effects is easily confirmed by SEM [162, 163].

Regarding H_2, we found that UI indirectly affects FAI through the use of PEOU ($\beta = 0.117$, $p = 0.001$). Regarding H_3, we found an indirect influence of UI on FI through PU ($\beta = 0.054$, $p = 0.020$). Regarding the H_4, a significant indirect effect of UI on FAI through PT was found ($\beta = 0.051$, $p = 0.040$). For the H_5, we found a significant indirect effect of PEOU on PU through PT ($\beta = 0.059$, $p = 0.045$). Finally, for the H_6, we found substantial serial mediating effects of PEOU, PT, and PU on the relationship between UI and FAI ($\beta = 0.006$, $p = 0.022$).

Since all the indirect effects are significant and the direct impact of UI on FAI ($\beta = 0.199$, $p = 0.015$) remains considerable, even after considering the mediators, we can conclude that all the mediations are partial. Table 9 and Figure 3 provide an overview of the structural model outcomes, including the model's path diagram, while Table 10 summarizes the results of the hypothesis testing.

In the context of this model, small but statistically significant β coefficients still carry practical significance. These values, though modest, indicate meaningful contributions to FAI when combined in the serial mediation pathway. Even slight improvements in this relationship can support effective FinTech design and policy interventions, leading to measurable behavioral changes among Saudi Gen Z users.

Table 10. Summary of results from the structural path analysis.

Path	Direct Effect β	*p* Value	Indirect Effect β	95% CI LLCI ULCI	*p* Value
UI→FAI	0.199	0.015			
UI→ PEOU->FAI			0.117	[0.043,0.233]	0.001
UI→PU →FAI			0.054	[0.007,0.154]	0.020
UI→PT →FAI			0.051	[0.002, 0.165]	0.040
PEOU→PT→ PU			0.059	[0.001, 0.158]	0.045
UI→PEOU→ PT→PU→FAI			0.006	[0.001, 0.022]	0.022

Note: " CI, confidence interval; LLCI, lower limit confidence interval; ULCI, upper limit confidence interval ".

Table 11. Hypothesis results.

Hypothesis	Hypothesized Path	β value	*p* Value	Results
H_1	UI→FAI	0.199	0.015	"Supported"
H_2	UI→ PEOU->FAI	0.117	0.001	"Supported"
H_3	UI→PU →FAI	0.054	0.020	"Supported"
H_4	UI→PT →FAI	0.051	0.040	"Supported"
H_5	PEOU→PT→ PU	0.059	0.045	"Supported"
H_6	UI→PEOU→PT→PU→FAI	0.006	0.022	"Supported"

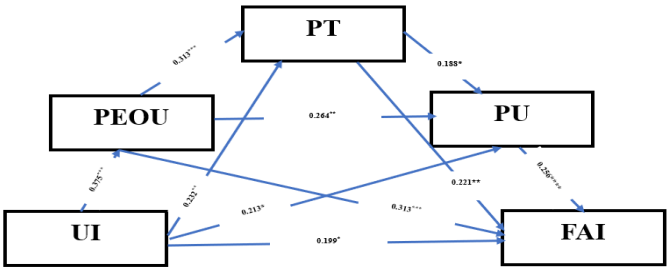

FIGURE 3. Path diagram.

Note:" * p < 0.05, ** p < 0.01, *** p < 0.001 ".

V. DISCUSSION

This research tested a serial mediation model that combines IIT (UI) with the Extended Technology Acceptance Model (TAM) constructs. PEOU, PU, and PT to explain FAI among Gen Z students in Saudi Arabia. All hypothesized paths were significant, supporting the model and indicating the impact of UI, PEOU, PU, and PT on FAI. The positive impact of UI on FAI (H_1: $\beta = 0.199$, $p = 0.015$) was confirmed, which is consistent with previous findings [40, 41, 61, 62]. Innovative individuals are more likely to adopt FinTech services due to their readiness to change, adaptability to new technology, and influence on social media. These results support previous research indicating that user innovativeness facilitates the early acceptance of new digital services and reduces resistance to them [38, 101, 164].

PEOU was observed as partially mediating the linkage between UI and FAI (H_2: $\beta = 0.117$, $p = 0.001$), which is consistent with extant research suggesting the necessity of user-friendly technology for adoption [165]. This indicates that, although innovative users are willing to experiment with new technologies, the perceived ease of access to FinTech technology remains a crucial factor in determining whether they adopt it. Systems must be user-friendly, and even early adopters need to be able to transition from interest to use easily. PU was also found to be a partial mediator between UI and FAI (H_3: $\beta = 0.054$, $p = 0.020$), similar to past research [166, 82, 83]. This result indicates that forward-thinking individuals are more likely to perceive the usefulness and advantages of FinTech solutions, leading to their intention to adopt them. Consistent with the previous study [40], PU is confirmed to be a critical mediator in transforming innovativeness to actual behavioural intention. PT was also reported to mediate the association of UI with FAI partially (H_4: $\beta = 0.051$, $p = 0.040$), which is consistent with other studies [37, 101]. This underscores the fact that even risk-averse users (as much as innovators) need to trust the system to get past security and reliability concerns. Previous research also highlights that trust is still a significant factor in inducing adoption, irrespective of a user's risk-taking propensity [37, 101].

The research further indicated that PT partially mediates the relationship between PEOU and PU (H_5: $\beta = 0.059$, $p = 0.045$), consistent with the previous works [167, 168]. This finding suggests that the ease of use of FinTech applications enhances perceived usefulness when the level of trust in these applications is reasonable. It has also been previously reported that trust is an essential mediator in translating usability into perceived value, especially in the context of technology adoption involving sensitive and private financial information.

Finally, the results also supported a dual serial mediation model, wherein PEOU, PT, and PU significantly mediated the relationship between UI and FAI (H_6: $\beta = 0.006$, $p = 0.022$). That is, innovative individuals are likely to perceive FinTech as easy to use first, and such perceived ease of use may foster their trust in the system, leading to an enhanced perception of usefulness and, subsequently, an intention to use the system. This supports other research [40, 79, 109], indicating that the process from innovation to adoption proceeds through a series of cognitive evaluations, and that user perceptions, such as convenience, trust, and usefulness, take part in shaping adoption behaviour.

VI. THEORETICAL CONTRIBUTIONS AND PRACTICAL IMPLICATION

1. THEORETICAL CONTRIBUTIONS

The present study conceptualized and developed a framework based on the synthesis of IIT and the ETAM, incorporating PEOU, PU, and PT as extended factors to examine the sequential mediation of FAI among Gen Z students in Saudi Arabia. Although the basic TAM [42] focuses on PEOU and PU as core determinants of technology adoption, it does not directly examine the effects of external factors on intentions [85]. ETAM [39] incorporated trust as a key factor, crucial in the setting of online transactions. This research expands the theoretical basis of technology acceptance by combining ETAM and IIT. While [39] accounted for 46% of behavioral intention by PU, PEOU, and Trust, the current model provides a higher R^2 estimate of 0.67 by including UI and mediation paths, indicating a moderate to strong explanatory power [169]. This model is also more sophisticated and context-specific than Roger's IIT [38], which in the context of SEM is not predictive [170]. Moreover, although IIT has been explored in various technology areas, its application has been limited in digital finance, including mobile banking and blockchain. This research bridges that gap by revealing that more innovative users are presumably more likely to use FinTech services through a complex mediation path. This study also highlights the significance of trust in the FinTech domain, given higher financial risk and the associated regulatory and cybersecurity challenges.

2. PRACTICAL IMPLICATIONS

- Role of Educational Institutions: In Saudi Arabia, universities should partner with banks, financial regulatory bodies, and policymakers to develop and deliver customized programs, such as seminars, e-classes, and interactive workshops, that aim to increase awareness of financial literacy and FinTech among students. Such programmes should pay particular attention to students who have low levels of exposure to technology [112, 171].
- Innovation in FinTech Products: FinTech companies should focus on creating personalized digital financial solutions tailored to students. This includes simplified expense tracking, crowd-investing opportunities, and low-barrier-to-entry lending, combined with compelling rewards, ranging from cash back to student deals, to drive usage and uptake [172, 173].
- User Experience Enhancement: To take digital accessibility and inclusiveness to the next level, FinTech companies need to deploy and develop mobile-first designs, smooth interfaces, and features like biometric login, which are both advanced and user-friendly. These improvements will reduce the mental strain and technological barriers for those who are less technically literate [2, 174].
- Using AI for Personalization: The introduction of AI-driven features, including personalized dashboards and targeted financial recommendations, can significantly increase customer engagement by aligning services with the account-usage preferences and user expectations of digitally native, tech-savvy Gen Z [175].
- Building Trust through Transparency: With trust being one of the top factors in financial decisions, FinTech providers would do well to introduce and communicate strong data protection measures, anti-fraud mechanisms, and transparency. This will be essential for greater user trust and to comply with looming regulations [176].
- Supporting Vision 2030 Objectives: These initiatives collectively contribute to the financial incorporation and digital transformation objectives of the Saudi Vision 2030 by enabling a digitally-skilled youth and delivering sustainable economic diversification through responsible FinTech growth.

VII. LIMITATIONS AND FUTURE DIRECTIONS

This investigation has expanded our understanding of students in Saudi Arabia regarding their behavioural intentions towards FinTech adoption; however, several limitations can be highlighted, providing a course of action for future research. First, while the sample size meets the minimum statistical requirements [141] , a larger sample of a more diverse group is likely to improve the generalisation and stability of the findings. Prospective studies will be necessary to collect a larger dataset from various institutions and regions, thereby

further enhancing the model's predictive performance and generalization capability. Second, the survey design was cross-sectional, as it captured the respondents' views at a single point in time. This method limits the extent to which causal inferences can be drawn. Longitudinal research is recommended to investigate changes in attitudes, perceptions, and intentions over time, providing an overview of the development of FinTech adoption. Third, the study's sample was confined to university students in Saudi Arabia, which limits the cultural and geographical coverage. The diffusion of FinTech can vary significantly due to cultural, economic, and legal factors. Subsequent studies would be better served by cross-cultural comparisons or sampling regarding examining how national culture, digital infrastructure, or regulatory environment affects FinTech use. Fourth, response bias might have been present, as self-reports might be influenced by social desirability and interpretation. Although anonymity was guaranteed, a social desirability bias was present in the participants' responses. Other methods of data collection, such as, tracking behaviour, experiments, triangulation with qualitative information can be used to assure external and internal validity. Fifth, the present study was purely quantitative with an emphasis on relations between numbers, rather than model testing. As helpful as they are, they tend to bypass rich contextual nuances. Future research is recommended to employ a mixed-methods research design, adding quantitative results with complementary qualitative insights (e.g., interviews, focus groups), to provide a vivid vignette regarding the motivations and barriers to FinTech usage among users based on their lived experiences. Sixth, the possible moderating variables were not tested in our research. Demographic characteristics, such as an individual's age, gender, income, computer skills, or prior experience in financial technology, may also influence the behavioural intention. Investigating these moderating effects is of interest for future studies to gain subgroup-specific knowledge. Lastly, the research focused on behavioural intention rather than actual FinTech use. Intention is a prognosticator of behaviour, but it is not always realized. In the future, further studies should attempt to utilize real usage data or transaction records to test our proposed behaviour models and gain a more empirically based insight into actual adoption behaviour.

VIII. CONCLUSION

The study presented an extensive framework that examined how IIT (UI) interacts with the ETAM (PEOU, PU, and PT) via a sequential mediation process to impact FAI of Gen Z students in Saudi Arabia regarding the adoption of Fintech. In this study, a substantial favorable effect of UI on FAI was observed. Additionally, this study found that PEOU partially mediated the association between UI and FAI. Moreover, this study found that PU partially mediated the relationship between UI and FAI. Furthermore, PT was identified as a partial mediator in the association between UI and FAI in this study. In addition, the current study showed the partial mediating effect of PT on the association between PEUO and PU. Notably, the present study revealed the partial serial mediating effects of PEOU, PT, and PU in the association between UI and FAI. The study's findings suggest that promoting financial literacy and developing customized FinTech solutions can encourage user innovation, thereby increasing student acceptance of digital financial services. Well-designed mobile apps, AI-powered assistants, and innovative authentication solutions will make it more accessible and easier for consumers to trust, thereby enhancing user engagement. Enhancing cybersecurity and increasing awareness efforts will help foster confidence in FinTech, thereby ensuring that financial transactions are safe and secure. These plans support the Saudi Vision 2030 objectives of economic sustainability, digital transformation, and an innovation-led economy.

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Author Contributions

All authors contributed formally and equally to the development and planning of the study.

Conflicts of Interest

There is no conflict of interest declared by the authors.

Data Availability Statement

Upon request, data can be obtained from the authors.

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