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Factors Affecting Fintech Business Sustainability Among Generation Z in Perak

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Abstract: Fintech business sustainability is increasingly important in the evolving digital financial ecosystem, driven by intensifying competition and rising user expectations. One of the key challenges affecting fintech business sustainability is the variation in financial literacy among Generation Z (Gen Z) users. This study analyzes the factors impacting fintech business sustainability among Generation Z in Perak, Malaysia, focusing on the roles of digital financial services, financial literacy, technology infrastructure, and financial attitude. A cross-sectional survey design was utilized in a quantitative research approach, collecting primary data via a structured self-administered online questionnaire from Generation Z individuals aged 18–27 who actively use fintech services. A total of 384 valid responses were analyzed using Statistical Package for the Social Sciences (SPSS). The findings indicate that all four independent variables are positively related to fintech business sustainability. Digital financial services significantly enhance fintech business sustainability ($\beta = 0.248$, $p = 0.002$), supporting hypothesis 1; technology infrastructure positively influences fintech business sustainability ($\beta = 0.192$, $p = 0.009$), supporting hypothesis 2; financial attitude has a positive impact on fintech business sustainability, supporting hypothesis 3 ($\beta = 0.271$, $p = 0.001$); and perceived trust and security is identified as the most influential predictor of fintech business sustainability, with a beta coefficient of 0.334 and a p-value of 0.000, thereby supporting hypothesis 4. The study highlights that fintech service providers should focus on enhancing service quality, improving technological infrastructure, and promoting positive financial behaviors to retain Generation Z users, thereby ensuring long-term sustainability in Malaysia's fintech industry.

Keywords: digital financial services, technology infrastructure, financial attitude, trust and security, fintech business sustainability

1. Introduction

Financial technology (fintech) is significantly transforming Malaysia's financial sector, driven by rapid digitalization in banking and payments. Generation Z, noted for their technological and mobile focus, increasingly utilizes digital financial services for transactions, savings, investments, and bill payments [1]. Digital financial services improve convenience and efficiency, leading to increased user satisfaction and continuous usage. Financial literacy boosts users' confidence in utilizing fintech services responsibly, fostering long-term engagement. Reliable technology infrastructure is essential for consistent service delivery, while positive financial attitudes promote ongoing usage and loyalty to fintech platforms. Fintech providers must focus on long-term engagement and loyalty to ensure sustainable growth as they expand. Fintech has revolutionized the financial services sector with innovative digital solutions including mobile banking, e-wallets, peer-to-peer payments, and online investment platforms [2]. As the fintech industry grows, emphasis is moving from adoption to long-term sustainability, which involves maintaining continuous usage, customer retention, competitiveness, and operational viability amid rapid digital changes [3]. Generation Z is characterized by its focus on technology and mobile usage, leading to an increased reliance on digital financial services for transactions and savings [4]. The fintech industry is shifting from mere adoption to ensuring sustainability, which includes customer retention and viability amid rapid digital evolution [5], with Gen Z's behaviors significantly affecting fintech firms' success [6]. Nevertheless, challenges such as shifting preferences, intense competition, reliability concerns, and diverse financial knowledge levels hinder sustained engagement among these users [7, 8]. Despite rapid growth in the Malaysian fintech sector, firms encounter challenges in retaining long-term engagement and customer loyalty, especially among Generation Z [9]. Although adoption rates are high, sustainable usage is uncertain due to intense competition, shifting user expectations, and technological issues, jeopardizing the long-term viability of these firms [10, 11]. In Perak, the rapid growth of digital financial services among young adults highlights the importance of understanding the factors influencing fintech business sustainability for Generation Z. Despite the growth of fintech in Malaysia, there is a significant research gap regarding the transition from initial adoption to long-term sustainability among Generation Z. Current literature emphasizes adoption but overlooks the drivers of continuous engagement in Perak. This study aims to address this gap by integrating the Technology Acceptance Model (TAM) and Social Exchange Theory (SET) to explore how perceived utility and reciprocal value influence long-term retention. "Fintech business sustainability" is defined as a firm's ability to ensure ongoing

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usage, customer loyalty, and operational viability through high-quality digital engagement. This research supports the Sustainable Development Goals, particularly Goal 8 and Goal 9, by promoting a stable and inclusive digital financial ecosystem. The research aims to identify key technological and behavioral factors, including digital financial services, financial literacy, technology infrastructure, and financial attitude, which impact the sustainability of fintech providers. Insights from these factors will help firms develop strategies to improve customer retention among Generation Z.

2. Literature Review

This study shifts the focus from fintech adoption to long-term sustainability in Malaysian research. It integrates behavioral factors (financial literacy, financial attitude, trust) and technological factors (digital financial services, infrastructure) to support existing models like Unified Theory of Acceptance and Use of Technology (UTAUT) and TAM, emphasizing technology readiness and behavioral intention [12]. Identifying key drivers of sustained fintech usage among Generation Z can help policymakers design initiatives that foster digital economy development, support innovation, and enhance the fintech sector's competitiveness in Malaysia, while promoting secure and sustainable digital financial ecosystems. This study integrates behavioral and technological factors to support existing models like the TAM, emphasizing technology readiness and behavioral intention [12]. According to TAM, users are more inclined to continue using technology if they find it useful and convenient. For Generation Z, reliant on digital platforms, effective digital financial services significantly influence long-term engagement and continuance intention [13, 14].

1) Fintech business sustainability among Generation Z

Fintech in Malaysia has grown swiftly thanks to government backing, widespread smartphone use, and increasing cashless transaction acceptance [13]. However, challenges persist in sustaining long-term engagement, largely due to security, service quality, and financial behavior concerns. Generation Z is a key demographic, as their ongoing participation is vital for the future success of fintech companies in the region [4]. Prior studies indicate that financial literacy increases confidence and diminishes the misuse of fintech platforms [15]. Limited financial literacy leads to impulsive spending and poor budgeting, potentially diminishing long-term engagement with fintech services [16]. Financially literate users are more likely to consistently utilize fintech platforms for savings, payments, and financial planning, positively impacting fintech sustainability among Generation Z [17].

2) Digital financial services and fintech business sustainability among Generation Z

Digital financial services encompass various fintech products, including e-wallets, mobile banking, online transfers, and digital investment platforms, which enhance convenience, efficiency, and accessibility. Previous studies indicate that well-designed digital financial services improve user satisfaction and intention to continue using them. According to the TAM, users are more inclined to continue using technology if they find it useful and convenient. For Generation Z, reliant on digital platforms, effective digital financial services significantly influence long-term engagement [18]. SET indicates that when fintech providers deliver valuable digital services, users tend to reciprocate with ongoing usage and loyalty. Enhancements in service functionality, speed, and user experience elevate perceived benefits, thereby supporting long-term sustainability for fintech businesses. Consequently, digital financial services are anticipated to positively impact fintech business sustainability among Generation Z.

Hypothesis 1 (H1): Digital financial services are positively related to fintech business sustainability among Generation Z.

3) Technology infrastructure and fintech business sustainability among Generation Z

Technology infrastructure comprises the reliability, system stability, security mechanisms, and technical performance essential for supporting fintech platforms. Prior studies show that system reliability and technological robustness are key factors affecting users' continuous usage intention and satisfaction [12]. Frequent system failures and slow processing can undermine user trust and hinder long-term engagement. Generation Z's focus on seamless digital experiences underscores the importance of technology infrastructure for enhancing fintech business sustainability.

Hypothesis 2 (H2): Technology infrastructure is positively related to fintech business sustainability among Generation Z.

4) Financial attitude and fintech business sustainability among Generation Z

Financial attitude encompasses an individual's beliefs and confidence regarding financial management via digital platforms. Research indicates that those with a positive financial attitude are more willing to embrace financial innovations and sustain long-term usage [19, 20]. Generation Z users perceive fintech as a valuable financial management tool, leading to increased consistent engagement with these platforms. SET suggests that positive financial attitudes enhance perceived benefits and lower psychological resistance to digital financial services. Users who see fintech platforms as aiding financial decision-making are more likely to maintain long-term relationships with providers. Thus, financial attitudes are anticipated to positively impact fintech business sustainability within Generation Z.

Hypothesis 3 (H3): Financial attitude is positively related to fintech business sustainability among Generation Z.

5) Perceived trust and security and fintech business sustainability among Generation Z

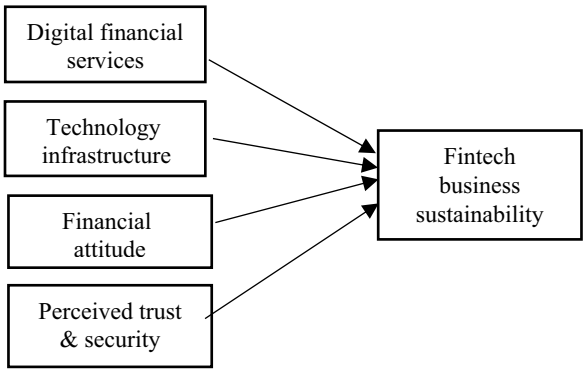
Perceived trust and security are key factors affecting users' confidence in data privacy and transaction protection on fintech platforms. Trust significantly influences fintech usage and continuity [5, 21], while security concerns, including data breaches and fraud risks, can hinder long-term usage and affect business sustainability. SET posits that trust serves as a non-monetary benefit enhancing long-term relationships. Generation Z is more inclined to maintain loyalty to fintech platforms they perceive as secure and trustworthy. Consequently, this perception of trust and security is anticipated to positively influence fintech business sustainability.

Hypothesis 4 (H4): Perceived trust and security are positively related to fintech business sustainability among Generation Z

2.1. Conceptual framework

Figure 1 presents a conceptual framework for a study on factors influencing fintech business sustainability among

Figure 1
Conceptualized on factors affecting fintech business sustainability among Generation Z



Generation Z. It identifies four independent variables—digital financial services, technology infrastructure, financial attitude, and perceived trust and security—that are believed to directly affect the dependent variable, fintech business sustainability. The framework integrates the TAM and SET to examine fintech platforms. It highlights that digital financial services and technology infrastructure affect users' perceptions of usefulness and ease of use, essential for continued engagement. Efficient services backed by strong technology increase the likelihood of sustained usage among Generation Z, supporting long-term business sustainability [22]. Financial attitude among Generation Z users encompasses their beliefs and confidence in managing finances via digital platforms [23, 24]. According to SET, users with positive financial attitudes perceive greater benefits from fintech services, which fosters loyalty and continued engagement, thereby supporting the sustainability of fintech businesses. Perceived trust and security significantly mitigate the risks users associate with digital financial transactions [25]. According to SET, trust serves as a non-monetary reward that enhances long-term relationships between users and fintech providers. Generation Z users' perception of fintech platforms as secure and trustworthy encourages ongoing usage, thereby promoting business sustainability. The conceptual framework indicates that fintech business sustainability for Generation Z is shaped by technological factors, such as digital financial services and technology infrastructure, as well as behavioral factors, including financial attitude and perceived trust and security. This framework offers a basis for hypothesis development and empirical testing.

3. Research Methodology

3.1. Research design

This study utilizes a quantitative approach with a descriptive and explanatory design to analyze digital financial service usage among Generation Z in Malaysia. It aims to describe current usage, technology infrastructure, financial attitudes, perceived trust, security, and debt management behaviors, while also examining the causal relationships between independent and dependent variables.

The study utilizes a non-contrived setting for gathering data from respondents about their real-life experiences, which increases external validity. It employs a cross-sectional time horizon, collecting data at one point through self-administered questionnaires, suiting the study's constraints and nature [26].

This research employs a deductive approach to develop and test hypotheses rooted in existing theories like SET and behavioral finance. It utilizes multiple regression analysis to examine the impact of digital financial services, technology infrastructure, financial attitudes, and perceived trust and security on debt management in Generation Z. This study focuses on Generation Z in Perak, Malaysia, correcting previous editorial errors related to other regions for consistency. It employs non-probability convenience sampling to efficiently reach the youth demographic while acknowledging potential selection bias, which has been addressed by ensuring a diverse representation from urban and semi-urban districts.

3.2. Participants

The study targets Generation Z individuals aged 18–27 in Perak, Malaysia, who use fintech services like mobile banking, e-wallets, and online financial platforms, highlighting their significant role in adopting digital financial services due to their technological exposure and digital engagement. The study analyzes individual users to explore their perceptions, attitudes, and behaviors regarding fintech usage and financial inclusion, aligning with previous research on financial behavior and technology adoption [27].

Perak, Malaysia, is the geographical focus of this study, chosen for its increasing use of digital financial services by young adults in urban and semi-urban areas. Questionnaires were distributed online to respondents across different districts in Perak, targeting Generation Z individuals who actively use fintech services, irrespective of gender, education level, or employment status.

This study uses a non-probability convenience sampling method, selecting respondents based on their accessibility and willingness to participate in the survey. The researcher notes that while convenience sampling may not adequately represent all of Generation Z, it is commonly employed in social science studies involving youth and students due to practical limitations. Convenience sampling is an efficient method for data collection, particularly in explanatory and descriptive quantitative studies, due to its time and cost effectiveness [28].

For large populations and non-probability sampling studies, a formula is utilized to estimate the minimum required sample size [29]:

$$= (p(1-p)z^2)/E^2.$$

Where:

n = required sample size

p = estimated proportion of the population (0.5, to maximize variance)

z = z-value corresponding to a 95% confidence level (1.96)

E = margin of error (0.05)

$n = (0.5(1 - 0.5)(1.96)^2) / (0.05)^2$-|

$n = 384.16 \approx 384$

The minimum required sample size for this study is 384 respondents, deemed sufficient for representing the target population and conducting meaningful statistical analysis.

3.2.1. Instruments

The study employed a structured questionnaire as its research instrument, which was designed to be simple, clear, and user-friendly. The questionnaire had two main sections.

Table 1
Measurement item

Variable	Items	Scale
Digital financial services	Fintech services offer convenience for everyday financial transactions Fintech platforms are characterized by ease of use and user-friendly interfaces Fintech services are more time-efficient than traditional banking Fintech applications provide dependable and effective services Fintech services effectively address my financial needs	5-point likert scale
Technology infrastructure	I have reliable internet access when using fintech services Fintech applications operate efficiently with minimal system failures Fintech platforms are accessible on my mobile devices Transaction processes on fintech platforms exhibit high speed and stability Fintech platforms are equipped with robust technological support systems	5-point likert scale
Financial attitude	I prefer to plan my finances carefully before spending I believe in saving money regularly using fintech tools I manage my finances in a disciplined manner using digital platforms I use fintech services for long-term financial planning I avoid unnecessary spending when using fintech services	5-point likert scale
Perceived trust and security	I trust fintech platforms to protect my personal information Fintech services ensure secure transaction processes. I feel secure using fintech platforms for financial transactions Fintech platforms employ robust security measures to protect against fraud I believe fintech providers handle data responsibly	5-point likert scale
Fintech business sustainability	I intend to continue using fintech services in the future I am satisfied with my overall experience using fintech platforms Fintech services are highly recommended I frequently rely on fintech services for financial activities Fintech platforms play a crucial role in long-term financial management	5-point likert scale

Section A gathered demographic data from respondents, such as age, gender, education level, and fintech usage frequency, to confirm the sample represented the intended population [30].

Sections B and C utilized a 5-point-point Likert scale (1–5) to measure variables in the study. The dependent variable was Financial inclusion, assessed alongside five independent variables: Digital financial services, Financial literacy, Technology infrastructure, Financial attitude, and Perceived trust and security. Measurement items were adapted from established literature to fit the Malaysian and Generation Z context. A summary of the questionnaire design and measurement sources is provided in the relevant Table 1 of this study.

4. Result and Discussion

A total of 390 questionnaires were distributed online to Generation Z respondents in Perak, resulting in 384 usable responses after data screening. The response rate of 98.46% is deemed satisfactory and surpasses the minimum recommended threshold. Overall, the demographic profile of the sample is representative of Generation Z in Perak, making it suitable for studying the role of fintech in enhancing financial inclusion. The respondents' characteristics validate the study and provide a strong basis for further data analysis and interpretation in Table 2. Gender distribution among respondents is balanced, with 198 females (51.6%) and 186 males (48.4%), reflecting an adequate representation of both genders from Generation Z and no significant gender bias. The majority of respondents (38.0%) are aged 21–24 years (146 individuals), followed by 33.3% aged 17–20 years (128 individuals), 16.1% aged 13–16 years (62 individuals), and 12.5% aged 25–28 years (48 individuals). This age distribution is typical of Generation Z and indicates the sample is suitable for studying fintech adoption and financial inclusion among young individuals. Most respondents possess a Diploma, Foundation, or Sijil Tinggi Pelajaran Malaysia (STPM) qualification (37.0%), followed by undergraduate or degree holders (34.4%). Secondary school education accounts for 25.0%, while only 3.6% hold postgraduate qualifications. This highlights that most respondents have a basic to intermediate education level, relevant for financial literacy and fintech usage. More than half of the respondents are students (56.8%), with 218 individuals. Employed respondents numbered 124 (32.3%), while self-employed and unemployed respondents accounted for 26 (6.8%) and 16 (4.1%), respectively. This distribution highlights Generation Z's transitional phase between education and entering the workforce. The income distribution of respondents shows that 55.7% earn below Malaysian Ringgit (MYR) 1000, reflecting a high student presence. Those earning MYR 1001–MYR 3000 represent 28.1%, while 11.5% earn MYR 3001–MYR 5000. Only 4.7% report earnings above MYR 5000. This indicates a prevalence of lower-income individuals, underscoring the importance of financial inclusion and fintech services for this demographic.

Table 2
Profile respondents

Demographic category	Frequency	Percent (%)
Gender		
Male	186	48.4
Female	198	51.6
Age group		
13–16 years old	62	16.1
17–20 years old	128	33.3
21–24 years old	146	38
25–28 years old	48	12.5
Education level		
Secondary school	96	25
Diploma/foundation/STPM	142	37
Undergraduate	132	34.4
Postgraduate	14	3.6
Employment status		
Student	218	56.8
Employed	124	32.3
Self employed	26	6.8
Unemployed	16	4.1
Monthly income		
Below MYR 1000	214	55.7
MYR 1001–MYR 3000	108	28.1
MYR 3001–MYR 5000	44	11.5
Above MYR 5000	18	4.7

4.1. Reliability test

Digital financial services demonstrated excellent internal consistency with a Cronbach's alpha value of 0.912, while technology infrastructure achieved a reliability coefficient of 0.904, both measured using four items. The financial attitude construct, measured with four items, shows excellent reliability with a Cronbach's alpha value of 0.918. Similarly, perceived trust and security, also assessed with four items, has a strong internal consistency indicated by a Cronbach's alpha value of 0.926. Fintech business sustainability was assessed with five items, achieving a high Cronbach's alpha value of 0.934, demonstrating strong internal consistency among the measurement items in Table 3.

Table 3
Reliability analysis

Construct	No. of items	Cronbach's alpha value
Digital financial services	4	0.912
Technology infrastructure	4	0.904
Financial attitude	4	0.918
Perceived trust and security	4	0.926
Fintech business sustainability	5	0.934

4.2. Multi-regression analysis – hypothesis testing

The R value of 0.781 indicates a strong positive relationship between independent and dependent variables, while an R^2 value of 0.610 reveals that 61.0% of the variation in fintech business sustainability is explained by the independent variables. The adjusted R^2 value of 0.605 affirms the model's robustness after adjusting for the number of predictors, highlighting good model fit. The Durbin–Watson statistic of 1.68 indicates no serious autocorrelation in the residuals, confirming that the regression assumptions are satisfied in Table 4.

4.3. Coefficients and multicollinearity

The beta (β) values show the strength and direction of relationships between independent and dependent variables. Statistical significance is indicated by Sig. values below 0.05. The variance inflation factor (VIF) assesses multicollinearity, with VIF values under 5.0 indicating no issues. Digital financial services positively impact fintech business sustainability (β = 0.248, p = 0.002), indicating that enhanced efficiency and accessibility in digital services foster sustainability. The VIF value of 2.14 shows no multicollinearity issues. Technology infrastructure shows a significant positive correlation with long-term fintech sustainability (β = 0.192, p = 0.009), and its VIF value of 2.03 indicates no multicollinearity. The financial attitude construct has a positive and significant effect on sustainability (β = 0.271, p = 0.001), indicating that individuals with favorable financial attitudes are more likely to remain engaged with fintech services. The VIF value is 2.21, which is acceptable. Trust and security is the most significant predictor of fintech business sustainability, with a beta coefficient of 0.334 (p = 0.000), underscoring the importance of trust, data protection, and security perceptions. A VIF value of 2.37 confirms there are no issues with multicollinearity in Table 5.

4.4. Hypothesis discussion

The p-value < 0.05 indicates support for H1 (digital financial services) (beta = 0.248, p = 0.002), demonstrating a positive relationship between digital financial services and fintech business sustainability among Generation Z in Perak. This implies that fintech platforms providing convenient, efficient, and user-friendly digital services have a better chance of achieving long-term sustainability. Generation Z demonstrates significant engagement with digital payment systems, mobile banking, and e-wallet services, suggesting that the innovation in digital financial services boosts customer retention and usage, crucial for fintech sustainability [31]. This aligns with earlier studies emphasizing digital service quality as vital for the sector's longevity.

The p-value > 0.05 indicates that H2 (beta = 0.192, p = 0.009) is supported, as there is a significant relationship between technology infrastructure and fintech business sustainability among Generation Z in Perak. This lack of significance may be attributed to the well-established basic technological infrastructure, including internet access and smartphone availability, within this generation in Malaysia [32, 33]. Generation Z's access to digital technology suggests that infrastructure is not the sole factor affecting sustainability; rather, service innovation and customer experience are more significant influences.

The p-value < 0.05 indicates that H3 (beta = 0.271, p = 0.001) is supported, demonstrating a significant positive

Table 4
Model summary

R	R^2	Adjusted R^2	Durbin–Watson statistic
0.781	0.610	0.605	1.68

Table 5
Regression coefficients

Variance inflation factor	Variable	Beta	Significance
Digital financial services	0.248	0.002	2.14
Technology infrastructure	0.192	0.009	2.03
Financial attitude	0.271	0.001	2.21
Trust and security	0.334	0.000	2.37

relationship between financial attitude and fintech business sustainability. This suggests that Generation Z users who exhibit responsible financial behavior and positive attitudes toward money management and digital finance are more likely to persist in using fintech services [24, 34–36]. A positive financial attitude fosters engagement with fintech platforms, enhancing customer loyalty and long-term business sustainability, reinforcing previous research on the importance of behavioral factors in fintech adoption [14, 37, 38].

Widespread use of reputable fintech applications may have normalized trust perceptions, diminishing their effect on sustainability, leading to the support of H4 (beta = 0.334, p = 0.000) with a p-value > 0.05. The study finds that perceived trust and security do significantly impact fintech business sustainability for Generation Z in Perak, indicating that younger users are more confident in digital platforms and less worried about security risks than older generations [39].

5. Conclusion

Generation Z significantly influences the sustainability of the fintech industry through their digital engagement and dependence on fintech services. To ensure long-term sustainability, fintech companies should focus on improving service quality, enhancing technological reliability, educating users, and fostering positive perceptions. This study enhances the understanding of how fintech firms can bolster sustainability strategies by addressing these critical factors affecting Generation Z users. Policymakers should enhance digital infrastructure in semi-urban and rural areas to promote inclusive fintech access, while government-led financial literacy programs aimed at youth can improve digital financial initiatives. Therefore, financial institutions and fintech providers should enhance the accessibility, reliability, and user-friendliness of digital financial platforms. Improving cybersecurity and simplifying application interfaces could foster trust and ongoing usage, particularly among young users. Additionally, incorporating educational features in fintech apps can promote financial literacy. The study endorses the use of behavioral theories, particularly the Theory of Planned Behavior, to understand digital financial engagement in young adults, suggesting directions for future comparative research across different regions or age groups. Findings help fintech companies, financial institutions, and policymakers identify factors influencing long-term sustainability. Emphasizing digital service quality and financial attitudes allows organizations to improve customer retention and competitive advantage.

6. Limitation and Recommendations

Despite its contributions, the study has limitations, primarily focusing on Generation Z users in Perak, which restricts the generalizability of the findings. It employs a cross-sectional design capturing perceptions at a single time point, failing to reflect behavioral changes over time. Additionally, self-reported questionnaires were used for data collection, which may introduce response bias.

Several recommendations are proposed to enhance fintech business sustainability among Generation Z in Perak based on the study's findings. Fintech firms should enhance financial literacy initiatives via in-app education, tutorials, and user guidance, fostering responsible usage and increasing user trust and loyalty to their platforms. Fintech service providers must enhance the quality of digital financial services by improving user experience, simplifying interfaces, and ensuring efficient transactions, which will boost satisfaction and promote long-term engagement. Fintech firms need to enhance their technology infrastructure for improved system stability, security, and scalability, with significant investments in cybersecurity and system upgrades to sustain user trust and business operations. Fintech companies should cultivate positive financial attitudes in Generation Z by emphasizing transparency, trustworthiness, and innovative features that resonate with their financial goals. Strong communication and customer engagement are essential for fostering loyalty and ensuring long-term business sustainability in the fintech sector.

Ethical Statement

This study received ethical approval from the TRGS/Universiti Tun Abdul Razak at Universiti Tun Abdul Razak. All procedures involving human participants were conducted in accordance with the ethical standards and guidelines established by the committee. Informed consent was obtained from all participants prior to data collection, and no personally identifiable information was disclosed in the study.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

Data are available from the corresponding author upon reasonable request.

Author Contribution Statement

Suresh Verappan: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Project administration. **Hemaloshinee Vasudevan:** Writing – review & editing, Visualization, Supervision, Project administration.

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