An-Najah University Journal for Research – B
Humanities
مجلة جامعة النجاح للأبحاث - ب
العلوم الإنسانية

Exploring the Digital Divide's Moderating Role in Sustainable Digital Banking Service Adoption: An Extended TAM Study from Palestine

Omar Alshamesti[1,2], Noormaizatul Akmar binti Ishak[3] & Juraini Zainol Abidin[3]

(Type: Full Article). Received: 20th Jul. 2025, Accepted: 10th Oct. 2025, Published: ××××. DOI: https://doi.org/10.xxxx.

Accepted Manuscript (In Press)

Abstract: Objective: This study investigates the influence of the digital divide on the effects of key technological and experiential factors, namely perceived ease of use, facilitating conditions, perceived usefulness, and customer satisfaction, on individuals' intention to adopt sustainability oriented digital services, with particular focus on the Palestinian context. **Methodology:** In line with the Technology Acceptance Model (TAM), the study extends the model to include customer satisfaction and sustainability intention as endogenous variables, and the digital divide as a moderating variable. Data were collected from 550 users of digital banking services in Palestinian banks through an online survey. The data were analysed using partial least squares structural equation modeling (PLS SEM). **Results:** The results show that perceived ease of use, facilitating conditions, perceived usefulness, and customer satisfaction significantly influence sustainability intention. In addition, the digital divide significantly moderates the relationships between perceived usefulness and sustainability intention, and between customer satisfaction and sustainability intention. No significant moderating effect of the digital divide is found for the other relationships. **Conclusion:** By combining sustainability intention and customer satisfaction within the TAM model and examining the effect of digital inequality, this study offers fresh empirical evidence from Palestine, where digital divides remain a significant barrier to inclusive digital transformation. The findings highlight that overcoming structural digital divides is a prerequisite for leveraging the full potential of technology to achieve sustainability outcomes in developing regions that are digitally disadvantaged. **Recommendations:** The study recommends expanding digital infrastructure, reducing internet costs, and promoting digital literacy to bridge the digital divide and enhance the sustainable adoption of digital banking services. Policymakers and banks should design inclusive digital platforms and provide support systems tailored to digitally disadvantaged users.

Keywords: Sustainability intention, Digital divide, TAM, Customer satisfaction, Facilitating conditions, Moderation, Palestine

استكشاف الدور المعدل للفجوة الرقمية في تبني خدمات البنوك الرقمية المستدامة: دراسة موسعة لنموذج قبول التكنولوجيا (TAM) في السياق الفلسطيني

عمر الشامسطي[1،2]، ونورميزاتول أكمار بنت إسحاق[3]، وجوريني زين العابدين[3]

تاريخ التسليم: (2025/7/20)، تاريخ القبول: (2025/10/10)، تاريخ النشر: (××××)

الملخص: الهدف: تسعى هذه الدراسة إلى استقصاء تأثير الفجوة الرقمية على أثر العوامل التكنولوجية التجريبية المؤثرة مثل سهولة الاستخدام المدركة، والظروف الميسرة، والمنفعة المدركة، ورضا العملاء على نية الأفراد في تبني الخدمات الرقمية الموجهة نحو الاستدامة، مع التركيز بشكل خاص على السياق الفلسطيني. **المنهجية**: انسجامًا مع نموذج تقبّل التكنولوجيا (TAM)، قامت الدراسة بتوسيع النموذج ليشمل رضا العملاء ونية الاستدامة كمتغيرات داخلية، إضافةً إلى إدراج الفجوة الرقمية كمتغير مُعدّل. جُمعت البيانات من 550 مستخدمًا للخدمات المصرفية الرقمية من بنوك فلسطينية عبر استبيان إلكتروني، وتم تحليلها باستخدام أسلوب نمذجة المعادلات الهيكلية بالحد الأدنى للمربعات الجزئية (PLS-SEM). **النتائج**: أظهرت النتائج أن سهولة الاستخدام المدركة، والظروف الميسرة، والمنفعة المدركة، ورضا العملاء تؤثر بشكل كبير في نية الاستدامة. بالإضافة إلى ذلك، تبين أن الفجوة الرقمية تعدّل بشكل ملحوظ العلاقة بين كل من المنفعة المدركة ورضا العملاء من جهة، ونيّة الاستدامة من جهة أخرى، بينما لم يظهر هذا الدور التعديلي في العلاقات الأخرى. **الاستنتاجات:** من خلال الجمع بين نية الاستدامة ورضا العملاء ضمن نموذج تقبّل التكنولوجيا (TAM) وفحص أثر عدم المساواة الرقمية، تقدم هذه الدراسة دليلًا تجريبيًا جديدًا من فلسطين حيث لا تزال الفجوات الرقمية تشكّل عقبة كبرى أمام التحول الرقمي الشامل. وتؤكد الدراسة أن التغلب على الفجوات الرقمية البنيوية يُعد شرطًا أساسيًا للاستفادة الكاملة من إمكانات التكنولوجيا لتحقيق آثار الاستدامة في المناطق النامية والمحرومة رقميًا. **التوصيات:** توصي الدراسة بتوسيع البنية التحتية الرقمية، وخفض تكاليف الإنترنت، وتعزيز المهارات الرقمية لسد الفجوة الرقمية ودعم تبني الخدمات المصرفية الرقمية المستدامة. كما يجب على صناع القرار والبنوك تصميم منصات رقمية شاملة وتوفير دعم مخصص للفئات المحرومة رقميًا.

الكلمات المفتاحية: نية الاستدامة، الفجوة الرقمية، نموذج تقبّل التكنولوجيا (TAM)، رضا العملاء، الظروف الميسرة، التعديل، فلسطين.

1 Department of Business and Economic, Palestine Technical University–Kadoorie, Hebron, Palestine.
Orcid: https://orcid.org/0009-0004-6966-411X
* Corresponding author: omar.shamsti@ptuk.edu.ps,
2 Faculty of Business & Communication, Universiti Malaysia Perlis, Perlis, Malaysia.
3 Department of Business, Faculty of Business & Communication, Universiti Malaysia Perlis, UniCITI Campus, Perlis, Malaysia.

1 كلية الأعمال والاقتصاد، جامعة فلسطين التقنية خضوري، الخليل، فلسطين.
* الباحث المراسل: omar.shamsti@ptuk.edu.ps
2 كلية الأعمال والاتصالات، جامعة ماليزيا برليس، برليس، ماليزيا.
3 قسم الأعمال، كلية الأعمال والاتصالات، جامعة ماليزيا برليس، حرم يونستي، برليس، ماليزيا.

Background

In recent years, models such as the TAM (Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al*., 2003) have become the norm for studying the digital technology adoption process. But scant attention has been given to structural constraints—such as digital inequality—that can significantly influence or hinder the adoption process (van Dijk, 2005). This study fills the gap by introducing the digital divide as a moderating variable, and more specifically, examining how it influences the intentions of citizens to use digital services for sustainability purposes, particularly in the context of digital banking services in Palestinian banks.

The understanding of digital banking services and digital service use has grown exponentially, as substantial evidence points to the fact that both internal drivers and external system factors affect user behavior (Zhou, 2012). These include perceived usefulness, perceived ease of use, and technological affordances. Additionally, demographic traits and users' digital experience mediate the level of use on such platforms (Alalwan *et al*., 2016).

Despite this progress, utilization and access to digital services remain unequal, especially where the digital divide is persistent. In Palestine and similar settings, disparities in ICT infrastructure, high connectivity costs, and insufficient digital skills hinder widespread adoption of advanced digital platforms (UNCTAD, 2024). The divide deprives citizens of equal opportunities to access services such as online banking, e-government platforms, and other digital public services.

While existing work has acknowledged the influence of digital inequality on technology use (Hargittai, 2002), comprehensive models that formally integrate this dimension into mainstream technology adoption frameworks remain scarce. Disadvantaged groups—whether older adults, women, or rural populations—often face challenges in using digital tools due to limited access, skills, or both (Scheerder *et al*., 2017). Moreover, exogenous factors such as market readiness, infrastructure quality, and the regulatory environment considerably shape digital engagement and usage patterns Merhej, K. (2021,).

To address these limitations, this study proposes a modified version of TAM with the digital divide acting as both a direct and moderating variable. Using a case study of banks in Palestine, the model tests how the digital divide moderates the influence of perceived usefulness, ease of use, and facilitating conditions on sustainability intentions. A total of eleven hypotheses are tested to offer a comprehensive account of how structural and perceptual factors jointly drive or constrain digital adoption in resource-constrained environments.

Theoretical Framework

Technology Adoption Model (TAM): TAM is a basic model employed to describe how people accept and utilize new technologies (Davis, 1989). TAM has been advanced since its initial formulation and then incorporated into broader models such as the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al*., 2003). Such advancement has made the model more applicable within various technological settings.

Two most significant predictors of user acceptance at the core of TAM are perceived usefulness and perceived ease of use. Perceived usefulness refers to an individual's belief that using a given system will improve their effectiveness or performance. Perceived ease of use, on the other hand, is concerned with how easy or simple the system is to use (Davis,

ACCEPTED

1989). There is also a direct relationship between these two variables technologies that are seen as easy to use are likely to be perceived as positive (Venkatesh & Davis, 2000).

The other significant factor to the model is facilitating conditions, which entails the availability of technical and organizational infrastructure needed for technology adoption (Venkatesh *et al*., 2003). They range from training and infrastructure to support users, and they play a crucial role in determining usage as well as behavioral intention (Alalwan *et al*., 2016).

This theoretical model explains well digital adoption processes across different contexts, including Palestinian banks, where digital service platforms are being introduced more and more but are unevenly adopted due to varying user familiarity, system support, and digital readiness (UNCTAD, 2024).

Perceived Ease of Use (PE): All previous research has indicated that the perceived ease of use (PEOU) is a strong driver of individuals' intention to use online platforms (Gefen *et al*., 2003) and (Abed & Asmar, 2023). Not only does it drive their intention to use a system, but it also enhances their perception of the usefulness of the system (Pikkarainen *et al*., 2004). This has been established in numerous online service contexts, including banking Kumar, D., & Ayedee, N. (2021).

H1: Perceived ease of use positively and directly affects individuals' usage behavior on digital banking services websites.

H2: Perceived ease of use positively influences users' perceptions of the usefulness of digital banking services systems.

H9: Perceived ease of use indirectly affects digital banking services behavior via its effect on perceived usefulness.

Perceived Usefulness (PU): Perceived usefulness is one of the best researched constructs in the context of the TAM (Shih, 2004). It is a critical determinant of why the people would use it and hence continue to utilize digital technologies (Chau & Hu, 2002). In diverse contexts, users are likely to employ a system where it is perceived that it would highly enhance their performance or productivity (Nasri & Charfeddine, 2012).

H3: The perceived usefulness directly and positively affects digital banking services usage behavior.

Facilitating Conditions (FC): Facilitating conditions are the presence of supportive infrastructure technical, physical, or organizational in the guise of technical facilities, physical facilities, and organizational support which enable smooth interaction with digital platforms (Teo, 2011). They include access to machines, training, customer support, reliable internet connectivity and infrastructure availability (Mansour *et al*., 2025). Although earlier models did not give much importance to this factor, it has been recognized as a critical determinant of ease of use and behavioral intention (Venkatesh *et al*., 2012). After users feel that support is adequate, they are more likely to use and accept digital technology (Abu-Shanab *et al*., 2010).

H4: Facilitating conditions positively influence the ease-of-use perception of the system.

H5: Facilitating conditions directly influence actual usage of digital banking services websites.

H10: Facilitating conditions indirectly affect digital banking services usage behavior since it enhances perceived ease of use.

Customer Satisfaction (CS): Customer satisfaction is in this study, the user's overall evaluation of his/her experience with digital services (Oliver, 1999). It includes whether it is useful, reliable, convenient, and well-taken-care-off from the user's perspective (Kim *et al*., 2009). The digital platform being deemed

ACCEPTED

satisfying or even better than users' expectations make the users more satisfied, with this likely to result in both ongoing use and intention to practice sustainability (Lee, Kozar, & Larsen, 2003).

Sustainability Intention (SI): Sustainability intention involves a user's conscious determination of embracing digital practices in line with environmental sustainability. This may involve choosing paperless digital tools, minimizing face-to-face transactions to reduce environmental impacts (Kanchanapibul *et al*., 2014), or advocating for organizations embracing green digital practices. In essence, SI is an extension of one's wish to act in ways that are favorable to environmental well-being using digital service consumption (Testa *et al*., 2015).

Digital Divide (DD): Digital divide refers to unequal access to digital assets and competence among different groups of individuals, typically according to social, economic, and geographical attributes (van Dijk, 2020). Researchers have categorized the divide into technological access (e.g., infrastructure, ownership of a device) and social access (e.g., literacy, income, education) (Scheerder *et al*., 2017). Not only does the gap affect accessibility but also the quality of competence in being able to effectively use digital platforms (Hargittai, 2002).

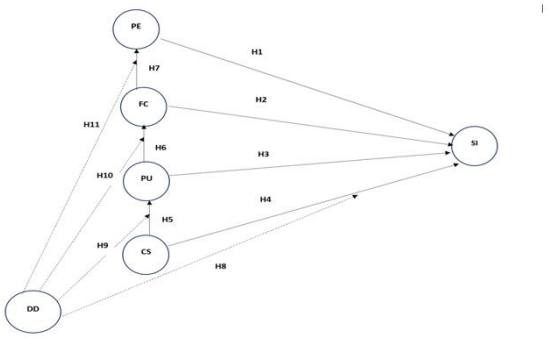
Notably, the awareness of the digital divide can moderate TAM relationships. Individuals lacking infrastructure, capability, or know-how will perceive technologies as more difficult to use and less helpful and therefore be less inclined to adopt them.

H6: Awareness of the digital divide negatively moderates the between perceived ease of use and perceived usefulness.

H7: Awareness of the digital divide negatively moderates the between facilitating conditions and perceived ease of use.

H8: Digital divide perception has a negative moderating effect on the facilitating conditions and digital banking services usage behavior relationship.

H11: Digital divide perception has a direct negative effect on digital banking services usage behavior.



Method

Measurement Tool and Sample: To quantify the digital divide and sustainability intention constructs in digital banking services, the study used a list of validated measurement items drawn from scales that had been tested before (Hair *et al*., 2019). Each construct was quantified on a five-point Likert scale with response categories ranging from 1 (strongly disagree) to 5 (strongly agree). Prior to the administration of the full survey, the pilot test was conducted on a small sample of academic experts for ensuring item clarity, face validity, and relevance (Eslami *et al*., 2022). Some minor changes were incorporated as per their feedback before mailing the final version of the questionnaire.

The final questionnaire was then administered to a sample of 550 respondents, who were selected to reflect a broad range of socioeconomic backgrounds. Several statistical procedures were employed to confirm the reliability and adequacy of the measurement tool. The Kaiser–Meyer–Olkin (KMO) statistic was 0.957, reflecting an excellent level of sampling adequacy. Furthermore, Bartlett's test of sphericity was very significant (χ^2 = 18,740.561, $p < 0.001$), in support of the

ACCEPTED

factorability of the data. Reliability was established through the Intraclass Correlation Coefficient (ICC), which was 0.978, with observed values ranging between 0.975 to 0.980, all of which were statistically significant ($p < 0.001$). Additionally, overall Cronbach's alpha for internal consistency was 0.978, suggesting strong reliability for the elements of the instrument (Tavakol & Dennick, 2011).

Sampling and study design: The research was conducted in the Palestinian banking sector, which is reputed to be one of the strongest adopters of web-based financial services across the Middle Eastern region. The population for the research comprised all the quoted commercial banks on the Palestine Stock Exchange (PSE). For purposes of representation perspective, a simple random sampling technique was applied, with participants being sampled from a mix of bank branches with varying levels of usage and exposure to electronic services. Data collection occurred between March and May 2025, yielding a final sample of 550 fully completed questionaries.

The theoretical model employed here brings together six latent factors: Perceived Ease of Use (PE), Facilitating Conditions (FC), Perceived Usefulness (PU), Customer Satisfaction (CS), Digital Divide (DD), and Sustainability Intention (SI). There were eleven hypotheses (H1–H11) that were examined to examine direct and moderating relationships between these variables (Figure 1).

Table (1): Preliminary Tests for Sample Adequacy, Reliability, and Internal Consistency.

Test	Metric	Value	Sig.
Measure of sampling adequacy statics	KMO	0.957	
	Bartlett χ^2	18740.561	0.00
ICC test reliability	ICC	0.978	
	Min	0.975	0.00
	Max	0.98	0.00
Cronbach's α	0.978		0.00

Statistical Analysis: The analytical approach utilized for this study was Partial Least Squares Structural Equation Modeling (PLS-SEM) due to its efficacy in testing complex, exploratory models, especially where initial theory development is limited. Before structural paths were tested, the 30 questionnaire items representing the study's six latent constructs' descriptive statistics were calculated. The items were scored on a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree).

Analysis further revealed that the highest mean score was in item PU4 (mean = 3.71), which suggested participants had a very positive view of the technology being useful. CS2 was the lowest mean (2.63), suggesting relatively low levels of satisfaction regarding experiences related to customers.

In comparing means to constructs, Sustainability Intention (SI) items showed scores from 2.92 (SI3) to 3.23 (SI5), indicatively of moderately sustainability-oriented attitudes. Scores of Digital Divide (DD) items showed narrow range, with scores of 3.10 (DD1) to 3.16 (DD2). Perceived Ease of Use (PE) construct yielded moderately high means of 3.24 (PE1) to 3.48 (PE4). Conversely, Facilitating Conditions (FC) had more neutral scores with item means between 2.97 (FC2) to 3.22 (FC4). Overall, Perceived Usefulness (PU) was most highly rated among the constructs and Customer Satisfaction (CS) had lower means across the board, 2.63 to 2.80, reflecting points of improvement in users' digital service experience.

Measurement Model Validation: The convergent validity as well as measurement model's reliability was tested with a battery of statistical indices including standardized factor loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) (Fornell & Larcker, 1981). The results indicated that all the construct validity thresholds were fulfilled successfully. In

ACCEPTED

particular, standardized factor loadings for each of the items were more than the minimum accepted as 0.70, with the range being from 0.76 to 0.915, proving that each item captured its respective latent construct highly.

For internal consistency assessment, Cronbach's alpha and composite reliability were also examined. The values of Cronbach's alpha varied from 0.918 to 0.944, which also indicates a high level of internal consistency of the items per construct. Likewise, the composite reliability values varied from 0.918 to 0.945, which also confirms the strength of the internal structure.

Convergent validity was established by the employment of AVE values, which ranged from 0.695 to 0.776 and were all greater than the default cut-off of 0.50. This acts to establish that most of the variance within every item is captured by its own respective construct. In total, these findings establish that the measurement model is statistically sound and psychometrically robust and offers a solid foundation upon which to test the structural model relationships in the second phase of analysis (Table 2).

Table (1): Measurement Model Assessment: Factor Loadings, Internal Consistency, and Convergent Validity.

item	Factor loading > 0.70	Cronbach alpha >.0.70	Composite reliability > 0.70.	Average variance. Extracted > 0.50.
SI1	0.846	0.927	0.927	0.72
SI2	0.821			
SI3	0.838			
SI4	0.875			
SI5	0.857			
DD1	0.833	0.931	0.932	0.732
DD2	0.834			
DD3	0.846			
DD4	0.861			
DD5	0.902			
PE1	0.896	0.938	0.939	0.754
PE2	0.846			
PE3	0.829			
PE4	0.888			
PE5	0.886			
FC1	0.864	0.943	0.943	0.771
FC2	0.866			
FC3	0.876			
FC4	0.887			
FC5	0.891			
PU1	0.872	0.944	0.945	0.776
PU2	0.864			
PU3	0.882			
PU4	0.866			
PU5	0.915			
CS1	0.76	0.918	0.918	0.695
CS2	0.79			
CS3	0.825			
CS4	0.869			
CS5	0.905			

Discriminant validity was evaluated using the Fornell-Larcker criterion, which involves comparing the square root of the Average Variance Extracted (AVE) for each latent construct to its correlations with the other constructs in the model (Fornell & Larcker, 1981). According to the results shown in the matrix, all constructs satisfied this criterion. The figures along the diagonal—representing the square roots of AVE—fell between 0.834

ACCEPTED

and 0.881, and in every case, these were greater than the corresponding inter-construct correlations.

For instance, the square root of AVE for Sustainability Intention (SI) was 0.849, which was higher than its highest correlation with another construct, Digital Divide (DD), at 0.842. Similarly, the AVE square root for Perceived Usefulness (PU) was 0.881, which was higher than its highest correlation at 0.83 with Perceived Ease of Use (PE). These results confirm that each construct is more strongly correlated with its own measurement items than with the items of other constructs, thereby confirming the discriminant validity of the measurement model (Table 3).

Table (2): Fornell-Larcker Criterion for Discriminant Validity

	SI	DD	PE	FC	PU	CS
SI	0.849					
DD	0.842	0.856				
PE	0.809	0.772	0.868			
FC	0.732	0.781	0.685	0.878		
PU	0.777	0.68	0.83	0.72	0.881	
CS	0.594	0.691	0.548	0.746	0.547	0.834

To further enhance the Fornell-Larcker test, discriminant validity was also assessed with Heterotrait-Monotrait Ratio of Correlations (HTMT), which is regarded by many as a better indicator of construct distinctiveness in structural equation modeling (Henseler *et al.*, 2015). Using the conservative cut-off value of 0.85, all HTMT values derived in this study were found to be under acceptable thresholds, providing evidence in favor of discriminant validity of the model.

As an example, the HTMT of Sustainability Intention (SI) and Digital Divide (DD) was 0.842, a shade less than the threshold. Other construct-to-construct comparisons were also way within range, for example, that of Perceived Ease of Use (PE) and Perceived Usefulness (PU) at 0.812, Facilitating Conditions (FC) and Customer Satisfaction (CS) at 0.799, and between PU and CS at 0.583. These results confirm that the constructs are statistically distinct from one another.

Along with the findings of HTMT, results of a Fornell-Larcker test also indicate good discriminant validity, which again validates the overall validity and reliability of the measurement model (Table 4).

Table (3): Heterotrait-Monotrait Ratio (HTMT) of Correlations for Discriminant Validity.

	SI	DD	PE	FC	PU	CS
SI	1					
DD	0.842	1				
PE	0.829	0.825	1			
FC	0.779	0.833	0.725	1		
PU	0.83	0.724	0.812	0.763	1	
CS	0.632	0.747	0.585	0.799	0.583	1

Results

Moderating Effect of the Digital Divide: To examine the moderation role of the digital divide (DD) in the association between salient predictors and sustainability intention (SI), a moderation analysis was conducted using the Partial Least Squares Structural Equation Modeling (PLS-SEM) method (Hair *et al.*, 2017). The two-stage approach was employed in the analysis, which is an appropriate strategy for handling interaction effects in complex models with latent variables.

During the first step, latent scores for all the focal constructs (e.g., Customer Satisfaction (CS), Perceived Usefulness (PU), Facilitating Conditions (FC), and Perceived Ease of Use (PE)) were computed on the basis of the PLS algorithm. During the second step, interaction terms were formed by taking each predictor variable's product with the moderator variable (DD). These newly formed interaction terms were subsequently added to the model to measure their impact on the outcome variable, SI.

This method was chosen over alternatives such as the product indicator method, as it is particularly well-fitted to models where constructs are operationalized reflectively and where there are a lot of interaction terms. It also

ACCEPTED

minimizes problems with multicollinearity and enhances the interpretability of the effects of moderation—especially in contexts such as digital inequality that are characterized by many aspects such as access to infrastructure, digital capability, and socioeconomic barriers.

The results of moderation analysis showed that the digital divide significantly moderated four of the relationships in the model:

• H8 (CS × DD → SI): The interaction of Customer Satisfaction and Digital Divide had a positive and significant effect on Sustainability Intention (β = 0.040, t = 2.47, p = 0.014). This means that among the group with greater digital access and capability, the positive effect of customer satisfaction towards their sustainability intentions is stronger. On the contrary, those who are more digitally excluded may not be capable of converting satisfaction into sustainable action since they have no access to digital platforms or resources.

H9 (PU × DD → SI): Likewise, the cross-interaction of Perceived Usefulness and Digital Divide was also positive and statistically significant (β = 0.036, t = 2.75, p = 0.006). The implication is that technology or service usefulness exerts a stronger effect on sustainability intention for digitally privileged users, but poor digital competency can keep people from getting maximum benefit from or reacting to the perceived usefulness.

H10 (FC × DD → SI): Contrary to expectation, the interaction of Digital Divide and Facilitating Conditions was negatively and significantly related to sustainability intention (β = -0.037, t = -2.31, p = 0.021). This implies that within individuals with more digital exclusion, even when facilitating conditions (i.e., technological support, device availability) are present, these conditions translate less well into long-term behaviors than they do for connected users. The moderating role of DD thus dampens the influence of facilitating conditions on SI in more vulnerable groups.

H11 (PE × DD → SI): In a similar fashion, Perceived Ease of Use and Digital Divide interaction had a significant and negative effect on sustainability intention (β = -0.041, t = -2.05, p = 0.039). This reveals that the more easily one can utilize a system, the more it leads to sustainability intentions—but only when the user is less affected by the digital divide. For low access to digital or skills users, simplicity is not sufficient to trigger sustainability-sensitive actions.

Table (4): Summary of Hypothesis Testing Results for the Structural and Moderation Model.

Hypothesis	Effect	Estimate	Std. Error	t value	P
H1	PE → SI	0.498	0.013	39.68	0.000
H2	FC → SI	0.453	0.015	29.96	0.000
H3	PU → SI	0.502	0.013	39.43	0.000
H4	CS → SI	0.436	0.02	22.21	0.000
H5	CS → PU	0.784	0.032	24.46	0.000
H6	PU → FC	0.854	0.024	36.13	0.000
H7	FC → PE	0.807	0.025	32.69	0.000
H8	CS DD (moderates → SI)	0.040	0.0162	2.47	0.014
H9	PU DD (moderates → SI)	0.036	0.0131	2.75	0.006
H10	FC DD (moderates → SI)	-0.037	0.0160	-2.31	0.021
H11	PE DD (moderates → SI)	-0.041	0.0200	-2.05	0.039

Together, these findings yield core understandings of the contextual nature of digital behavior. While the overarching majority of technology adoption research posits the assumption of a playing field in terms of digital accessibility, this article emphasizes that digital inequality alters the manner in which individuals perceive and react to influential constructs such as satisfaction, usefulness, and ease of use. For marginalized digital publics, even robust usability or satisfaction will not create sustainability intentions without the structural entry barriers to them (like internet access, digital literacy, or socioeconomic status).

ACCEPTED

Theoretically, this examination lends credence to the importance of integrating digital equity into theory regarding behavioral intention and technology adoption. It argues that current models such as the TAM or the Unified Theory of Acceptance and Use of Technology (UTAUT) can be augmented with socio-digital moderators if they are to be applied in heterogeneous real-world contexts—most specifically in developing countries or disadvantaged communities.

Practical Implications and Conclusion

This study extends the TAM by integrating sustainability intention and customer satisfaction, while highlighting the digital divide as a central moderating factor (Venkatesh *et al*., 2003; Davis, 1989). The findings confirm that perceived ease of use, perceived usefulness, facilitating conditions, and customer satisfaction significantly shape individuals' willingness to adopt sustainability-oriented digital services. However, the digital divide consistently moderates these effects, suggesting that digital inequality not only impedes access but also undermines technology's ability to drive sustainable behavior (Wei *et al*., 2011; Pick & Nishida, 2015).

The implications are substantial for policymakers, telecom providers, and development agencies. The digital divide mediates the relationship between technology acceptance constructs and sustainability intention (UNCTAD, 2022a), reinforcing that equitable digital access is foundational for broader sustainable development goals (Ghobadi & Ghobadi, 2015; Bon *et al*., 2023). Expanding digital infrastructure, lowering costs, and promoting digital literacy are critical to enhancing participation, particularly for marginalized and rural communities (Wang, 2013; UNCTAD, 2022b).

Further, platform providers should design user interfaces and technical support systems that are inclusive and adaptable to the needs of digitally excluded users, ensuring both accessibility and usability. Such approaches not only enable broader access but empower users to act in environmentally responsible ways via digital platforms (Bon *et al*., 2023).

This study's results offer valuable insights for bridging digital divides and promoting digital sustainability. Facilitating conditions—such as infrastructure reliability and technical support—are strongly affected by users' perceived digital access (Lankton *et al*., 2014). Thus, targeted interventions are essential to ensure that technology adoption is equitable and sustainable across socio-economic contexts (Pick & Nishida, 2015).

Nonetheless, this research is not without limitations. The cross-sectional design limits causal interpretations. Future research should incorporate longitudinal methods to track digital behavior over time. Additionally, self-reported data introduces potential bias; triangulating with behavioral metrics or mixed-methods approaches could provide more robust validation. Finally, as the study focused on the Palestinian banking sector, its generalizability may be constrained. Expanding the analysis to other regions or industries would strengthen external validity (UNCTAD, 2022b).

Despite these limitations, the study contributes to academic and policy discussions by revealing how digital inequality intersects with technology acceptance and sustainable behavior. It charts a pathway toward equitable and inclusive technology policy development that supports both digital empowerment and environmental sustainability.

List of Abbreviations

TAM: Technology Acceptance Model

UTAUT: Unified Theory of Acceptance and Use of Technology

ACCEPTED

PE / PEOU: Perceived Ease of Use

PU: Perceived Usefulness

FC: Facilitating Conditions

CS: Customer Satisfaction

SI: Sustainability Intention

DD: Digital Divide

PLS-SEM: Partial Least Squares Structural Equation Modeling

- KMO: Kaiser–Meyer–Olkin
- ICC: Intraclass Correlation Coefficient
- AVE: Average Variance Extracted
- CR: Composite Reliability
- HTMT: Heterotrait–Monotrait Ratio of Correlation

Disclosure Statement

The authors declare that they have no relevant or material financial interests that relate to the research described in this paper

- **Ethical approval and consent to participate:** The ethical requirements were upheld rigorously throughout the research process. The research was endorsed by the Research Ethics Committee of Palestine Technical University – Kadoorie with approval number PTUK–2025-04. The participants were informed in detail about the objectives of the study, promise of confidentiality, and their right to withdraw from participation at any point in time. Electronic informed consent was obtained from all the respondents prior to the administration of the questionnaire.
- **Availability of data and materials:** The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.
- **Author contribution:** All authors listed have contributed to the work and approved it for publication. O.A. conceptualized the study, conducted the literature review, performed the statistical analysis, and drafted the manuscript. N.A.I. supervised the research, contributed to model development, and provided critical revisions to the manuscript. J.Z.A. assisted in data collection, interpretation of findings, and manuscript editing and finalization. The authors read and approved the final manuscript.
- **Conflict of interest:** The authors declare that they have no competing interests.
- **Funding:** The authors declare that this research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.
- **Acknowledgments:** The authors would like to thank Universiti Malaysia Perlis, Palestine Technical University – Kadoorie, and all stakeholders involved for their support throughout the research process.

Open Access

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit https://creativecommons.org/licenses/by-nc/4.0/

ACCEPTED

References

- Abed, H., & Asmar, M. (2023). E-Recruitment in Palestine: A study into applicant perceptions of an online application system. *An-Najah University Journal for Research - B (Humanities), 37*(6), 1205–1230. https://doi.org/10.35552/0247.37.6.2027
- Abu-Shanab, E., Pearson, J. M., & Setterstrom, A. J. (2010). Internet banking and customers' acceptance in Jordan: The unified model's perspective. *Communications of the Association for Information Systems, 26*(1), 23. https://doi.org/10.17705/1CAIS.02623
- Alalwan, A. A., Dwivedi, Y. K., & Rana, N. P. (2016). Factors influencing adoption of mobile banking by Jordanian bank customers: Extending UTAUT2 with trust. *International Journal of Information Management, 37*(3), 99–110. https://doi.org/10.1016/j.ijinfomgt.2017.01.002
- Bon, A., Saa-Dittoh, F., & Akkermans, H. (2023). Bridging the Digital Divide. In Introduction to Digital Humanism. Springer. https://link.springer.com/chapter/10.1007/978-3-031-45304-5_19
- Chau, P. Y. K., & Hu, P. J.-H. (2002). Investigating healthcare professionals' decisions to accept telemedicine technology: An empirical test of competing theories. *Information & Management, 39*(4), 297–311. https://doi.org/10.1016/S0378-7206(01)00098-2
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008
- Eslami, S. P., Ghasemaghaei, M., & Hassanein, K. (2022). Understanding consumer engagement in social media: The role of product lifecycle. *Decision Support Systems, 162*, 113707. https://doi.org/10.1016/j.dss.2021.113707
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.1177/002224378101800104
- Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly, 27*(1), 51–90. https://doi.org/10.2307/30036519
- Ghobadi, S., & Ghobadi, Z. (2015). How access gaps interact and shape digital divide: A cognitive investigation. *Behaviour & Information Technology, 34*(4), 330–340. https://doi.org/10.1080/0144929X.2013.833650
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Sage Publications.
- Hargittai, E. (2002). Second-level digital divide: Differences in people's online skills. *First Monday, 7*(4). https://doi.org/10.5210/fm.v7i4.942
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*, 115–135. https://doi.org/10.1007/s11747-014-0403-8
- Kanchanapibul, M., Lacka, E., Wang, X., & Chan, H. K. (2014). An empirical investigation of green purchase behavior among the young generation. *Journal of Cleaner Production, 66*, 528–536.

ACCEPTED

https://doi.org/10.1016/j.jclepro.2013.10.062

– Kim, M. J., Chung, N., & Lee, C. K. (2009). The effect of perceived trust on electronic commerce: Shopping online for tourism products and services in South Korea. *Tourism Management, 30*(3), 405–413. https://doi.org/10.1016/j.tourman.2010.01.011

– Kumar, D., & Ayedee, N. (2021). Technology adoption: A solution for SMEs to overcome problems during COVID-19. Vision: *The Journal of Business Perspective, 26*(1), 1–14. https://doi.org/10.1177/0972262921106056 5

– Lankton, N., McKnight, D. H., & Thatcher, J. B. (2014). Incorporating trust-in-technology into Expectation Disconfirmation Theory. *The Journal of Strategic Information Systems, 23*(2), 128–145. https://doi.org/10.1016/j.jsis.2013.09.001

– Lee, Y., Kozar, K. A., & Larsen, K. R. T. (2003). The technology acceptance model: Past, present, and future. *Communications of the Association for Information Systems, 12*, 752–780. https://doi.org/10.17705/1CAIS.01250

– Mansour, T. M., & Mansour, H. T. (2026). Employing Digital Marketers' Use of Artificial Intelligence in Jordanian Construction Companies: An Analytical Study within the UTAUT Framework. *An-Najah University Journal for Research - B (Humanities), 40*(3), 2571. https://doi.org/10.35552/0247.40.3.2571

– Merhej, K. (2021,). *Digital Transformations in the Middle East and North Africa: A review of Egypt, Saudi Arabia, and the United Arab Emirates* (Working Paper No. 54). Issam Fares Institute for Public Policy and International Affairs, American University of Beirut. https://www.aub.edu.lb/ifi/Documents/publications/working_papers/2020-2021/20210401_Digital_Transformations_working_paper.pdf

– Nasri, W., & Charfeddine, L. (2012). Factors affecting the adoption of Internet banking in Tunisia: An integration theory of acceptance model and theory of planned behavior. *The Journal of High Technology Management Research, 23*(1), 1–14. https://doi.org/10.1016/j.hitech.2012.03.001

– Oliver, R. L. (1999). Whence consumer loyalty? *Journal of Marketing, 63(Special Issue)*, 33–44. https://doi.org/10.1177/00222429990634s105

– Pick, J. B., & Nishida, T. (2015). Digital divides in the world and its regions: A spatial and multivariate analysis of technological utilization. *Technological Forecasting and Social Change, 91*, 1–17. https://doi.org/10.1016/j.techfore.2013.12.026

– Pikkarainen, T., Pikkarainen, K., Karjaluoto, H., & Pahnila, S. (2004). Consumer acceptance of online banking: An extension of the Technology Acceptance Model. *Internet Research, 14*(3), 224–235. https://doi.org/10.1108/10662240410542652

– Scheerder, A., van Deursen, A., & van Dijk, J. (2017). Determinants of Internet skills, uses and outcomes. *A systematic review of the second- and third-level digital divide. Telematics and Informatics, 34*(8), 1607–1624. https://doi.org/10.1016/j.tele.2017.07.007

– Shih, Y.-Y. (2004). An empirical study on predicting user acceptance of e-shopping on the Web. *Information & Management, 41*(3), 351–368.

ACCEPTED

https://doi.org/10.1016/S0378-7206(03)00079-X

- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 2*, 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd
- Teo, T. (2011). Factors influencing teachers' intention to use technology: Model development and test. *Computers & Education, 57*(4), 2432–2440. https://doi.org/10.1016/j.compedu.2011.06.008
- Testa, F., Iraldo, F., Vaccari, A., & Ferrari, E. (2015). Why eco-labels can be effective marketing tools: Evidence from a study on Italian consumers. *Business Strategy and the Environment, 24*(4), 252–265. https://doi.org/10.1002/bse.1821
- UNCTAD. (2022). *Developments in the economy of the Occupied Palestinian Territory*. United Nations Conference on Trade and Development. https://unctad.org/system/files/official-document/tdb71_d3_en.pdf
- UNCTAD. (2022a). *Technology and Innovation Report 2021: Catching Technological Waves*. United Nations Conference on Trade and Development. https://unctad.org/webflyer/technology-and-innovation-report-2021
- UNCTAD. (2022b). *Developments in the economy of the Occupied Palestinian Territory*. United Nations Conference on Trade and Development. https://unctad.org/system/files/official-document/tdb71_d3_en.pdf
- UNCTAD. (2024). *Developments in the economy of the Occupied Palestinian Territory*, United Nations Conference on Trade and Development. https://unctad.org/system/files/official-document/tdb71_d3_en.pdf
- Van Dijk, J. (2005). *The deepening divide: Inequality in the information society*. SAGE Publications. https://doi.org/10.4135/9781452229812
- Van Dijk, J. A. G. M. (2020). *The digital divide* (4th ed.). Polity Press.
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science, 46*(2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478. https://doi.org/10.2307/30036540
- Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly, 36*(1), 157–178. https://doi.org/10.2307/41410412
- Wang, P.-Y. (2013). Examining the Digital Divide between Rural and Urban Schools: Technology Availability, Teachers' Integration Level and Students' Perception. *Journal of Curriculum and Teaching, 2*(2). https://doi.org/10.5430/jct.v2n2p127
- Wei, L., Teo, H. H., Chan, H. C., & Tan, B. C. Y. (2011). Conceptualizing and testing a social cognitive model of the digital divide. *Information Systems Research, 22*(1), 170–187. https://doi.org/10.1287/isre.1090.0273
- Zhou, T. (2012). Examining mobile banking user adoption from the perspectives of trust and flow experience. *Information Technology and Management, 13*(1), 27–37. https://doi.org/10.1007/s10799-011-0111-8

ACCEPTED