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Advancing ESG through FinTech in the MENA region: The Role of Sustainable Financial Behaviour and Digital Financial Literacy

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ABSTRACT:
Financial technology (FinTech) is rapidly transforming. It presents new opportunities to promote sustainability, but the behavioural mechanisms through which digital finance can help achieve environmental, social and governance (ESG) outcomes remain poorly understood. This study aims to explore the contribution of Sustainable Financial Behaviour (SFB) to ESG through FinTech adoption and Digital Financial Literacy (DFL). Based on the behaviour approach to sustainable digital finance, the study proposes a sustainable digital finance model and empirically investigates it. The data are gathered using a structured questionnaire and analysed using partial least squares structural equation modelling (PLS-SEM). The findings reveal that the DFL has a significant positive effect on SFB, and that FinTech adoption also has a positive effect on SFB. The interpretation of SFB is related to ESG; there is a strong positive correlation between them. The mediation analysis shows that SFB fully mediates the relationships between DFL, FinTech, and ESG. In addition, DFL significantly affects the link between FinTech adoption and SFB, but in a negative direction: the greater the level of digital financial literacy, the smaller the marginal behaviour contribution of FinTech adoption. The moderated mediation effect, however, is not statistically significant. The results reveal that the sustainability impact of FinTech is not only tied to technological adoption but also to users' digital financial skills and their capacity to convert digital financial opportunities into sustainable financial behaviours. This study fits into the newly developing body of literature on the FinTech–ESG nexus by focusing on individual financial behaviour as a focal point of the relationship between digital finance and sustainability, and provides implications for the design of FinTech products, financial institutions and policy makers wishing to ensure digital finance aligns with the objectives of sustainable finance.

Keywords: FinTech adoption; digital financial literacy; sustainable financial behaviour; ESG; sustainable finance; digital finance; MENA region; PLS-SEM

1. Introduction

The rapid digitalisation of financial services is revolutionising the way individuals access, manage, and allocate financial resources. The increasing digitisation of financial services in the FinTech industry, such as payments, mobile banking, and digital investment platforms, has opened new possibilities for financial inclusion and efficiency. Concurrently, the sustainability aspects of digital finance have come to the fore, as financial systems are now expected to contribute to broader environmental, social, and governance (ESG) goals. Some recent studies show that digital finance and FinTech can play a positive role in boosting ESG performance by facilitating green innovation, alleviating financing pressures, and improving monitoring systems (Mu et al., 2023; Ren et al., 2023; Gao et al.,

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2024). However, most of this literature has focused on firm-level outcomes of ESG, while the behavioural aspects of digital finance have been comparatively under-researched. This is significant given that the sustainability impacts of digital finance will ultimately depend on the available technologies and on their uptake and use by individuals. While access to technology can help make financial services more accessible and convenient, it does not necessarily mean these services are offered responsibly or sustainably. People need to be knowledgeable and skilled in digital financial products, financial resources, risk assessment, and decision-making. Digital financial literacy (DFL) is an important capability in this regard, as it combines technological access and financial behaviour. Recent studies provide evidence of a strong link between digital financial literacy and financial behaviour, and increasingly with decisions regarding sustainability-related finance (Abdallah et al., 2025; D'Ignazio et al., 2025). The findings indicate that the sustainability of digital finance can depend significantly on end users' understanding and ability to use digital financial technologies.

When it comes to sustainable financial behaviour (SFB), the need for this ability is even more apparent. However, making financial services more sustainable is not enough; people need to transform financial information and technology into sustainable financial behaviours. The implications of saving, investing, spending, and other financial decisions for sustainability can be broader. Thus, understanding the behavioural mechanism linking digital finance and ESG is key to understanding how technological innovation affects ESG outcomes. Prior research has explored the link between digital finance and ESG at the organisational level (Mu et al., 2023; Ren et al., 2023; Gao et al., 2024), but little has examined the explanatory power of individual sustainable financial behaviour. This is particularly timely in the Middle East and North Africa (MENA) region, where financial-sector digitalisation is also underway alongside a wide range of economic diversification and sustainable-development plans. While there are significant differences across the region in financial market development, digital infrastructure, financial inclusion, and regulatory frameworks, the spread of digital financial services presents an opportunity to link financial sector innovation with sustainability. Meanwhile, a lack of digital financial literacy among users could constrain FinTech's sustainability gains, which could otherwise help increase access. Meanwhile, users' inability to develop their digital financial skills could have the opposite effect, reducing the sustainability gains of FinTech that could enhance access. In emerging markets, it is essential to understand how technology, financial capability, and behaviour interact if markets are to ensure that digital transformation is connected to the ESG and sustainable finance agenda.

Although existing ESG research has predominantly examined firm-level practices, governance mechanisms, and organisational performance, a complementary individual-level perspective is important because sustainability outcomes are also shaped by consumers' and financial users' everyday financial decisions. Individual choices regarding saving, spending, borrowing, investing, and using digital financial services can influence the demand for responsible financial products and the allocation of financial resources (Din et al., 2022). Thus, examining sustainable financial behaviour provides explanatory value beyond firm-level ESG studies by focusing on the behavioural processes through which individuals may translate digital financial capabilities into sustainability-oriented financial decisions. This perspective is particularly relevant in the context of FinTech,

where digital platforms increasingly mediate individuals' financial choices. Building on this perspective, the present study advances behavioural sustainable-finance research by proposing a mechanism-based framework rather than simply combining previously examined constructs. Specifically, the model conceptualises FinTech adoption and digital financial literacy as behavioural and capability-related antecedents, while sustainable financial behaviour serves as the mechanism by which these factors are associated with ESG-oriented outcomes. Digital financial literacy is further examined as a boundary condition that may alter the relationship between FinTech adoption and sustainable financial behaviour. This framework, therefore, connects technological access, individual financial capability, behavioural responses, and sustainability-oriented outcomes within a single explanatory structure. In doing so, the study extends existing research by explaining not only whether FinTech and digital financial literacy are associated with sustainable outcomes, but also how and under what conditions these associations may emerge through individual financial behaviour.

Amid the vast literature on FinTech, financial literacy, and sustainability, a significant gap remains between theory and practice. Previous studies have tended to either explore the direct link between ESG and digital finance or isolate digital financial literacy and financial behaviour. Much less is known about the causal relationship between sustainable financial behaviour, FinTech adoption, and ESG. Furthermore, the relationship between digital financial literacy and its impact could be negative rather than positive. People with higher DFL scores may gain more from using FinTech, but they will also rely less on the behavioural aspects of digital financial technologies. This raises an important question: whether DFL enhances or detracts from the link between FinTech adoption and sustainable financial behaviour. In this context, this study proposes an integrated behavioural model that connects FinTech Adoption (FA), Digital Financial Literacy (DFL), Sustainable Financial Behaviour (SFB) and ESG. Specifically, the study investigates whether the adoption of FinTech and the DFL impact sustainable financial behaviour; whether sustainable financial behaviour is an intervening variable between FinTech adoption and ESG; and whether the DFL moderates the relationship between FinTech adoption and SFB. The framework is not only technology-based but also considers how technological opportunity, individual capability, and financial behaviour can collectively influence sustainability outcomes.

The study contributes to the field of research in three main ways. First, it adds to the growing FinTech–ESG literature, which has largely focused on the outcomes of FinTech and ESG, rather than the individual behavioural underpinnings of ESG-oriented finance. Second, it defines sustainable financial behaviour as a possible link among the adoption of FinTech, digital financial literacy, and ESG, and it links two streams of research that have largely remained separate. Third, it investigates the boundary condition of digital financial literacy by assessing whether the relationship between FinTech adoption and sustainable financial behaviour varies across levels of digital financial capability. The study presents a more nuanced explanation of how digital finance can support sustainability. The study thus poses the question of how FinTech adoption and DFL influence ESG and whether DFL could moderate the connection between FinTech adoption and SFB. The study answers this question and offers implications for financial

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institutions, FinTech service providers, policymakers, and other stakeholders on how to align digital financial transformation with ESG goals.

2. Literature Review and Hypothesis Development

This study mainly relies on the Theory of Planned Behaviour (TPB) and the financial capability perspective to examine how they believe digital financial technologies can translate into sustainability-oriented financial outcomes. In line with this, TPB suggests that attitudes, subjective norms, and perceived behavioural control influence behaviour, with perceived behavioural control being especially important when the person must possess the capability and resources to engage in the behaviour (Ajzen, 1991). As people navigate a digital financial world, they are increasingly making financial decisions using technologies that demand both financial literacy and digital skills. The financial capability perspective builds on TPB, with the key idea that there is a difference between opportunities and a person's capability to use them. Financial knowledge is a significant component of human capital, as it influences savings, investments, loans and other financial actions (Lusardi & Mitchell, 2014). Digitalisation extends this requirement, as consumers now must deal with technologically mediated financial products, digital information, and new types of financial risk. Accordingly, Koskelainen et al. (2023) identify three themes at the intersection of digitalisation and financial capability, all of which are connected to FinTech: financial behaviour in digital environments, financial capability, and behavioural interventions. These are theoretical logics used in the present model. The technological opportunity is how people engage with and use the financial system; sustainable financial behaviour is how they use that opportunity, and ESG contribution is the outcome of sustainable financial behaviour. In the current context, digital financial literacy is presented as a boundary condition that can enhance the sustainability of financial behaviour through the adoption of FinTech. As a result, the model does not assume that technology is inherently sustainable. Rather, it suggests that user behaviour and users' ability to navigate digital financial worlds effectively are also significant factors in determining the sustainability value of FinTech.

2.1 Digital Financial Literacy and Sustainable Financial Behaviour

Digital financial literacy (DFL) is defined as the knowledge, skills, awareness, attitudes and capabilities needed to access, understand, analyze and make safe and effective use of digitally delivered financial products and services. In recent times, DFL has been understood as a multidimensional phenomenon, building on conventional financial literacy by incorporating the digital skills needed to operate in digital financial contexts (Tan et al., 2026). In terms of financial capability, those who value financial knowledge and skills are more likely to take advantage of available financial opportunities when making financial decisions (Lusardi & Mitchell, 2014). These skills are especially significant in a digital financial world, as people need to be able not only to grasp financial concepts but also to assess digital risks, compare services, and make informed choices when utilising a technology-enabled financial product. The link between digital financial literacy and financial behaviour is supported by recent empirical evidence. For instance, in a study conducted in Kuwait, Abdallah et al. (2025) identified a strong relationship between digital

financial literacy and financial knowledge, awareness, and financial decision-making. In the same way, Chhillar et al. (2025) found a strong link between DFL and PFMB; they concluded that digital financial skills could be a driver in achieving better financial practices. The findings also reveal that users of FinTech services are more likely to exhibit positive saving habits if financial literacy is high, a finding that can be connected to the ability of financial literacy to shape financial behaviours (Başar et al., 2025; Bashir et al., 2024).

Especially in sustainable finance, the importance of DFL is becoming increasingly apparent. Based on survey data from over 5,000 Italian households, Mazzoli and Baiocco (2025) conclude that higher levels of digital financial literacy were positively correlated with holdings of sustainable investments, particularly among people with higher digital skills. This implies that education and digitisation in financial fields can help to translate financial opportunities into more sustainable financial decisions. Moreover, a recent study of 53 studies has found a link between DFL and financial behaviour and individual financial well-being, reinforcing its importance as a key personal financial capability (Tan et al., 2026). The same relationship is evident in the context of Saudi Arabia. Al-Ghazali et al. (2025) identified digital financial literacy as a key driver of FinTech adoption in Saudi Arabia, highlighting the importance of users' knowledge and skills in the evolving digital financial landscape. This is also reflected in more recent evidence from young people in Saudi Arabia, which demonstrates the role of digital financial literacy in the relationship between FinTech use and personal financial health (Chabchoub & Smaoui, 2026).

Taken together, it seems reasonable to conclude that those with higher digital financial literacy can better comprehend financial opportunities, evaluate digital risks, consider financial alternatives, and make informed financial decisions. These are expected to ease financial behaviour towards greater sustainability. Thus, the study suggests:
H1: Digital financial literacy positively influences sustainable financial behaviour.

2.2 FinTech adoption and sustainable financial behaviour

FinTech has revolutionised financial services by making them more accessible, convenient, faster, and more informative. Digital banking and mobile payments, electronic investment platforms, and other technology-driven financial services enable people to conduct economic transactions without geographical or transactional restrictions. Based on a systematic review of 42 peer-reviewed studies, Abis et al. (2025) conclude that implications for financial inclusion are a key pathway through which FinTech can enhance the accessibility, use, and quality of financial products and services. Furthermore, the MENA region serves as an example of a region where digital finance is important. Analysing 12 MENA countries between 2004 and 2020, Al-Smadi (2023) finds that digital finance has a strong positive impact on improving financial inclusion by increasing access, availability and usage of financial services. This discovery confirms that digital financial technologies have the potential to change people's financial opportunities in the regional context. However, having access to technology does not mean financial habits will be desirable. Digital financial services have the potential to support responsible saving and financial management, as well as to facilitate and accelerate consumption, borrowing, and investment. Consequently, the behaviour outcomes will depend, in part, on the use of technology.

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Recent individual-level evidence is of special significance. Based on over 30,000 people from 12 countries, Başar et al. (2025) report that fintech users are more inclined to increase their saving rates – a trend that is even more pronounced for fintech users with higher financial literacy. This discovery is significant because it supports the idea that FinTech can help foster positive financial habits but also indicates that the technology's behaviour depends on users' capabilities. More directly, Idrus et al. (2026) studied 315 active FinTech users and concluded that FinTech adoption is not directly linked to sustainable financial behaviours; financial literacy and financial inclusion serve as important mechanisms linking FinTech to such behaviours. In no way does this finding undermine a positive relationship between FinTechs and behaviour; rather, it points to the need to examine how and when such a relationship can occur. In view of the technological possibilities enabled by FinTech and the growing evidence on its behavioural effects, the research suggests the following:

H2: FinTech adoption positively influences sustainable financial behaviour.

2.3 Sustainable financial behaviour and ESG contribution

The traditional domain of ESG studies is related to organisations, financial institutions, and investment portfolios. However, with the increasing digitisation of personal finances, individual financial behaviour should be given sufficient consideration in sustainability research. Individuals' saving, consumption, borrowing and investment choices may affect the demand for specific financial products and the distribution of financial resources. Sustainable financial behaviours can then be seen as financial decision-making that takes into account responsible, informed, and long-term perspectives, including environmental and social impacts. It is not just about an organisational outcome of ESG; it is about a behavioural connection between financial activity and sustainability. This behavioural approach has been confirmed by recent research. Using PLS-SEM, Kamara et al. (2026) test the hypothesis that sustainable financial behaviour mediates the relationship between digital financial literacy and green consumer behaviour among 500 consumers in Sierra Leone. Their findings show that moving from financial capability to sustainability outcomes can be facilitated by sustainable financial behaviour.

Previous research has also highlighted the importance of individual awareness and behavioural engagement in translating sustainability objectives into practical outcomes (Javeed et al., 2022). Recent evidence-based research further underscores the importance of understanding sustainability from an integrated perspective that links individual and societal factors to broader sustainable development outcomes (Javeed et al., 2026). Research on sustainable investing also shows that personal finance skills can influence sustainable investing-related financial decisions. Employing a representative sample of over 5,000 Italian households, Mazzoli and Baiocco (2025) also find that higher levels of digital financial literacy are associated with a greater propensity to hold sustainable investments, especially among those with higher levels of digital skills. While these studies do not measure the same construct as the present study's ESG contribution measure, they nonetheless provide a solid theoretical foundation for linking individual financial actions to broader sustainability outcomes. Financial choices are now more than ever made based on a policy. The products, services, and investments now receive increasing financial support based on financial choices made, in accordance with a policy. As a result, there

should be a correlation between financial sustainability and people's understanding and promotion of the ESG aspects of digital financial services. Therefore, there is a relationship between understanding and promotion of ESG aspects of digital financial services and financial sustainability. Thus:
H3: Sustainable financial behaviour positively influences ESG contribution.

2.4 Digital Financial Literacy, FinTech Adoption and Sustainable Financial Behavior Relationship

In addition to playing a direct role in sustainable financial behaviour, digital financial literacy could also affect individuals' ability to translate FinTech implementation into financial behaviour. Access to a digital financial service does not guarantee positive financial outcomes from a financial capability perspective; users need the knowledge and skills to assess and use it correctly. Therefore, it is possible to regard DFL as a boundary condition which influences the relationship between FinTech adoption and sustainable financial behavior instead of as a mediating mechanism. This is consistent with evidence that the behavioural impact of FinTech may be contingent on users' financial capacity. A positive relationship between saving behaviour and the use of FinTech was found by Başar et al. (2025), and this relationship was more pronounced among those with higher financial literacy. Likewise, Mazzoli and Baiocco (2025) found that the relationship between DFL and sustainable investment behaviour was stronger among those with high digital skills. The results indicate that financial literacy might shape the relationship between access to digital financial services and users' financial practices.

Further support to consider DFL as a conditioning factor is provided by the Saudi Arabian context. Besides technological availability, Al-Ghazali et al. (2025) also highlight that educational and behavioural capabilities are key factors influencing the adoption of FinTech in Saudi Arabia, positioning DFL as a key element in the effective utilisation of digital financial services. Similarly, Chabchoub and Smaoui (2026) highlight the linkages between the use of FinTech, digital financial literacy, trust and individual financial well-being among the young Saudi consumers. The current research investigates whether these relationships between FinTech adoption and sustainable financial behaviour differ by users' DFL levels. In theory, higher DFL could also affect users' use of FinTech tools, as highly knowledgeable financial professionals could make financial decisions, assess risks, and evaluate financial alternatives without relying so heavily on FinTech platforms' technological features. Hence, DFL can serve as a boundary condition for the relationship between FinTech behaviour and the FinTech-behaviour relationship.
H4: Digital financial literacy moderates the relationship between FinTech adoption and sustainable financial behaviour.

2.5 Sustainable Financial Behaviour as a Mediating Mechanism

Digital financial literacy equips individuals with the knowledge and skills to understand, assess, and utilise digital financial services effectively, but it doesn't always translate directly into sustainable financial outcomes. The financial capability approach holds that outcomes are determined by people's ability to use knowledge and skills in real-life financial decisions (Lusardi & Mitchell, 2014). From a digital finance perspective, this means that digital financial literacy can build the ability to make more informed financial decisions, and that sustainable financial behaviour is the behavioural process by which this

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ability can be realised in an ESG-oriented financial outcome. There is empirical evidence of this path to behavior in recent years. Mazzoli and Baiocco (2025) identified a positive association between digital financial literacy and sustainable investment holdings, particularly among individuals with high levels of digital skills. Likewise, a recent study found that digital financial literacy is correlated with personal financial management behaviour, indicating that digital financial skills can influence personal financial management and financial decisions (Chhillar et al., 2025). Moreover, the behavioural pathway is also significant in recent studies on the relationship between digital financial skills and sustainability-related outcomes. Kamara et al. (2026) demonstrate that sustainable financial behaviour acts as an intervening factor between digital financial literacy and sustainability-related consumer outcomes, and how financial competencies can be translated into more general sustainability-related behaviours via financial practices. Similarly, recent research on sustainable financial behaviour confirmed that while using FinTech products can support sustainable financial awareness and decision-making, the role of behavioural processes in the link between financial digital capabilities and sustainable outcomes was emphasised (Sönmez Soydaş et al., 2026). This study indicates that technological availability and financial competence can be necessary but not sufficient conditions for achieving sustainability outcomes if they are not translated into people's financial practices.

The proposed mediation is also consistent with the broader FinTech–ESG literature. FinTech can support sustainability in the following ways: by enabling information processing, enhancing transparency, expanding access to financial services, reducing transaction costs, and providing sustainability-related financial products. Both Gao et al. (2024) and Wang et al. (2024) suggested a positive relationship between FinTech development and improved company ESG performance. Abu alim and Mansour (2026) investigated the relationship between FinTech adoption and the ESG performance of listed banks across 11 MENA countries and concluded that there was a positive association between the two, with corruption risk partially mediating this relationship in the MENA context. They showed that FinTech may impact ESG outcomes through an intermediate effect, rather than directly through technical effects. But these studies mainly focus on organisational/institutional ESG outcomes. In the present study, we take this approach, focus on individual ESG outcomes, and suggest sustainable financial behaviour as a behavioural mechanism through which digital financial literacy can drive these outcomes. Sustainable financial behaviour is relevant because, at the individual level, the financial outcomes stemming from ESG considerations depend on it. Financial products and their use, the choice of spending, saving, and borrowing, and even investment decisions can reflect environmental, social, and governance considerations. Therefore, digital financial literacy might be defined as the ability to cognitively and technologically assess financial options, and sustainable financial behaviour as the use of such ability in financial decision-making. This is significant because knowledge by itself does not guarantee sustainability outcomes unless applied in practice. Recent evidence also indicates that financial literacy can support sustainable financial decision-making when people have the capacity to translate financial knowledge into action (Mazzoli & Baiocco, 2025; Tan et al., 2026; Xin et al., 2023).

The proposed mechanism is different from other explanations, such as financial inclusion, trust, governance, and transparency. Financial inclusion is primarily about an individual's access to and participation in financial services, while trust concerns confidence in digital technologies, financial institutions, and financial service providers. Governance and transparency are primarily institutional mechanisms by which organisations provide information, manage risk and are accountable. Sustainable financial behaviour, on the other hand, reflects the individual-level behavioural process through which digital financial capabilities translate into sustainable financial decisions. This difference aligns with findings that the adoption of FinTech does not consistently lead to beneficial financial behaviours, and that financial literacy and skills can influence the outcomes of such behaviours in the context of digital financial services (Khan et al., 2022; Idrus et al., 2026). As such, this study suggests that digital financial literacy affects ESG-oriented outcomes, which, in turn, are mediated by sustainable financial behaviour. The intended sequence can thus be summarised as: digital financial literacy – sustainable financial behaviour – contribution to ESG. Digital financial literacy is a person's ability to comprehend and assess digitally provided financial opportunities; sustainable financial behaviour is the application of that ability; and ESG contribution is the resulting sustainability-oriented financial outcome. The sustainable financial behaviour, in turn, theoretically establishes a meaningful behavioural link between digital financial capability and ESG-oriented outcomes. Considering this, the following is hypothesised:
H5: Sustainable financial behaviour mediates the relationship between digital financial literacy and ESG contribution.

2.6 FinTech Adoption, Sustainable Financial Behaviour, and ESG Contribution

The use of FinTech can help achieve sustainability goals by increasing financial access, streamlining information processing, reducing transaction costs, and enabling novel forms of financial participation. At the personal level, however, the sustainability effects of FinTech are not only related to access to digital financial technologies but also to their utilisation in personal financial decision-making. Sustainable financial behaviour is thus a crucial behavioural mechanism to consider when thinking about how FinTech adoption can become an outcome of ESG. Current studies have shown a positive correlation between FinTech and sustainability. Gao et al. (2024) demonstrated that FinTech development positively affects corporate ESG performance; Wang et al. (2024) found that FinTech development can reduce companies' carbon emissions through mechanisms such as green innovation and energy efficiency. More recently, Abu alim and Mansour (2026) found a positive relationship between FinTech adoption and the ESG performance of listed banks across MENA countries and identified corruption risk as a mediator. The results prove that the sustainability impacts of FinTech can be mediated by intermediate processes. This literature, however, is primarily concerned with organisational outcomes and offers little insight into how adoption of FinTech can influence individual financial decisions regarding sustainability. The sustainability consequences of financial development are not necessarily uniformly positive; evidence from developing countries indicates that it can also be associated with environmental degradation, highlighting the importance of how financial resources are directed towards sustainable activities (Jamil et al., 2023).

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The behavioural aspect is important, as the opportunities created by FinTech allow people to make payments, save, invest, borrow, and manage their financial resources digitally, but this does not necessarily translate into financial behaviour. The adoption of FinTech is not always sufficient to foster sustainable financial behaviour, and Idrus et al. (2026) highlighted the importance of financial literacy and financial inclusion in the relationship between the two. Likewise, Kamara et al. (2026) illustrate the intervening role of sustainable financial behaviour in the relationship between digital financial literacy and sustainability-oriented consumer behaviour. However, recent studies suggest that FinTech use may be linked to green financial literacy, further reinforcing the idea that digital financial engagement can contribute to sustainability-oriented financial awareness and practices (Sönmez Soydaş et al., 2026). This relationship is further substantiated by evidence from the MENA region. Across Saudi Arabia, recent studies have shown that the adoption of FinTech is linked to the economic, social, and environmental dimensions of sustainability (Belgacem & Alaskar, 2026). Libya also provides evidence of how FinTech payment methods and financial automation can help achieve financial inclusion and enhance banking services (Etorbi, 2025). The results underscore the relevance of digital financial technologies across various financial systems in the MENA region and highlight the importance of understanding how digital financial engagement can lead to sustainability-related outcomes through behavioural processes.

Financial sustainability is therefore an individual-level pathway between FinTech and ESG contribution, with theoretical meaning. Technological opportunity is referred to as FinTech adoption, while sustainable financial behaviour is defined as the use of this opportunity in the context of responsible saving, spending, borrowing, and investment decisions. This behavioural mechanism differs from institutional mechanisms such as governance, transparency, and corruption risk, as highlighted in previous FinTech–ESG studies (Abu alim & Mansour, 2026; Khan et al., 2026). It also builds on recent FinTech consumer-level studies that highlighted the importance of financial empowerment, digital trust and eco-friendliness for FinTech adoption (Javeed et al., 2026). This study thus contributes to previous research on FinTech and ESG by examining whether the adoption of FinTech influences ESG-oriented outcomes through individuals' sustainable financial behaviour.

H6: Sustainable financial behaviour mediates the relationship between FinTech adoption and ESG contribution.

2.7 Digital Financial Literacy, FinTech Adoption and Sustainable Financial Behaviour–ESG Pathway

The suggested connection between FinTech adoption and sustainable financial behaviour and ESG contribution may vary with an individual's digital financial literacy (DFL). DFL empowers individuals to acquire knowledge, skills, awareness, and confidence to understand, assess, and effectively utilise digital financial services (Koskelainen et al., 2023; Tan et al., 2026). Therefore, digital financial opportunities through FinTech adoption may be a function of DFL, reflecting how well individuals understand and apply these opportunities in their financial decision-making. The financial capability perspective is a basis for this conditional relationship. Financial knowledge and skills help individuals to compare options and make decisions (Lusardi & Mitchell, 2014). The skills are especially

relevant in the digital financial arena, as users need to evaluate digitally delivered products, comprehend associated risks, compare options, and interpret information provided via digital technology. In line with this, Başar et al. (2025) observed a stronger positive relationship between the behavioural benefits of using FinTech and financial literacy, and Mazzoli and Baiocco (2025) found that sustainable investment holdings were positively related to DFL, especially among individuals more likely to be digitally skilled. The results of this study indicate that digital financial competencies have the potential to shape how people engage with digital financial opportunities through financial practices.

The Saudi context further underscores the significance of DFL for FinTech, as recent evidence suggests. Al-Ghazali et al. (2025) highlight the contribution of DFL to the adoption of FinTech in the Kingdom of Saudi Arabia, while Chabchoub and Smaoui (2026) explore the link between DFL and financial well-being among young consumers in Saudi Arabia, as well as the role of trust in the relationship between DFL and financial well-being. The studies do not directly test this moderated mediation, but they support the relevance of individual digital financial skills in driving the outcomes of FinTech engagement. Based on H6, this study therefore suggests that DFL can moderate the indirect effect of FinTech adoption on ESG contribution, mediated by sustainable financial behaviour. The different levels of DFL require users to engage differently with the same FinTech opportunities, since there are varying levels of ability in financial information assessment, risk awareness, and alternative evaluation. This implies that DFL could alter the strength of the behavioural mechanism by which FinTech adoption translates into ESG-based financial outcomes. The negative relationship between DFL and FinTech adoption and their predictive effect on sustainable financial behaviour is noteworthy, especially in the context of this study, since the overall moderated mediation effect was not statistically significant. The result suggests that in this case, users with higher DFL tend to be more "reluctant" to rely on the adoption of FinTech as a catalyst for sustainable financial behavior, but this should be understood as a possible explanation rather than the absolute cause.

H7: Digital financial literacy moderates the relationship between FinTech adoption and ESG contribution through sustainable financial behaviour.

3. Methodology

3.1 Research Design

The research design used in this study is a quantitative cross-sectional survey to investigate the role of FinTech adoption in achieving ESG-oriented outcomes and sustainable financial behaviour across varying levels of digital financial literacy. Data is gathered from the adult population of digital financial service users in the MENA region through a structured questionnaire. Partial least squares structural equation modelling (PLS-SEM) is used to examine the direct, mediating, and moderating relationships among the latent constructs in the proposed model. PLS-SEM is suitable for prediction-oriented models that include multiple latent variables and interactions (Hair et al., 2019; Sarstedt et al., 2022).

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3.2 Population and Sampling

Adult users of FinTech and digitally enabled financial services in the MENA region are the target group. There is an age limit of 18 years and a requirement of at least 1 year of experience with at least one digital financial service, including mobile banking, digital wallets, mobile payments, online investment services, and other FinTech applications. The online questionnaire collected 380 valid responses, which is sufficient to support the application of PLS-SEM and to screen and remove incomplete or invalid responses.

3.3 Measures

The study comprises four main constructs: Fintech Adoption (FA), Sustainable Financial Behaviour (SFB), Digital Financial Literacy (DFL), and ESG Contribution (ESG). All constructs are assessed using multi-item scales based on the published literature. Responses have been recorded on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). Adoption of FinTech is respondents' true and ongoing relationship with technology-enabled financial services. The construct is based on existing FinTech adoption and use studies, such as Ryu (2018), as well as the more recent FinTech adoption scale developed and validated by Durak et al. (2024). Sustainable financial behaviour is the financial management of individuals, in terms of their saving and spending habits and their financial planning and consequences, carried out in a responsible, disciplined, and long-term manner. The measure is adapted from the Financial Management Behaviour Scale developed by Dew and Xiao (2011) while retaining its sustainability context. Digital financial literacy is defined as the knowledge, skills and confidence necessary to make sense of, evaluate and use digitally delivered financial services. The construct extends the conventional financial literacy into the digital financial landscape. It is based on recent literature on digital financial literacy (DFL), particularly that of Choung et al. (2023) and Pak et al. (2026). ESG contribution refers to how individuals consider environmental, social, and governance (ESG) issues in their financial decisions, which may include responsible, ethical, transparent, and sustainability-focused financial products and services. The construct reflects ESG-oriented financial decision-making rather than organisational ESG performance, as the respondents are individual users of financial services. The measure is based on ongoing research investigating individual investors' preferences and sustainable financial decision-making regarding ESG (Ciaian et al., 2024).

3.4 Data Analysis

Data collected and analysed with SmartPLS. Two steps are taken in the analysis. The assessment of the measurement model is conducted first with respect to indicator reliability, internal consistency, and convergent and discriminant validity. Second, the structural model is tested using path coefficients, significance levels, and predictive accuracy. The PLS-SEM procedures are based on methodological recommendations of the literature (Hair et al., 2019; Sarstedt et al., 2022), while the assessment of the mediation is based on the recommended bootstrapped indirect-effect approach of Nitzl et al. (2016).

4. Results and Discussion

4.1 Measurement Model Assessment

Partial least squares structural equation modelling (PLS-SEM) was employed to analyse the hypothesised model. The study investigates a model with direct, mediation, and moderation effects, and its primary aim is to explain the behavioural mechanisms linking digital financial capabilities, adoption of FinTech, sustainable financial behaviour, and ESG, which makes PLS-SEM a suitable fit for the study. The analysis was conducted according to the recommendations of PLS-SEM assessment (Hair et al., 2019; 2020; Sarstedt et al., 2022). A final measurement model was created after removing four indicators (ESG5, FA5, SFB1 and SFB2) due to comparatively poor indicator performance in the initial assessment. The removal was restricted to indicators with clear measurement concerns, not to collect data to make the structural relationships more significant. The final model comprises 18 indicators: six for Digital Financial Literacy (DFL), four for FinTech Adoption (FA), four for Sustainable Financial Behaviour (SFB), and four for ESG.

The retained indicators have loadings between .542 and .830. Most indicators are close to or above the commonly preferred .70 level, while ESG4 and FA4 have comparatively lower loadings. However, both remain above .50 and were retained after considering the overall reliability and validity of their respective constructs. In PLS-SEM, indicator deletion should not be based solely on an automatic loading threshold; the effect of deletion on construct reliability, validity, and content coverage should also be considered (Hair et al., 2020; Sarstedt et al., 2022). The decision to retain the remaining indicators, therefore, provides a reasonable balance between empirical measurement quality and the preservation of the constructs' conceptual coverage.

Table 1: Final outer loadings

Construct	Indicator	Loading
Digital Financial Literacy	DFL1	.692
	DFL2	.681
	DFL3	.692
	DFL4	.751
	DFL5	.646
	DFL6	.634
ESG	ESG1	.695
	ESG2	.780
	ESG3	.719
	ESG4	.586
FinTech Adoption	FA1	.739
	FA2	.693
	FA3	.776
	FA4	.542
Sustainable Financial Behaviour	SFB3	.697
	SFB4	.780
	SFB5	.830
	SFB6	.762

The reliability results show good internal consistency for the constructs. Composite reliability scores are between .784 and .852, which is higher than the recommended minimum of .70. Cronbach's alpha ranges from .632 to .775, while rho. A range from .643 to .790. The reliability of DFL and SFB is particularly good, while that of

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ESG and FA is slightly lower but still reasonably good. The AVE results should be interpreted with caution. The AVE for SFB is .591, which is above the .50 standard. The AVE values for DFL (.467), ESG (.488), and FA (.481) are marginally below .50.

Table 2: Reliability and convergent validity

Construct	Cronbach's α	rho_A	Composite reliability	AVE
DFL	.775	.790	.840	.467
ESG	.653	.668	.790	.488
FA	.632	.643	.784	.481
SFB	.768	.774	.852	.591

Thus, convergent validity cannot be said to be consistently high. However, the deviations from .50 are not that significant, composite reliability is acceptable, and most indicators show acceptable loadings. The measurement model can thus be considered satisfactory, with three constructs being on the margin of convergent validity. This is a clear interpretation rather than an overstatement of the model's measurement quality. According to the latest recommendations of PLS-SEM (Hair et al., 2019; 2020), when assessing the reliability of reflective constructs, one should consider indicator reliability, internal consistency, and convergent validity simultaneously.

4.1.1 Discriminant validity

Discriminant validity was assessed using the heterotrait–monotrait ratio (HTMT), which is considered a more sensitive approach than relying exclusively on the Fornell–Larcker criterion (Henseler et al., 2015). The HTMT values range from .426 to .823. The highest value is observed between DFL and ESG (.823), which remains below the conservative .85 threshold. All other values are substantially lower.

Table 3: HTMT results

Construct pair	HTMT
DFL ↔ ESG	.823
DFL ↔ FA	.545
DFL ↔ SFB	.511
ESG ↔ FA	.622
ESG ↔ SFB	.480
FA ↔ SFB	.426

The results, therefore, provide satisfactory evidence of discriminant validity and indicate that the four constructs are empirically distinguishable. Overall, the measurement assessment indicates that the final 18-item model provides an acceptable basis for testing the proposed structural relationships.

4.2 Structural Model Assessment

After assessing the measurement model, the structural model was evaluated using bootstrapping. The analysis examined the direct relationships between DFL, FA, SFB, and ESG, as well as the proposed mediating and moderating relationships.

Table 4: Structural model and hypothesis-testing results

Hypothesis	Relationship	β	t-value	p-value	Decision
H1	DFL → SFB	.319	6.030	<.001	Supported
H2	FA → SFB	.144	2.622	.009	Supported
H3	SFB → ESG	.355	6.353	<.001	Supported

H4	DFL × FA → SFB	−.070	2.057	.040	Supported
H5	DFL → SFB → ESG	.113	3.983	<.001	Supported
H6	FA → SFB → ESG	.051	2.226	.026	Supported
H7	DFL × FA → SFB → ESG	−.025	1.759	.079	Not supported

The results provide support for six of the seven hypotheses. The effects of DFL and FA are significant: both positively affect SFB, and SFB, in turn, has a significant positive impact on ESG. The mediation effects of SFB for both DFL and FA are significant. Further, DFL negatively moderates the FA–SFB relationship. The proposed moderated mediation effect, however, is not statistically significant.

4.3 Digital Financial Literacy and Sustainable Financial Behaviour

H1 proposed a positive relationship between Digital Financial Literacy and Sustainable Financial Behaviour. The results strongly support this hypothesis ($\beta = .319$, $t = 6.030$, $p < .001$). The study's results indicate that those with greater knowledge and skills about and in digital financial environments are more likely to display sustainable financial behaviour. Digital financial literacy, then, seems to go beyond one's ability to access digital financial services; it can also increase one's capacity to assess financial options and make better-informed financial choices through digital opportunities. This finding aligns with recent studies on financial behaviour and financial literacy in the context of digital technologies. For instance, Abdallah et al. (2025) concluded that customers' financial behaviour is linked to digital financial literacy. More recent studies have also linked high-level financial digital skills to sustainable investment practices, showing that digital capabilities can promote involvement in sustainable financial activities (D'Ignazio et al., 2025). This is significant for the current study as it shows that DFL is not only a technological competency, but also an important behavioural antecedent. It posits that unless digital financial skills are also advanced, offering greater access to digital financial services alone could not be enough to guarantee sustainable financial outcomes. H1 is supported.

4.4 FinTech Adoption and Sustainable Financial Behaviour

To support this, H2 suggested that Sustainable Financial Behaviour is positively influenced by FinTech Adoption. The result supports this hypothesis ($\beta = .144$, $t = 2.622$, $p = .009$). The positive relationship suggests that the higher the level of involvement in FinTech, the more sustainable the financial behaviour. However, this is a less strong association than that found with DFL. This discovery implies that digital financial technologies can enable consumers to carry out financial transactions, including payments, savings, investments, and financial management, more efficiently. This is in line with a growing body of research on the link between digital finance and sustainability. Mu et al. (2023) showed that digital finance positively affects corporate ESG performance, and Ren et al. (2023) demonstrated that it can positively influence companies' ESG performance through two mechanisms: green innovation and external monitoring. In a similar study, Gao et al. (2024) found that FinTech has a positive impact on corporate ESG performance. The current work builds on these organisational-level extensions and moves to the individual-behaviour level. The results indicate that sustainability aspects are not only technological/organisational but also financial, as seen in users' financial behaviour;

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thus, the FinTech dimension is analysed not only as a technological/organisational aspect but also as a financial behaviour dimension. H2 is supported.

4.5 Sustainable Financial Behaviour and ESG

H3 posits a positive relationship between Sustainable Financial Behaviour and ESG. This central relationship is well supported by the results ($\beta = .355$, $t = 6.353$, $p < .001$). This discovery suggests that sustainable financial behaviour is a key behavioural element in ESG-related financial results. This is especially true, as much of the current FinTech–ESG research has focused on corporate ESG performance, while comparatively little work has examined the personal drivers of sustainability. The findings are consistent with the overall hypothesis that the technologies and products available to people, and their use of financial resources, influence financial sustainability. Financial knowledge, digital capability and responsible financial practices can thus be seen as important behavioural building blocks for sustainability. This finding also underpins the mediation relationships explored later in this paper. To be part of ESG, DFL and FinTech must be expected to play a reasonable role through actual financial behaviour. H3 is supported.

4.6 The Mediating Role of Sustainable Financial Behaviour

A key contribution of the study is the mediation results. The indirect effect of DFL on ESG through SFB is positive and significant ($\beta = .113$, $t = 3.983$, $p < .001$). Thus, it is possible to support H5. The result shows that DFL plays a role in the creation of ESG-oriented outcomes, partly by promoting sustainable financial behaviour. Digital financial literacy is thus relevant to ESG not only because people have digital financial knowledge but also because this knowledge is applied in financial practices. This interpretation aligns with recent research on the relationship between DFL and sustainable financial decision-making and sustainable investment behaviour (D'Ignazio et al., 2025). It further builds on the current literature on financial literacy by introducing a mechanism for sustainable financial behaviour, rather than focusing solely on financial literacy as a single predictor. The indirect effect of FinTech Adoption on ESG through SFB is also positive and significant ($\beta = .051$, $t = 2.226$, $p = .026$), supporting H6. Theories are informative, as the smaller size of this indirect effect compared with the DFL pathway is theoretically meaningful. It implies that while technology adoption is likely to have a smaller behavioural effect, users' capabilities and attitudes toward financial transactions through digital channels have a greater influence on the transformation of digital financial opportunities into sustainable behaviour. This suggests that Sustainable Financial Behaviour is the main behaviour in the model.

4.7 Moderating Role of Digital Financial Literacy

H4 suggested a moderating effect of Digital Financial Literacy on the relationship between FinTech Adoption and Sustainable Financial Behaviour. The interaction effect is negative and statistically significant ($\beta = -.070$, $t = 2.057$, $p = .040$). The conditional effects give more information. The impact of FinTech Adoption on SFB is around .214 at low DFL, .144 at the median level of DFL, and .074 at high DFL. Therefore, the positive relationship between FinTech Adoption and SFB gets weaker as DFL increases. This is significant because it contrasts with the common notion that the benefits of FinTech would be enhanced only by financially literate users. The findings rather indicate a sub-

substitution effect. For some, the behavioural component of FinTech adoption is already low, even if they have sufficient knowledge and skills to make appropriate financial decisions. The impact of FinTech services' functionality and convenience may be more pronounced for those with lower DFL. Recent studies have corroborated the need to study financial literacy as a conditioning factor rather than assuming a universally positive relationship with digital financial behaviour. Han and Ko (2025), for instance, explicitly identify financial literacy as a moderator of the relationship between DFS and financial behaviour. Thus, the present finding indicates that, at all levels, FinTech adoption and DFL should not be seen as complementary resources. Their relationship might be a partial substitute in the formation of sustainable financial behaviour.

The negative moderating effect of digital financial literacy suggests that the positive relationship between FinTech adoption and sustainable financial behaviour becomes weaker as users' digital financial literacy increases. One possible explanation is a substitution effect: users with higher digital financial literacy may possess greater knowledge, confidence, and autonomy in making financial decisions and may therefore rely less on the behavioural support or decision-making convenience provided by FinTech platforms. In contrast, users with lower digital financial literacy may derive greater behavioural benefits from FinTech technologies because these platforms provide accessible tools and structured financial services that can facilitate more sustainable financial practices. The finding may also reflect a ceiling effect, whereby highly digitally literate users already possess established financial capabilities and sustainable decision-making practices, leaving less scope for additional FinTech adoption to strengthen their behaviour. These interpretations should be viewed as possible explanations rather than definitive causal mechanisms, particularly given the study's cross-sectional design. Nevertheless, the negative interaction highlights that digital financial literacy does not necessarily amplify the behavioural benefits of FinTech adoption; rather, its role may depend on users' existing financial capability and autonomy.

4.8 Moderated Mediation

H7 suggested that the indirect connection between FinTech Adoption and ESG would be moderated by SFB, with the intent to study the moderating effect of SFB.H7 suggested the indirect connection between FinTech Adoption and ESG would be moderated by SFB and proposed the study of the moderating effect of SFB. Moderated indirect effect is negative ($\beta = -.025$), but it is not statistically significant at the .05 level ($t = 1.759$, $p = .079$). So, it is not recommended to support H7. It is significant to note the difference between H4 and H7. The results show that the strength of the first-stage relationship between FinTech Adoption and SFB differs significantly when using DFL, but the difference is not sufficient to affect the overall indirect pathway from FinTech Adoption to ESG. The evidence, then, is that there is some moderation but not "moderated mediation". This outcome also helps avoid an overly broad interpretation of DFL's moderating role. The study should not assert that DFL is a fundamental shift in the entire FinTech–ESG mechanism. Instead, its conditioning effect appears to be limited to the model's behavioural component.

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4.9 Discussion

The overall findings offer an integrated answer to the question of the role of digital finance in the ESG approach via individual financial behaviour. As shown in the model, there is a stronger direct effect of Digital Financial Literacy on Sustainable Financial Behaviour (β = .319) than of FinTech Adoption (β = .144). This indicates that technology is important, but users' ability to comprehend and operate within the digital financial ecosystem could be more impactful for sustainable financial behaviour. There is then a significant relationship between Sustainable Financial Behaviour and ESG (β = .355). This creates a set of behaviours as a core link between digital finance and sustainability. The mediation results support this. SFB has an important indirect impact on both DFL and FinTech Adoption. The study, therefore, offers evidence of the behavioural and technological nature of the sustainability aspects of digital finance. The moderation finding also offers additional theoretical insight. The further the users can navigate a digital financial environment, the more their capacity is strengthened (DFL), while the more they can do, the weaker the marginal relationship between FinTech Adoption and SFB is. This implies that digital competence can partly replace the behavioural support provided by the technologies used in financial innovation. This research builds on and extends the current literature on digital finance and ESG by focusing on the firm-level impact. Digital finance and FinTech have been shown to promote corporate ESG performance through various channels, including green innovation, financing pressures, and external monitoring (Mu et al., 2023; Ren et al., 2023; Gao et al., 2024). The current research builds on this line of research and shows that this relationship is equally evident at the individual behavioural level. The results thus corroborate the more holistic interpretation. Digital Financial Literacy is the capability to leverage FinTech's technological opportunities, and Sustainable Financial Behaviour is the behavioural mechanism through which digital finance becomes relevant to ESG. This outlook is relevant for the sustainable development of digital finance. Policies and financial-service strategies aimed solely at increasing FinTech adoption can overlook users' capabilities and behaviour. Building digital financial literacy and responsible FinTech ecosystems may thus be better suited to bring digital financial innovation to fruition for more sustainable outcomes.

The negative moderating effect identified in this study should be considered alongside recent evidence linking FinTech and digital financial capability with sustainability-oriented outcomes. For example, recent evidence from Italy shows that digital financial literacy is positively associated with sustainable investment, particularly among individuals with more advanced digital skills (Mazzoli & Baiocco, 2025). Similarly, recent evidence from Saudi Arabia reports a positive relationship between FinTech adoption and economic, social, and environmental dimensions of sustainability. These findings are broadly consistent with the positive direct relationships identified in the present study. However, the current finding that higher digital financial literacy weakens the marginal effect of FinTech adoption on sustainable financial behaviour offers a different perspective. Recent research on digital financial services also suggests that the behavioural consequences of digital finance can vary across types of financial behaviour and dimensions of financial literacy, indicating that greater financial capability does not necessarily strengthen every behavioural effect of digital financial services (Han & Ko, 2025).

The MENA context may provide a plausible contextual explanation for this difference. The region has experienced rapid expansion of digital financial services alongside substantial variation in financial capability, digital skills, financial inclusion, and technology use patterns. In such an environment, highly digitally literate users may be better able to evaluate, customise, or independently manage financial decisions rather than relying on the behavioural convenience provided by FinTech platforms. The negative interaction observed in this study may therefore reflect a context in which FinTech provides greater incremental behavioural value for users with lower levels of digital financial literacy, while more digitally literate users exercise greater autonomy in their financial decision-making. This interpretation remains tentative and should be tested through comparative and longitudinal research across MENA countries.

5. Conclusion, Implications and Future Research Avenues

5.1 Conclusion

The current study aimed at investigating the mediating roles of Sustainable Financial Behaviour (SFB) between FinTech Adoption and ESG, and the moderating role of Digital Financial Literacy (DFIL) between FinTech Adoption and Sustainable Financial Behaviour (SFB). The results demonstrate that DFL has a positive effect on SFB ($\beta = .319$, $p < .001$), and that FinTech Adoption is also significant ($\beta = .144$, $p = .009$), using PLS-SEM. SFB, in turn, positively influences ESG ($\beta = .355$, $p < .001$). The mediation results validate the significant transmission of the effects of both DFL and FinTech Adoption to ESG by SFB. The indirect effects of DFL ($\beta = .113$, $p < .001$) and FinTech Adoption ($\beta = .051$, $p = .026$) through SFB are significant. The relationship between FinTech Adoption and SFB is also moderated, with DFL showing a negative effect ($\beta = -.070$, $p = .040$), suggesting that as DFL increases, the positive impact of FinTech Adoption decreases. The moderated indirect effect is not significant, however ($\beta = -.025$, $p = .079$). Therefore, the results do not support moderated mediation but do support first-stage moderation. Overall, the findings suggest that the sustainability impact of FinTech is not solely technological but also depends on users' digital financial capabilities and behaviour. A holistic view and approach towards technology, capability, behaviour, and sustainability is therefore needed in the realm of sustainable digital finance.

The principal contribution of this study lies in positioning sustainable financial behaviour as a behavioural pathway that links FinTech adoption and digital financial literacy to individual-level ESG-oriented outcomes. This extends FinTech–ESG research beyond its predominant focus on organisational and firm-level outcomes by highlighting the role of individual financial decision-making in sustainable finance. A further theoretical contribution is the identification of digital financial literacy as a boundary condition: rather than uniformly strengthening the behavioural benefits of FinTech adoption, higher digital financial literacy was associated with a weaker marginal effect of FinTech adoption on sustainable financial behaviour. Together, these findings suggest that sustainable FinTech outcomes should be understood not only in terms of technological adoption and digital capability, but also through the behavioural processes and conditions that shape how individuals use financial technologies.

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5.2 Theoretical Implications

The study contributes to the growing body of research in the field of FinTech–ESG by introducing an individual behavioural perspective. The results show that individual financial behaviour can be an important pathway between digital finance and sustainability, as previous research has mainly focused on corporate ESG outcomes. The study also identifies SFB as an important explanatory mechanism linking both DFL and FinTech Adoption to ESG. Further, the negative moderation result indicates that when the DFL is high, the marginal effect of FinTech on behaviour is likely to be smaller, perhaps because more financially able users are less dependent on technological support of behaviour. The large moderation and the non-significant moderated mediation also suggest that the moderating effect of DFL is restricted to the FinTech Adoption–SFB, rather than the entire path to ESG.

5.3 Implications for practice and policy

The results indicate that, in addition to the push for greater adoption of digital services, FinTech service providers should also implement features that promote responsible, sustainability-focused financial behaviours. These can include sustainability data, responsible investment features, spending management tools, savings features, and decision support features. Digital financial literacy should be part of financial institutions' digital banking programmes rather than a standalone component of digital transformation. To complement the advancement of FinTech and digital financial inclusion, policymakers should also support digital financial literacy, consumer education, responsible FinTech development, and sustainability awareness. Another highlight of the findings is the behavioural component of ESG. Sustainable finance is not just a data point in the organisation; it is also a financial choice and practice that can have a sustainable impact.

5.4 MENA Context

The results are especially significant for the MENA region, where digitalisation, financial inclusion, and sustainability are becoming increasingly linked. While the financial landscape varies across countries and digital readiness and regulatory frameworks differ in character, the growth of digital financial services offers an opportunity to enhance financial participation and sustainability. The findings indicate that technology-driven growth needs capability building. Improved digital financial literacy can help shape people's behaviour toward responsible, sustainable financial practices, provided they can access FinTech services. Digital finance development, financial education, and sustainable finance efforts can therefore be further integrated to boost FinTech's impact on ESG.

5.5 Limitations and Further Research

A key limitation of this study is its cross-sectional, non-probability sampling design, which limits causal inference and restricts the generalisability of the findings across the diverse MENA region. Future research could address these limitations through longitudinal, probability-based, and cross-country research designs. Such comparative studies could examine whether the observed mediation and moderation effects remain stable across different regulatory, cultural, and financial-development contexts and provide stronger evidence regarding the temporal and contextual conditions underlying these

relationships. More samples and other measures might also shed light on whether the non-significant moderated mediation is a true boundary condition of the theoretical model.

The research shows that progress on the ESG agenda in the FinTech industry goes beyond technology alone. While FinTech offers a platform for digital financial engagement, its sustainability value depends on users' capabilities and behaviour. SFB has a strong link to ESG and is supported by DFL and FinTech Adoption. Concurrently, DFL negatively moderates the FinTech–SFB relationship, but this moderation does not extend to the entire indirect pathway. Thus, the study suggests that sustainable digital finance results from the synergy among technology, financial skills, and responsible financial behaviour. The viewpoints presented here offer a valuable benchmark for further research and policy development on FinTech, ESG, and sustainable finance in the emerging markets and MENA region at large, which are rapidly digitalising.

References

Abdallah, W., Tfaily, F., & Harraf, A. (2025). The impact of digital financial literacy on financial behavior: Customers' perspective. *Competitiveness Review, 35*(2), 347–370. https://doi.org/10.1108/CR-11-2023-0297

Abis, D., Pia, P., & Limbu, Y. (2025). FinTech and consumers: A systematic review and integrative framework. *Management Decision, 63*(1), 49–75. https://doi.org/10.1108/MD-07-2023-1136

Abu alim, S. A., & Mansour, M. (2026). FinTech adoption and ESG performance in MENA banks: The mediating role of corruption risk. *Sustainability, 18*(4), 1887. https://doi.org/10.3390/su18041887

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Al-Ghazali, B. M., Sohail, M. S., Alaghbari, M. A., & Haddad, A. G. (2025). Digital financial literacy and FinTech adoption in Saudi Arabia: A decision-aid perspective. In *2025 International Conference on Decision Aid Sciences and Applications (DASA)* (pp. 1874–1877). IEEE. https://doi.org/10.1109/DASA68193.2025.11498952

Alqudah, M. Z., Marashdeh, Z., Martín, E., & Jebreel, M. (2026). Does ESG scores moderate the impact of FinTech on investment efficiency? Insights from firms in the MENA region. *Development and Sustainability in Economics and Finance, 10*, 100142. https://doi.org/10.1016/j.dsef.2026.100142

Al-Smadi, M. O. (2023). Examining the relationship between digital finance and financial inclusion: Evidence from MENA countries. *Borsa Istanbul Review, 23*(2), 464–472. https://doi.org/10.1016/j.bir.2022.11.016

Başar, D., Keskin, H., Esen, E., Merter, A. K., & Balcıoğlu, Y. S. (2025). Digital financial literacy and savings behavior: A comprehensive cross-country analysis of FinTech adoption patterns and economic outcomes across 12 nations. *Borsa Istanbul Review, 25*(Supplement 1), 59–72. https://doi.org/10.1016/j.bir.2025.09.004

Bashir, M., Asghar, S., Ashfaq, M., Raza, S. S., & Zahoor, S. (2024). Digitalizing tourism and interactive navigation: A case study of Pakistan. *Journal of Asian Development Studies, 13*(1), 547–566. https://doi.org/10.62345/jads.2024.13.1.46

Belgacem, I., & Alaskar, M. Z. (2026). Financial technology and sustainable development in Saudi Arabia and the GCC: Empirical evidence and policy implications. *Sustainability, 18*(5), 2182. https://doi.org/10.3390/su18052182

Chabchoub, M., & Smaoui, A. (2026). FinTech use and consumer financial well-being among young consumers in Saudi Arabia: The role of digital financial literacy and trust. *International Journal of Advances in Signal and Image Sciences, 12*(2s), 2152–2168. https://doi.org/10.29284/nx9amw56

Choung, Y., Chatterjee, S., & Pak, T.-Y. (2023). Digital financial literacy and financial well-being. *Finance Research Letters, 58*, 104438. https://doi.org/10.1016/j.frl.2023.104438

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Ciaian, P., Cupak, A., Fessler, P., & Kancs, d'Artis. (2024). Environmental and social attitudes and investments in crypto-assets. *Applied Economics, 56*(60), 9060–9080. https://doi.org/10.1080/00036846.2023.2297742

Din, S. U., Khan, M. Y., Khan, M. J., & Nilofar, M. (2022). Nexus between sustainable development, adjusted net saving, economic growth, and financial development in South Asian emerging economies. *Journal of the Knowledge Economy, 13*(3), 2372–2385. https://doi.org/10.1007/s13132-021-00818-6

Dew, J., & Xiao, J. J. (2011). The financial management behavior scale: Development and validation. *Journal of Financial Counseling and Planning, 22*(1), 43–59. Retrieved from https://scholarsarchive.byu.edu/facpub/4521/

Durak, İ., Çise, S. N., & Yazıcı, S. (2024). Developing a financial technology (FinTech) adoption scale: A validity and reliability study. *Research in International Business and Finance, 70*, 102344. https://doi.org/10.1016/j.ribaf.2024.102344

Etorbi, M. (2025). The impact of financial technology on advancing banking services and promoting financial inclusion in Libya. *Journal of Islamic Economic Laws, 8*(2), 152–170. https://doi.org/10.23917/JISEL.V8I02.10073

Gao, D., Tan, L., & Duan, K. (2024). Forging a path to sustainability: The impact of FinTech on corporate ESG performance. *The European Journal of Finance*. https://doi.org/10.1080/1351847X.2024.2416995

Hair, J. F., Alamer, A. (2022). Partial least squares structural equation modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. *Research Methods in Applied Linguistics, 1*(3), 100027. https://doi.org/10.1016/j.rmal.2022.100027

Hair, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research, 109*, 101–110. https://doi.org/10.1016/j.jbusres.2019.11.069

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review, 31*(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Han, J., & Ko, D. (2025). Digital financial services and sustainable development: Temporal trade-offs and the moderating role of financial literacy. *Sustainability, 17*(20), 8976. https://doi.org/10.3390/su17208976

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

Hu, H., Jia, Z., & Yang, S. (2025). Exploring FinTech, green finance, and ESG performance across corporate life-cycles. *International Review of Financial Analysis, 97*, 103871. https://doi.org/10.1016/j.irfa.2024.103871

Idrus, M., Laekkeng, M., Djamereng, A., Tenriwaru, T., & Safar, I. (2026). Bridging FinTech adoption to sustainable financial behaviour: The mediating roles of financial literacy and inclusion in Indonesia. *International Review of Management and Marketing, 16*(4), 305–310. https://doi.org/10.32479/irmm.22708

Jamil, S., Khan, A. Q., & Khan, M. Y. (2023). Financial development consequences on the quality of the environment: A case of developing countries. *International Journal of Energy Economics and Policy, 13*(3), 325–333. https://doi.org/10.32479/ijeep.14282

Javeed, A., Elghuweel, M. E., & Khan, M. Y. (2026). Beyond convenience and security: A trust-integrated framework for digital wallet adoption. *Future Business Journal, 12*, 143. https://doi.org/10.1186/s43093-026-00845-2

Javeed, A., Khan, M. Y., Raheem, M. M. (2026). An evidence-based approach to understanding sustainable urbanization in a developing country. *European Journal of Sustainable Development, 15*(1), 483–503. https://doi.org/10.14207/ejsd.2026.v15n1p483

Javeed, A., Khan, M. Y., Rehman, M., & Khurshid, A. (2022). Tracking sustainable development goals–a case study of Pakistan. *Journal of Cultural Heritage Management and Sustainable Development, 12*(4), 478–496. https://doi.org/10.1108/JCHMSD-04-2020-0052

Kamara, A. K., Kebe, I. A., & Duramany-Lakkoh, E. (2026). Bridging digital finance and environmental sustainability: The role of sustainable financial behavior in shaping green consumer choices in Sierra Leone. *Future Business Journal, 12*, 258. https://doi.org/10.1186/s43093-026-00959-7

Khan, A., Shuangjie, L., Khan, M. Y., Alomair, A., & Al Naim, A. S. (2026). Green bonds and air pollution: Global evidence with implications for emerging economies. *Development and Sustainability in Economics and Finance, 11*, 100147. https://doi.org/10.1016/j.dsef.2026.100147

Koskelainen, T., Kalmi, P., Scornavacca, E., & Vartiainen, T. (2023). Financial literacy in the digital age—A research agenda. *Journal of Consumer Affairs, 57*(1), 507–528. https://doi.org/10.1111/joca.12510

Liu, X., Ma, C.-Q., & Ren, Y.-S. (2025). ESG reactions to fintech: The role of cross-border capital flows. *Research in International Business and Finance, 76*, 102834. https://doi.org/10.1016/j.ribaf.2025.102834

Lone, U. M., Bhat, S. A., Irfan, P. S. U., & Darzi, M. A. (2025). Impact of digital financial literacy on financial well-being: Moderating role of gender and religiosity. *Journal of Financial Services Marketing, 30*, 16. https://doi.org/10.1057/s41264-025-00309-8

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature, 52*(1), 5–44. https://doi.org/10.1257/jel.52.1.5

Mazzoli, C., & Baiocco, S. (2025). Unlocking sustainable investing through digital financial literacy: The impact of advanced digital skills. *International Journal of Bank Marketing, 43*(9), 1863–1883. https://doi.org/10.1108/IJBM-10-2024-0622

Mu, W., Liu, K., Tao, Y., & Ye, Y. (2023). Digital finance and corporate ESG. *Finance Research Letters, 51*, 103426. https://doi.org/10.1016/j.frl.2022.103426

Nitzl, C., Roldán, J. L., & Cepeda, G. (2016). Mediation analysis in partial least squares path modeling: Helping researchers discuss more sophisticated models. *Industrial Management & Data Systems, 116*(9), 1849–1864. https://doi.org/10.1108/IMDS-07-2015-0302

Pak, T.-Y., Chatterjee, S., & Choung, Y. (2026). Navigating digital finance: How digital financial literacy influences digital financial services use and benefits in Korea. *Financial Innovation, 12*, 42. https://doi.org/10.1186/s40854-025-00820-w

Rehman Khan, S. A., Ahmad, Z., Sheikh, A. A., & Yu, Z. (2022). Digital transformation, smart technologies, and eco-innovation are paving the way toward sustainable supply chain performance. *Science Progress, 105*(4), 368504221145648. https://doi.org/10.1177/00368504221145648

Ren, X., Zeng, G., & Zhao, Y. (2023). Digital finance and corporate ESG performance: Empirical evidence from listed companies in China. *Pacific-Basin Finance Journal, 79*, 102019. https://doi.org/10.1016/j.pacfin.2023.102019

Ryu, H.-S. (2018). What makes users willing or hesitant to use Fintech? The moderating effect of user type. *Industrial Management & Data Systems, 118*(3), 541–569. https://doi.org/10.1108/IMDS-07-2017-0325

Sam-Abugu, C., Luo, X., & Wong, B. (2025). The combined role of FinTech innovation and financial literacy in sustainable financial inclusion in Nigeria. *International Review of Economics, 72*, 14. https://doi.org/10.1007/s12232-025-00490-1

Sarstedt, M., Hair, J. F., Pick, M., Liengaard, B. D., Radomir, L., & Ringle, C. M. (2022). Progress in partial least squares structural equation modeling use in marketing research in the last decade. *Psychology & Marketing, 39*(5), 1036–1064. https://doi.org/10.1002/mar.21640

Sönmez Soydaş, Ş., Özbek, A., Çam, A. V., & Rădulescu, M. (2026). Toward sustainable financial behavior: The role of financial socialization and FinTech in enhancing green financial literacy. *Sustainability, 18*(10), 4621. https://doi.org/10.3390/su18104621

Tan, W., Zhang, W., & Zhang, X. (2026). Review of research on digital financial literacy: Measurement, causes, and impact. *Journal of Economic Surveys*. https://doi.org/10.1111/joes.70109

Wang, C., Wang, L., Zhao, S., Yang, C., & Albitar, K. (2024). The impact of FinTech on corporate carbon emissions: Towards green and sustainable development. *Business Strategy and the Environment, 33*(6), 5776–5796. https://doi.org/10.1002/bse.3778

Xin, Y., Khan, R. U., Dagar, V., & Qian, F. (2023). Do international resources configure SMEs' sustainable performance in the digital era? Evidence from Pakistan. *Resources Policy, 80*, 103169. https://doi.org/10.1016/j.resourpol.2022.103169

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