

# How Digitalization Moderates the Link between Corporate Social Responsibility and Earnings Quality?

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DOI Link: <http://dx.doi.org/10.6007/IJARAFMS/v15-i4/27098>

Published Online: 26 December 2025

## Abstract

**Purpose** – This study examines the moderating role of digital transformation in the relationship between Corporate Social Responsibility (CSR) and the managerial discretion utilized in loan loss provisioning (LLP) among Islamic Banks (IBs). **Design/ Methodology / Approach** – Utilizing data from 79 Islamic banks operating across 20 countries from 2012 to 2021, this empirical study employs the generalized method of moments (GMM) to estimate the regression model. **Findings** – The results indicate that digital transformation positively moderates the effect of corporate social responsibility (CSR) on the earnings quality of Islamic banks and provides the necessary information to assess whether a bank is well-managed, prudent in its accounting practices, and capable of sustaining its profits over time. **Practical Implications** – These findings offer significant insights for regulators and policymakers by underscoring the necessity for targeted regulation governing digital transformation and proactive oversight of Environmental, Social, and Governance (ESG) practices within the Islamic banking sector. Consequently, this study provides valuable information on the critical importance of simultaneously integrating technological innovation and socially responsible practices to enhance earnings quality and effectively contribute to achieving sustainable development goals. **Originality/value** – This research is situated within a multidisciplinary context encompassing Corporate Social Responsibility (CSR), accounting, and technological innovation, thereby reflecting the contemporary challenges faced by Islamic banks in a changing economic environment.

**Keywords:** Digitalization, Earnings Management, Earning Quality, Discretionary Loan Loss Provisions, Corporate Social Responsibility, Islamic Banks.

## Introduction

Corporate social responsibility (CSR) has emerged as a strategic imperative for modern organizations, transcending the traditional confines of philanthropy to become a critical lever for sustainable performance. In recent years, the integration of environmental, social, and governance (ESG) risk management into strategic planning, accounting practices, and operational risk reporting has rapidly developed (Alqudah et al. 2025). The private sector increasingly recognizes the profound interdependence between social, environmental, and economic performance (Ren et al. 2023). Practitioners and researchers are actively exploring the complex relationships among corporate reporting, earnings management, corporate governance, and performance, aiming to develop a synergy between theory and practice (Liu and Jung, 2021).

Corporate social responsibility (CSR) has now become a strategic issue, transcending philanthropy to emerge as a driver of sustainable performance. The integration of ESG criteria into business practices is witnessing significant expansion, reflecting a growing awareness of the interdependence between economic, social, and environmental performance. CSR enables Islamic banks to address stakeholder expectations regarding transparency and ethics. The incorporation of digitalization into their strategies is crucial for optimizing financial management and strengthening relationships with stakeholders (Guo and Xu, 2021).

Digital transformation refers to the adoption of innovative technologies that reshape operational processes and facilitate value creation. Furthermore, digitization offers new opportunities to strengthen compliance with Islamic principles by improving transaction traceability, operational transparency and internal control mechanisms. By integrating digitalization into their CSR strategies, Islamic banks can not only enhance their transparency and stakeholder relationships but also optimize their financial management. The rise of digital technologies has profoundly transformed the business environment, changing the way companies produce, communicate and control information. In a context marked by increased demands for transparency and accountability, corporate social responsibility (CSR) has become a central element of modern governance. At the same time, the quality of profits is a key indicator of the credibility of financial information and investor confidence. Digital transformation is now a major strategic lever for companies, profoundly changing management, governance and financial communication practices. At the same time, CSR has become a central element in the assessment of companies' overall performance by investors, regulators and civil society. In this context, the quality of earnings appears to be a key indicator of the reliability of financial information and the trust placed in companies. This interaction is particularly crucial in the banking sector, where earnings quality plays a fundamental role in the reputation and sustainability of financial institutions. Digital transformation, a systemic change process driven by technology profoundly redefines corporate operational models, financial decision-making, and overall management efficiency. (Ferreira et al. 2019; Wang and Yan, 2023 and Wu and Liu 2025). Importantly, digitalization facilitates the integration of digital governance tools, thereby strengthening internal controls and risk management processes. The integration of digital governance tools helps to significantly reduce the risk of earnings manipulation, while ensuring greater reliability and comparability of financial information (Galindo-Martín et al., 2019; Hanelt et al., 2021). The relationship between corporate social responsibility and earnings quality is particularly important in the context of the Islamic economy, where the principles of justice,

transparency and social responsibility are essential foundations of economic practices. From this perspective, CSR fits naturally into Islamic philosophy, which views the company not only as an economic actor, but also as a responsible social agent. By limiting opportunistic behaviour and improving the quality of financial information, digital governance mechanisms play a decisive role in strengthening investor confidence and organisational credibility (Figuigui and Machrouh, 2020 ; Lv and Xiong 2022).

The quality of accounting information is assessed using various indicators, with earnings management being a central focus, particularly through income smoothing and discretionary provisions. The discretionary provision for loan losses (DPLL) is a financial reporting principle aimed at prudently recognizing and measuring assets and profits in the context of economic uncertainty for Islamic banks (Basu,1997). Ensuring the quality of accounting results is essential for the transparency and reliability of a company's financial information. Through digital transformation, organizations can enhance data collection and analysis, thereby improving the accuracy of their financial reporting (Wang & Hou, 2024). Integrating CSR into their strategy not only bolsters stakeholder confidence but also optimizes long-term financial performance. Thus, digitalization contributes to enhancing the quality of accounting results by facilitating the integration of CSR (Anderson et al., 2024; Wang & Hou, 2024).

It is therefore imperative to explore how digitalization acts as a moderator in the relationship between corporate social responsibility (CSR) and earnings quality. By examining this relationship, this study aims to illuminate the synergistic effects of digitalization and CSR, highlighting how a strategic integration of these elements can enhance the overall performance of Islamic banks. The central research question guiding this study can be formulated as follows: To what extent does the integration of digital transformation within Islamic banks moderate the relationship between CSR and the quality of these institutions' financial results?

The decision to focus on Islamic banks is justified by their specific institutional and ethical characteristics, which distinguish them from conventional banks. In addition, Islamic banks are subject to additional governance mechanisms, such as Sharia compliance committees, which reinforce requirements for transparency, control and quality of financial information. In this context, earnings quality is particularly important, as it determines the confidence of depositors, investors and other stakeholders in compliance with Islamic principles and the credibility of reported financial performance. In addition, digitalization is a major strategic challenge for Islamic banks, which are faced with the need to modernise their information systems while complying with the ethical and regulatory constraints specific to Islamic finance. In this case, this study aims to explore the moderating effect of digitalization on the relationship between corporate social responsibility (CSR) and earnings quality in Islamic banks.

By examining how digital transformation enhances the impact of CSR initiatives on earnings management, this research seeks to provide a comprehensive understanding of the interaction between these elements. Consequently, it contributes to the development of strategic frameworks that promote both financial performance and social responsibility within the banking sector.

The original contribution of this study lies in its relevance to the banking sector, particularly Islamic banks, as well as to the financial sector as a whole, including traditional banks, microfinance institutions, and insurance companies. It is also applicable to the consumer industry, which must meet the increasing expectations of consumers regarding sustainability and ethics, as well as to the energy sector, especially in the areas of renewable energies and environmental resource management. Consequently, each sector can benefit from improved governance and the effective integration of digitalization into its corporate social responsibility (CSR) practices.

Then, this study aims to fill this gap by examining how digitalisation influences the relationship between CSR and earnings quality. By incorporating digitalisation as a moderating variable, this article contributes to the existing literature by offering a more nuanced understanding of the mechanisms through which responsible practices translate into higher-quality financial reporting.

Furthermore, this article highlights that the findings provide a theoretical framework that enables organizations to reconcile profitability with sustainability objectives while offering evidence for the development of future policies.

Finally, this research is positioned within a perspective of innovation and sustainability, providing valuable insights for practitioners and researchers aiming to navigate the complex landscape of social responsibilities and contemporary economic demands and, few studies have analysed the role of digitalisation as a moderating mechanism in the relationship between CSR and profit quality. In particular, empirical research simultaneously incorporating these three dimensions remains limited, especially in emerging contexts. The structure of this article includes a literature review and hypothesis development, methodology, results, discussion, and conclusion.

## **Literature Review and Hypothesis Development**

### *Theoretical Framework*

The conceptual complexity and inherent ambiguity surrounding the definitions of both Corporate Social Responsibility (CSR) and earnings management have generated an extensive body of literature aimed at establishing a theoretical framework for their relationship and the moderating influence of digitalization. Notwithstanding these considerable efforts, the debate concerning the precise nature of the interaction between CSR and earnings management remains highly contentious.

Legitimacy Theory posits that organizations rely on formal mechanisms to adapt to their operating environment. This perspective is fundamentally based on the concept of a social contract established between a firm and its stakeholders, often manifesting through a strategy of legitimization achieved by disseminating specific information in annual reports. A firm's legitimacy is thus contingent upon its proactive strategy of communicating societal information to the public, thereby aligning with civil society's expectations. Legitimacy Theory is widely utilized in the accounting literature, predicated on the central assumption that organizational success is conditional upon managers ensuring that the firm's operations conform to societal expectations, viewing the entity as an integral component of a broader social system. (Savage et al., 2000).

Corporate Social Responsibility (CSR) practices implemented by firms are intrinsically linked to Stakeholder Theory, a concept that has garnered increasing attention in the literature and is central to contemporary discussions regarding the role of corporations in society (Donaldson and Preston, 1995). Stakeholders have become increasingly demanding regarding the economic, social, and environmental information disclosed in the reports of firms frequently engaged in CSR. For instance, the provision of high-quality earnings information is considered a corporate social responsibility toward key financial stakeholders, including investors, creditors, and suppliers (Chen and Yu, 2021).

Agency Theory focuses on the strategic utilization of Corporate Social Responsibility (CSR), positing that managers employ CSR to advance their own interests. The relationship between CSR and profit quality can be explained by agency theory, according to which responsible practices help reduce opportunistic behaviour by managers. Specifically, managers may strategically use CSR to mislead stakeholders regarding the firm's true value and performance (Morris, 1987). Agency theory suggests that CSR can limit opportunistic behaviour by managers. In this context, digitalisation appears to be a factor that can reinforce these mechanisms by improving the quality of information systems and internal control mechanisms. Consequently, agency problems and conflicts emerge between managers and owners when managers prioritize self-interest over maximizing the firm's value from the stakeholders' perspective. According to Agency Theory, information asymmetry is exacerbated when information quality is low, a phenomenon particularly salient for larger firms (Watts and Zimmerman, 1990).

#### *Corporate Social Responsibility and Earnings Management*

Corporate Social Responsibility (CSR) activities have experienced significant growth in recent years. The findings regarding the relationship between CSR and earnings management are mixed and subject to intense academic debate.

Buertey et al., (2020) affirmed that banks excelling in CSR often align management interests with those of the banks, thereby mitigating incentives for earnings manipulation. These banks, therefore, generally prioritize long-term objectives over short-term financial gains. Empirical evidence indicates that Islamic banks engaged in Corporate Social Responsibility (CSR) practices exhibit superior earnings quality and are less likely to resort to earnings management. Within this framework, Alqudah et al. (2025) and Rezaee et al. (2020) emphasize that these banks demonstrate better earnings quality and exhibit low levels of discretionary accruals.

Some studies, such as Buertey et al. (2020) have shown that, the positive association between Corporate Social Responsibility (CSR) and earnings quality can be rationalized by both Legitimacy Theory and Stakeholder Theory. These theoretical frameworks suggest that internal managers possessing a comprehensive understanding of Islamic banking principles are optimally positioned to act as effective stewards, thereby maximizing the institution's value for its stakeholders.

Kim et al., (2019), affirm that ethical and reputational concerns rationalize the positive relationship between Corporate Social Responsibility (CSR) and earnings quality. Similarly,

Almahrog et al. (2016) indicate that a positive association exists between the degree of CSR and earnings quality within the oil and gas industries.

Other research, notably that of Kumala and Siregar (2021) and Ololade et al. 2025; reveals a negative correlation which they attribute to the intrinsic profitability of banks highly engaged in Corporate Social Responsibility (CSR). Other studies, including those by Kumala and Siregar (2021), Yoon et al. (2019) and Kim et al., (2019), observe a negative correlation, which they attribute to the inherent profitability of high-CSR banks.

To further investigate this relationship in our context, we test the following hypothesis (H1): There is a significant association between CSR and earnings management

#### *Moderating effect of digital transformation*

Digital transformation has emerged as a crucial strategy for the economic growth of Islamic banks and the country as a whole, representing a major focus of future economic development (Weritz et al. 2025; Li et al. 2025). Furthermore, digital transformation has been presented as a key driver of high-quality business development. Digital transformation refers to the application of various emerging technologies, such as big data, cloud computing, and artificial intelligence, to a company's production and management processes (Karim et al. 2022).

According to (Zhao, 2022), increasing information availability through the processing of internal and external data by digital technologies allows companies to efficiently acquire, share, and analyze information (Paiola and Gebauer 2020).

Gouvea et al. (2022), explained that digital transformation can mitigate information asymmetry, respond quickly to the needs of different stakeholders, ensure a high social reputation and industry status, and enable the acquisition of non-replicable resources. This can lead to a better perception of the quality of results by stakeholders.

Hess et al. (2020), digitalization offers advanced risk management tools, enabling Islamic banks to better anticipate and mitigate the negative impacts of non-compliance with CSR criteria, which can improve the stability and reliability of financial results.

According to Cui, (2025) and Bilal et al. (2024) explained that the digital transformation improves internal operational processes, reducing costs and increasing efficiency, which can directly influence profitability and the quality of results. Digital transformation is a major issue for society, policymakers, and banks.

Furthermore, the work of (Ionaşcu et al. 2022) highlighted that digital transformation can help Islamic banks better fulfill their social responsibilities. Managers, who must seek maximum profits at the lowest cost, are likely to deliberately reduce the quality of disclosed information and only selectively provide information related to social responsibility to the public.

Big data and blockchain technologies help to effectively solve the problems caused by information asymmetry by improving recording and traceability, which improves public oversight of companies and encourages them to fulfill their social responsibilities in a concrete and effective manner. In addition, digital transformation improves a company's

ability to acquire and integrate resources, reduces operating costs associated with these activities, aligns closely with CSR needs, and increases the company's profits and return on investment (Cui, 2025).

Digitalization enables more accurate and real-time data collection, which strengthens the reliability of financial reports and improves the quality of earnings. Digitalization makes it easier for companies to integrate CSR criteria into their operations (Bilal et al., 2024). For example, reporting systems can include sustainability-related performance indicators, which can positively influence the quality of earnings. Digitalization acts as a catalyst that strengthens the links between CSR and the quality of accounting profits, enabling companies to better meet stakeholder expectations while optimizing their financial performance. To further investigate this relationship in our context, we test the following hypothesis (H2): As a moderating variable, digitalization significantly influences the relationship between CSR and earnings management.

## Research Methodology

### *Research Sample and Data*

The sample consisted of data from the annual reports of 79 Islamic banks (IBs) located in 20 countries. This data was gathered by downloading the reports from the banks' official websites. The study period spanned from 2012 to 2021. Data was manually collected from annual reports in both English and Arabic, resulting in 790 observations per bank-year from 2012 to 2021.

## Definitions and Measurement of Variables

### *Dependent Variable*

We will apply a multivariate regression model with DLLP as the dependent variable to study the influence of digitalization on CSR and the relationship between earnings management practices. This measure is commonly used by researchers like Cherni and Ben Amar (2024) and Ben Othman and Mersni (2014) in the study of Islamic banks (IBs) because of their adherence to Sharia law. These banks utilize both discretionary and non-discretionary methods, with the basic measurement model being defined by these components.

$$LLP = \beta_0 + \beta_1 Non - discretionaryLLP + \beta_2 Discretionay LLP + \varepsilon_{it} \quad (1)$$

Next, using the estimated coefficients ( $\beta_1, \beta_2, \beta_3$ ) from equation (1), we estimate the non-discretionary component of the LLP, which corresponds to the non-discretionary loan loss provision designed by the NDLLP.

Table 1  
GMM estimation of LLP model

Variables	LLP
NPL	2,547*** (0.021)
$\Delta$ NPL	-4.188*** (0.061)
Observations	788
Number of Panel	79
AR (2) test (p-value)	-1.04 (0.298)
Hansen test	18.63 (0.135)
Sargan test statistics	5643 (0.000)
Mean VIF	1.17
Notes: $LLP_{it} = \beta_0 + \beta_1 NPL_{it-1} + \beta_2 \Delta NLP_{it} + \beta_3 \Delta TL_{it}$ ; $LLP_{it}$ =Total provisions for loans, Musharaka, Mudharaba and Murabaha investment for bank i at the year t, deflated by beginning loans; $NPL_{it-1}$ = the beginning balance of nonperforming loan for bank i at the year t deflated beginning loans; $\Delta NLP_{it}$ = Change in the value of nonperforming loan for bank i at the year t, deflated by beginning loans; $\Delta TL_{it}$ = change in the value of total loan, for bank i at the year t, deflated by beginning loans; ***significance level at 1%; ** significance level at 5%; * significance level at 10%	

$$NDLLP_{it} = \beta^0 + \beta^1 NPL_{it-1} + \beta^2 \Delta NLP_{it} + \beta^3 \Delta TL_{it} \quad (2)$$

The discretionary loan loss provision (DLLP) is calculated by subtracting the non-discretionary LLP (NDLLP) from the total LLP. The DLLP is estimated from the residual obtained from equation (1). Our basic estimating equation is:

$$DLLP_{it} = LLP_{it} - NDLLP_{it} \quad (3)$$

#### Moderating Variable

This variable is employed as a moderator in our analysis. To calculate the Digitalization Score (DIG), we utilized the Text Mining methodologies established by implemented using the Python programming language. These methods are recognized as robust solutions for deriving a quantitative measure of digitalization. It is used by Kriebel and Debener (2020) and Cherni and Ben Amar (2024).

By applying specific keywords and the mentioned techniques, we successfully assessed the level of digitalization within Islamic banks. This approach yields a representative score that captures the institutional engagement with digital transformation.

Initially, we downloaded the annual reports of the Islamic banks. Subsequently, we utilized 77 specific keywords gathered from established digitalization dictionaries. We then performed a Python coding routine to integrate the annual reports and, finally, extract the resulting data.

Thus, we employed the following equation to calculate the digitalization score:

$$DIG (rapport\ annuel_i) Ln \sum_{x=1}^n = \frac{tf}{NT} \quad (4)$$

#### 2.1.1. Independent variable

The independent variable in this study is ESG (Environmental, Social, and Governance). ESG performance is measured using the ESG scores provided by ASSET4 database, which comprehensively evaluates firms' performance across environmental protection, social responsibility, and governance practices.

### Control Variables

In this study, the Return on total assets (ROA), the Bank size (SIZE), and the Leverage ratio (LEV) are employed as control variables. All variable definitions are presented in Table 1:

Table 2  
*Research variables and measurement.*

Variable	Symbol	authors	Measurement
Leverage ratio	LEV	(Alqudah et al., 2025)	Total liability / Total Asset
Return on total assets	ROA	(Wu and Liu, 2025)	Net Income / Total Asset
Bank size	SIZE	(Niu, 2022)	Board size

### Research Models

This article uses the Generalized Method of Moments (GMM) estimation method in the system to address the endogeneity issues of dependent and lagged explanatory variables, particularly in cases where the cross-sectional dimension is significant relative to the time dimension (Chowdhury and Rasid, 2016). The study aims to examine the moderating effect of digitalization on the relationship between CSR and DLLP.

We will evaluate two conceptual models to guide our empirical study, based on the considerations presented.

$$DLLP_{it} = \alpha_0 + \alpha_1 DLLP_{i,t-1} + \alpha_2 ESGscore_{i,t} + \alpha_3 SIZE_{i,t} + \alpha_4 LEV_{i,t} + \alpha_5 ROA_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$DLLP_{it} = \alpha_0 + \alpha_1 DLLP_{i,t-1} + \alpha_2 DIG + \alpha_3 ESGscore + \alpha_4 DIG_{i,t} * ESGscore_{i,t} + \alpha_5 SIZE_{i,t} + \alpha_6 LEV_{i,t} + \alpha_7 ROA + \varepsilon_{i,t} \quad (6)$$

### With:

- ESGscore<sub>i,t</sub>: Environmental, social and governance score
- DLLP<sub>i,t</sub>: Discretionary loan loss provisions of bank i at time t
- DIG<sub>i,t</sub>: Digitalization
- SIZE<sub>i,t</sub>: Represents the size of the bank
- LEV<sub>i,t</sub>: Represents the debt ratio
- ROA<sub>i,t</sub>: represents the bank's profitability
- ε<sub>i,t</sub>: represents the error term.

### Conceptual Research Model

Figure 1 illustrates a conceptual model exploring the relationship between digitalization, Environmental, Social, and Governance (ESG) criteria, and the earnings quality of Islamic banks. Notably, this model highlights the impact of digitalization on Corporate Social Responsibility (CSR) and the relationship between CSR and earnings management practices.

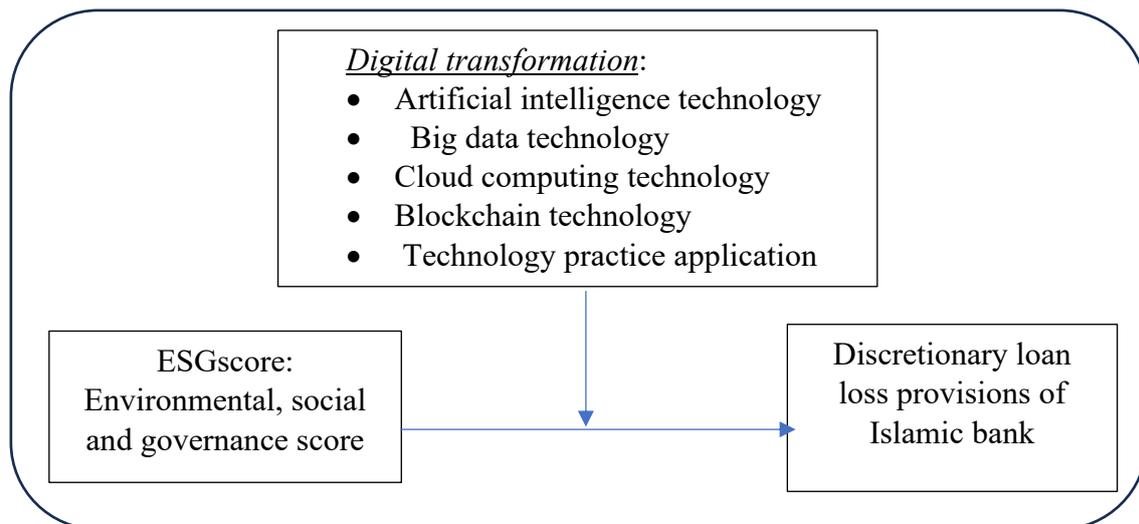


Figure 1: Model of research development. Source: Author owns creation

### Estimation and Discussion of Results

#### *Descriptive Analysis of the Sample*

The table presents descriptive statistics for the dependent and independent variables, including the mean, median, standard deviation, minimum, and maximum. The data cover the period from 2012 to 2021, with 79 observations.

The study found that the DLLP variable has a low mean of 1.174 and a high standard deviation of 1.956, with all observations falling between 0.619 and 2.341.

The independent variable ESGscore has a low mean and a high standard deviation, indicating a non-homogeneous distribution and high dispersion. Observations range from 0 to 0.098, with left skewness and a leptokurtic distribution. The distribution rejects normality and exhibits significant serial correlation.

The moderator variable **Dig** has an overall mean of -27.94422 with a standard deviation of 43.47785. Observations for Dig vary between -204.016 and 125.852.

Table 3

#### *Descriptive statistics*

	Mean	Std. dev	Min	Max
<b>DLLP</b>	1.17368	1.956393	0.619724	2.34105
<b>ESGscore</b>	45.43885	31.86191	-109.4683	127.48
<b>Dig</b>	27.94422	43.47785	-204.016	125,852
<b>Size</b>	20.14169	2.918042	13.59889	28.51432
<b>Lev</b>	56.5306	18.95622	2.86	167.92
<b>ROA</b>	1.792208	1.324851	-6.53	9.528909

*Correlation Matrix*

The correlation matrix shows weak but significant correlations between endogenous DLLP and most variables, except for PROFIT and LEV, which are not significant. While there are correlations among exogenous variables, the variance inflation factor (VIF) test indicates a low value of 1.89, confirming the lack of significant multicollinearity. It may be worth exploring other models to accommodate less correlated data.

Table 4

*Correlation matrix*

	ESGscore	Dig	Size	Lev	ROA
ESGscore	1.0000				
Dig	0.6819	1.0000			
Size	0.3161	0.2017	1.0000		
Lev	0.1392	0.3206	-0.2705	1.0000	
ROA	0.1984	0.0403	0.0889	-0.1734	1.0000

Table 5

*Multicollinearity test*

Variable	LIVELY
Dig	2.10
ESGscore	2.09
ROA	1.99
Lev	1.51
Size	1.29
<b>Mean VIF</b>	<b>1.79</b>

These VIF (Variance Inflation Factor) values indicate that multicollinearity in our model, where the dependent variable appears to be LIVELY, is generally low to moderate and should not compromise the estimation or interpretation of the coefficients. In descending order, Dig has the highest VIF (2.10), followed by ESGscore (2.09), ROA (1.99), Lev (1.51), and Size (1.29). In practice, commonly accepted thresholds place alerts at VIF > 5 (or even > 10 for a wider tolerance), and some authors adopt a conservative threshold of 3; however, here, all VIFs are significantly lower than 5 and even 3, which indicates limited collinearity. Specifically, the coefficient of Inv could undergo a slight inflation of variance due to its information overlap with other variables, but this inflation remains contained; Dig and ESGscore show a similar profile, while ROA is in the low zone, and Lev and Size have very low collinearity. The average VIF of 1.79 confirms that, overall, the predictors do not provide redundant information to the point of destabilizing the model; given these VIFs, multicollinearity is not a major problem in our current specification.

**Results and Discussion***Model 1*

This table presents the results of a dynamic panel data regression of Model 1 (Equation 5), likely using the Generalized Method of Moments (GMM), examining the direct impact of several variables on Discretionary Loan Loss Provisions (DLLP). The primary dependent variable is DLLP (Discretionary Loan Loss Provisions), a common proxy for earnings management in the islamic banking sector.

The empirical model presented in Table 6 indicate the effect of CSR on profit management DLLP in a Islamic bank. The analysis, reveals that the prior period's earnings management, represented by Lagged DLLP (L. DLLP), is the most significant determinant of current discretionary provisioning (P-value =0.000). This finding confirms the dynamic nature of managerial discretion in the banking sector.

These findings indicate that the ESG score exerts a negative effect on DLLP, which lends support to Hypothesis 1. This relationship can be rationalized by the fact that firms with high ESG scores are subject to greater market expectations, thereby enhancing the relevance of their accounting information. The literature underscores that firms with high ESG scores implement stronger governance mechanisms. This ethical conduct fosters a better alignment of interests between managers and shareholders (Buerter et al., (2020);Ololade et al. (2025) and Cui, 2025). Consequently, when this alignment is strengthened, managers have less incentive to manipulate earnings particularly through the opportunistic use of DLLP to maximize short-term benefits (such as meeting bonus targets or avoiding covenant violations).

Thus, a high ESG commitment signals an organizational culture oriented toward long-term value creation and transparency, which contributes to reducing information asymmetry. However, it is also plausible that, in certain contexts, economic incentives to manage earnings remain stronger than the ethical constraints associated with ESG performance, which may attenuate this virtuous effect. In other words, the degree of commitment of Islamic banks to CSR is not associated with the quality of financial reporting (Wang and Yan, 2023).

Control Variable Bank Size (Size) is highly significant and positively related to DLLP (Coefficient = 0.4088, P-value =0.000). This suggests that larger banks exercise greater discretion in setting loan loss provisions, potentially reflecting greater complexity or agency conflicts, as the work of others affirms (Chen et al. 2022). But, the Control Variables (Lev and ROA): Both the Leverage ratio (Lev) (Coefficient= 0.0018, P-value =0.495) and Return on Assets (ROA) (Coefficient = -0.0404, P-value =0.351) show no statistically significant direct impact on DLLP. The validity tests for the dynamic GMM model yield mixed results: AR (2) Test (p-value = 0.072): This test checks for second-order serial correlation in the residuals. Since the p-value is greater than 0.05 (but less than 0.10), the null hypothesis (no second-order serial correlation) is accepted at the 5% level but rejected at the 10% level. This is often considered marginally acceptable in GMM models but suggests the instruments might be borderline valid.

Sargan Test (p-value = 0.001) The null hypothesis that the instrumental variables are jointly valid and uncorrelated with the error term is strongly rejected (P-value < 0.01). This highly significant result casts serious doubt on the reliability of the instrumental variables and the overall model specification.

Table 6  
 Results of GMM estimation in the system for the direct effect

<i>Direct effect</i>		
	DLLP	
	Coefficient	P> z
<b>L 1. DLLP</b>	0.5014	0.000***
<b>ESGscore</b>	<b>-0.0006</b>	<b>0.0791</b>
<b>Size</b>	0.4088	0.000***
<b>Lev</b>	0.0018	0.495
<b>ROA</b>	-0.0404	0.351
<b>Observations</b>	863	863
<b>AR (2) test (p-value)</b>	-1.85	0.072*
<b>Sargan test statistics</b>	15.35	0.001***

Notes: (\*\*\*), (\*\*) and (\*) correspond to statistical significance at the 1%, 5% and 10% thresholds, respectively.

*Model 2:*

Table 7 presents the results of the System Generalized Method of Moments (GMM) estimation, which aims to evaluate the moderating effect of digitalization (DIG) on the association between the ESG score and Discretionary Loan Loss Provisions (DLLP). DLLP serves as a key indicator of earnings management in Islamic banks. Lagged DLLP (L. DLLP), as observed in the direct effect analysis, past DLLP remains the most robust determinant of current DLLP (Coefficient= 0.471, P-value =0.000), confirming the dynamic nature and the strong persistence of earnings management.

The table below shows a negative moderating effect suggesting that ethical engagement (ESG) becomes more effective in restraining managerial opportunism (DLLP) when the bank is highly digitized. The results indicate that when digital transformation moderates the relationship between CSR and DLLP in a islamic bank, CSR has a negative and significant impact on the DLLP of the bank when digital transformation is highly integrated. This suggests that Islamic banks that implement high levels of CSR and digital transformation together achieve better accounting earnings quality compared to those that do not. Digital transformation enhances the link between CSR and DLLP, supporting Hypothesis 2. However, there is a lack of empirical analysis on the interaction between digital transformation and CSR (Forcadell et al. 2020). Therefore, this study empirically examined the effects of this interaction to address this gap.

The findings suggest that Islamic banks that implement digital transformation and CSR strategies simultaneously can enhance their performance and improve their DLLP (Aljbour et al. 2025).

The influence of CSR on firm value varies based on the extent of digital transformation. Specifically, the impact of CSR on firm value is greater in firms with high levels of digital transformation compared to those with lower levels (Aljbour et al. 2025). This indicates that firms with both high CSR and high digital transformation achieve higher firm value than those with only one high factor or low levels of both (Haque and Haque, 2025).

Regarding the control variables, the Leverage ratio (LEV) (P-value = 0.533) and Return on Assets (ROA) (P-value = 0.639) remain statistically non-significant determinants of Discretionary Loan Loss Provisions (DLLP). Conversely, the control variable Bank Size (SIZE) retains its highly significant and positive effect on DLLP (Coefficient = 0.4666, P-value = 0.000). This finding reaffirms that larger banks, likely due to greater institutional complexity and less stringent external scrutiny, exercise greater discretion over their loan loss provisioning practices

The diagnostic tests for the GMM model reveal several significant methodological limitations. First, the AR (2) test (P-value = 0.001) rejects the null hypothesis of no second-order serial correlation in the residuals at the 1% significance level. In a dynamic GMM model, the non-significance of the AR (2) test is an essential condition for validity; its strong significance thus indicates a model specification problem. Furthermore, the Sargan test (P-value = 0.000) also rejects the null hypothesis of instrument validity. This high significance suggests that the instruments used are not truly exogenous, which compromises the reliability of the estimations. Consequently, the double rejection of both the AR (2) and Sargan tests calls into question the robustness and empirical relevance of the estimations obtained with the System GMM model. Even though the moderating effect appears statistically significant, its interpretation must be conducted with extreme caution due to the identified problems of instrumental validity and model specification.

Table 7

*Results of GMM estimation in the system for the indirect effect*

<i>Indirect effect</i>		
<b>DLLP</b>		
	<b>Coefficient</b>	<b>P&gt; z </b>
<b>DLLPL1.</b>	0.471	0.000***
<b>ESGscore</b>	0.002	0.296
<b>Dig</b>	-0.0005	0.974
<b>Dig*ESG</b>	<b>-0.00005</b>	<b>0.007***</b>
<b>Size</b>	0.4666	0.000***
<b>Lev</b>	0.0016	0.533
<b>ROA</b>	-0.02051	0.639
<b>Observations</b>	863	863
<b>AR (2) test (p-value)</b>	-4.15	0.001**
<b>Sargan test statistics</b>	99.82	0.000***

## Conclusion

This research aimed to evaluate the moderating effect of digitalization (DIG) on the relationship between environmental, social, and governance performance (ESG score) and earnings management (DLLP) within a sample of 79 Islamic banks over the period from 2012 to 2021, utilizing the system GMM model. Our study is situated within a multidisciplinary framework that connects corporate social responsibility (CSR), accounting, and technological innovation, which are crucial areas for the stability of contemporary financial institutions.

The empirical results confirm the main hypothesis that digitalization exerts a highly significant and negative moderating effect on the association between ESG and DLLP. This result

indicates that when Islamic banks are highly digitized, their ESG engagement becomes more effective in constraining managerial opportunism (measured by DLLP). Digitalization promotes transparency and reduces information asymmetry, thereby making ethical engagement (ESG) a more powerful governance mechanism. This conclusion enriches Agency Theory and Stakeholder Theory, arguing that under the influence of digitalization, CSR acts as a mechanism for aligning interests and increasing control, encouraging managers to prioritise long-term value creation and quality results.

Recently, companies have felt a growing need to conduct more CSR activities due to changing stakeholder perceptions, technological advancements, and political environments, while simultaneously implementing digital transformation using various technologies. However, the efficient allocation of limited resources to corporate strategies poses a challenge for managers. From this perspective, the results of this study provide managers with useful insights into the complementary implementation of digital transformation and CSR. Companies, which must demonstrate greater social responsibility in a context of fierce competition, should not focus solely on economic responsibility but should also promote sustainable and harmonious development with their various internal and external stakeholders through the synergy between digital transformation and CSR. This result implies that digital transformation strengthens the relationship between CSR and accounting earnings quality for one of the Islamic banks, helping to protect the rights and interests of stakeholders, promote sustainability, and fulfill key strategic functions to mitigate potential risks and uncertainties related to digital transformation.

This study contributes to the existing literature by addressing the underexplored synergies between corporate social responsibility (CSR) and digital transformation within the context of Islamic banks. It provides an innovative research model that examines the temporal relationships between CSR, digital transformation, and earnings management (DLLP). By filling this gap, the study enhances the understanding of how these factors interact to influence the quality of accounting earnings, thus offering a more nuanced perspective on the strategic management of Islamic banks.

The findings of this research have significant practical implications for Islamic banks aiming to improve their economic performance and sustainability. By integrating CSR and digital transformation strategies, these banks can enhance their accounting profits and strengthen their governance frameworks. This integrated approach fosters transparency and accountability, which are crucial for building trust among stakeholders and ensuring long-term viability in a competitive market.

Future research should explore the specific discriminatory effects of various CSR sub-domains on accounting earnings quality through digital transformation. Such studies could provide deeper insights into which aspects of CSR are most effective in enhancing profitability. Additionally, improving the objectivity of digital transformation assessments is essential. Future work could employ survey methods or analyze investments in digital initiatives as proxy variables, thereby refining measurement techniques and offering a more accurate reflection of banks' digital capabilities.

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