

The Impact of Digital Transformation on Corporate Social Responsibility (CSR): An Empirical Study of Companies Listed on the Casablanca Stock Exchange

Imad ASSARRAJ, (PhD student)

*University Research Laboratory in Instrumentation and Organization Management
(LURIGOR)*

*Faculty of Legal, Economic and Social Sciences of Oujda
Mohamed 1st University of Oujda, Morocco*

Mohamed AL MAACHE, (Full Professor)

*University Research Laboratory in Instrumentation and Organization Management
(LURIGOR)*

*Faculty of Legal, Economic and Social Sciences of Oujda
Mohamed 1st University of Oujda, Morocco*

Correspondence address :	Faculty of Legal, Economic, and Social Sciences University research laboratory in instrumentation and management organizations University complex - Hay Al Quds B.P: 724 – 60000 Mohamed Premier University Oujda Oujda, Morocco Postcode 05-36-50-05-97 / 05-36-50-05-98
Disclosure Statement :	Authors are not aware of any findings that might be perceived as affecting the objectivity of this study and they are responsible for any plagiarism in this paper.
Conflict of Interest :	The authors report no conflicts of interest.
Cite this article :	ASSARRAJ, I., & AL MAACHE, M. (2024). The Impact of Digital Transformation on Corporate Social Responsibility (CSR): An Empirical Study of Companies Listed on the Casablanca Stock Exchange. <i>International Journal of Accounting, Finance, Auditing, Management and Economics</i> , 5(10), 688-701. https://doi.org/10.5281/zenodo.14031636
License	This is an open access article under the CC BY-NC-ND license

Received: August 27, 2024

Accepted: October 29, 2024

International Journal of Accounting, Finance, Auditing, Management and Economics - IJAFAME
ISSN: 2658-8455
Volume 5, Issue 10 (2024)

The Impact of Digital Transformation on Corporate Social Responsibility (CSR): An Empirical Study of Companies Listed on the Casablanca Stock Exchange

Abstract

This study examines the impact of digital transformation on Corporate Social Responsibility (CSR) among companies listed on the Casablanca Stock Exchange. Digital transformation, characterized by adopting technologies such as Artificial Intelligence, Big Data Analytics, and the Internet of Things, is increasingly recognized as a critical driver of CSR performance. This research uses a sample of 45 companies, analyzing their CSR efforts through ESG (Environmental, Social, and Governance) ratings obtained from Refinitiv and their digital transformation efforts measured by keyword frequency analysis from their 2023 annual reports. The findings reveal a positive relationship between digital transformation and CSR, particularly in governance and social responsibility dimensions. Regression analysis confirms that companies with higher levels of digital transformation tend to achieve better ESG scores, suggesting that digital transformation is a technological upgrade and a strategic imperative for enhancing CSR. The study highlights the variation in impact across different sectors, with heavily regulated industries such as banking and finance showing stronger correlations. The implications for businesses are clear: investing in digital transformation can significantly improve sustainability practices and stakeholder engagement. Future research should explore specific digital strategies that enhance CSR and investigate potential non-linear relationships in greater depth.

Keywords: Digital Transformation, Corporate Social Responsibility, ESG, Casablanca Stock Exchange

JEL Classification: M14,M15

Paper type: Empirical research

1. Introduction:

Corporate Social Responsibility (CSR) has become an essential element in the strategic management of companies, driven by increased stakeholder expectations and regulatory pressures. CSR is commonly defined as a voluntary commitment by companies to integrate economic, social, and environmental objectives into their operations and stakeholder relationships (Taleb, 2013). The European Commission's definition of CSR emphasizes the integration of social, environmental, and economic concerns into corporate activities voluntarily, urging companies to go beyond legal obligations by investing in human capital and environmental stewardship (Benaicha, 2017).

The ISO 26000 standard "CSR guidelines" defines CSR as *the responsibility of an organization concerning the impacts of its decisions and activities on society and the environment through transparent and ethical behavior that contributes to sustainable development, including the health and well-being of society, takes into account the expectations of stakeholders, respects the laws in force and by international standards of behavior, is integrated throughout the organization and implemented in its relationships*.

Benaicha (2017) offers a synthetic definition of CSR: *"The principles of social responsibility, the integrated and ethical management processes of CSR and the results of this management as they are deployed in the interactions between the company and its stakeholders and in its contribution to the well-being of the society and sustainable development"* (Benaicha, 2017)

On the other hand, there are several definitions of digital transformation. In a synthesis of definitions, common points have been identified:

Transformation as a process: Digital transformation is not a single step (Feroz and al., 2021).

Digital transformation involves change: The word "transformation" implies change, but the critical question debated in Anglo-Saxon literature is determining what this change entails. The change is related to the company's business model, meaning digital transformation changes how a company creates and delivers value to customers. Digital transformation, therefore, involves new business models (Verhoef and al., 2019). It affects the entire company and changes the company's business logic. This shift in business models is a strategic change, and digital transformation leads to innovative business models.

Digital transformation as a strategy: Business strategy research has followed the development of digital transformation in companies. These studies highlight the concept of the digital transformation strategy, which discusses the opportunities and threats of digital technologies for companies. On the other hand, they consider digital transformation strategy as the plan that supports companies in governance and transformation that occurs during digital technology integration and operations after the transformation. Thus, a digital transformation strategy involves strategic planning to allocate the necessary resources for digital transformation to achieve the company's goals (Verhoef and al., 2019).

Digital transformation as innovation: Digital transformation constitutes a disruptive phenomenon that will structurally modify companies' organizational, economic, and societal models. It is a profound change that impacts the company's traditional functions (marketing, production, human resources), influences its hierarchical levels, and radically restructures its various processes (functional or business). Furthermore, it relies on adopting new practices tied to the digital context, such as collaborative intelligence and open innovation... (Oumil, 2020).

Digital transformation as the transformation resulting from the implementation of digital technologies: It affects at least three of the seven dimensions identified by Lucas. Digital transformation is part of what (Dussart, 2015) calls innovation through complete transformation, which is the fourth and final type of innovation alongside process innovation, product innovation, and innovation in customer experience enhancement. As an innovation strategy, digital transformation supports company performance by introducing new ICT

investments or strengthening the use of existing ICTs (Deltour & Lethiais, 2014). (Ferhan, 2019).

Thus, several academic studies have noted the positive impact of digital transformation on CSR. Our literature review approach is based on the study of research works that have examined the impact of digital transformation on the three components of CSR: the economic, social, and environmental components. A summary of this work will be carried out in the literature review section.

Subsequently, we will detail the methodology adopted to test these impacts through an empirical study of 45 companies listed on the Casablanca stock exchange. This choice is motivated by the availability of data, either at the level of the annual reports published by the said companies to carry out a content analysis to measure their degrees of digital transformation or by the consultation of the scores attributed by definitive to the companies, which are available via the internet.

Once the data is collected, linear regression analysis is adopted to test these impacts between digital transformation and each CSR component. Python carries out this regression; the part of the regression analysis details the results for each hypothesis.

Finally, we will discuss these results with a conclusion summarizing them and opening new research perspectives.

Therefore, three research questions were developed following the literature review and which we will try to answer in this work:

- 1- Does digital transformation have a positive impact on economic CSR?
- 2- Does digital transformation have a positive impact on social CSR?
- 3- Does digital transformation have a positive impact on environmental CSR?

2. Literature review

In this literature review, we will try to present the research work that has dealt with the impact of digital transformation on the three components of CSR

2.1 Digital transformation and CSR economic dimension

Businesses rely heavily on information systems and data analysis to gain their competitive advantage; in this sense, there has been an exponential growth in data collected, stored, and processed by organizations. The massive amount of data usually contains valuable information about the business market, customers, and the company itself. As a result, some companies are increasingly looking to run their business more efficiently using BDA. Interestingly, many empirical studies investigate the impact of BDA on economic performance, such as profitability, sales growth, return on investment (ROI) (Court, 2015), and customer retention. Other recent research has indicated factors that play a determining role in the employment of digital technologies. (Gupta and George, 2016) demonstrate that investment in digital technologies is associated with increased operational performance, market performance, and superior firm performance. Similarly, (Akter et al., 2016) and (Wamba et al., 2017) studied the impact of digital technologies on management capacity and business performance. According to a systematic literature review (Arunachalam al., 2018), studies show the role of digital technologies, including BDA, in organizational decision-making, leading to positive business performance. The results of the study by (Gunasekaran et al., 2017) indicate the positive impact of the assimilation of Big Data and Predictive Analytics (BDAP) as a capability on organizational and supply chain performance. There are many vital contributions of BDA to improve economic performance, such as profitability and sales growth, discussed in the following subsections (Shdifat, 2022).

2.2 Digital transformation and CSR social dimension

Digital transformation enhances the social Corporate Social Responsibility (CSR) practices in multiple ways, improving stakeholder engagement and boosting internal efficiency.

One of the primary impacts is using digital platforms and technologies to engage more actively with employees and local communities. Digital tools like social media, collaboration platforms, and online forums create a space for open communication and help organizations better understand and respond to social issues and community needs. Companies can leverage social media not only to publicize their CSR efforts but also to receive real-time feedback from their stakeholders (Vogler & Eisenegger, 2021)

On the other hand, digital technologies positively improve communication with stakeholders, particularly customers and suppliers, through social networks and mobile applications. Thus, digital transformation ensures the wide dissemination of information, and feedback from customers and suppliers actively contributes to creating value for the company (Na and al., 2021).

Another significant impact of digital transformation is the ability to monitor and measure social initiatives more effectively. The use of data analytics enables companies to track the social impact of their CSR activities in real time, allowing them to adapt and refine their strategies based on real-world outcomes (ElMassah & Mohieldin, 2020)

For instance, data collected from employees through digital HR platforms can help monitor workplace diversity, track employee well-being, and promote equitable opportunities within the organization. Digitalization facilitates corporate training and education on social responsibility. Online platforms and e-learning modules can help train employees on critical social issues such as diversity, inclusion, and corporate ethics. By providing access to these resources, companies can empower their workforce to participate actively in their CSR strategies. So, digital transformation improves their well-being by allowing them to have good working conditions and maintain a balance. Personal life and improve their performance through the development of their knowledge and skills following the use of specific digital technologies such as (Artificial Intelligence, big data Analytics) as well as digital distance learning platforms, which facilitate work and aid in decision-making. (Robertson and Lapiņa, 2023) Digital transformation can also improve work safety work efficiency and reduce stress at work (Na and al., 2021)

The role of digital technologies extends into the supply chain as well. The use of blockchain and digital tracking systems has revolutionized how companies ensure social responsibility in their procurement and supplier relations

these technologies provide greater transparency and accountability, helping companies ensure that their suppliers adhere to ethical labor practices and contribute to reducing social inequalities within the supply chain.

Furthermore, artificial intelligence (AI) is being increasingly used to tailor CSR efforts. AI can analyze vast amounts of data to identify social trends and predict areas where CSR efforts will have the most significant impact. For example, AI-driven systems can help predict the social and economic challenges of local communities, allowing companies to focus their CSR initiatives on pressing needs such as education or healthcare (Kıymalıoğlu, 2020)

This allows for more targeted and impactful CSR strategies.

2.3 Digital transformation and CSR environmental dimension

Digital transformation through the use of digital technologies mainly (Artificial Intelligence AI, Big Data Analytics, mobile, social platforms, etc.) contribute to the improvement of environmental sustainability, with this in mind several research has explained this contribution such as the work (Björn, 2020) which shows the positive effects of the use of digital

technologies on the environment, it has determined these impacts according to two categories of the environment: The first which he called the static environment which consists of the design phase, production and the distribution process, that is to say the phase before purchase by the customer, at this level AI for example acts positively on the reduction of CO2 emissions, likewise the BDA through its potential for measuring and mapping these emissions, makes it possible to control these CO2 emissions, another aspect is the efficient management of resources, these technologies allow the choice of materials used in production with a view to reducing energy consumption by promoting green energy, likewise (Feroz, al 2021) underlines the positive role of “Smart Water Management” in rationalizing water consumption in the production process (Feroz, and al, 2021,)

Digital transformation has led to the adoption of cleaner and more sustainable products in the production process that reduce an organization's environmental impacts, thereby creating a reliable production system that improves profitability, reduces operating costs, and increases the efficiency and safety of employees. (Rosário, and al., 2022,)

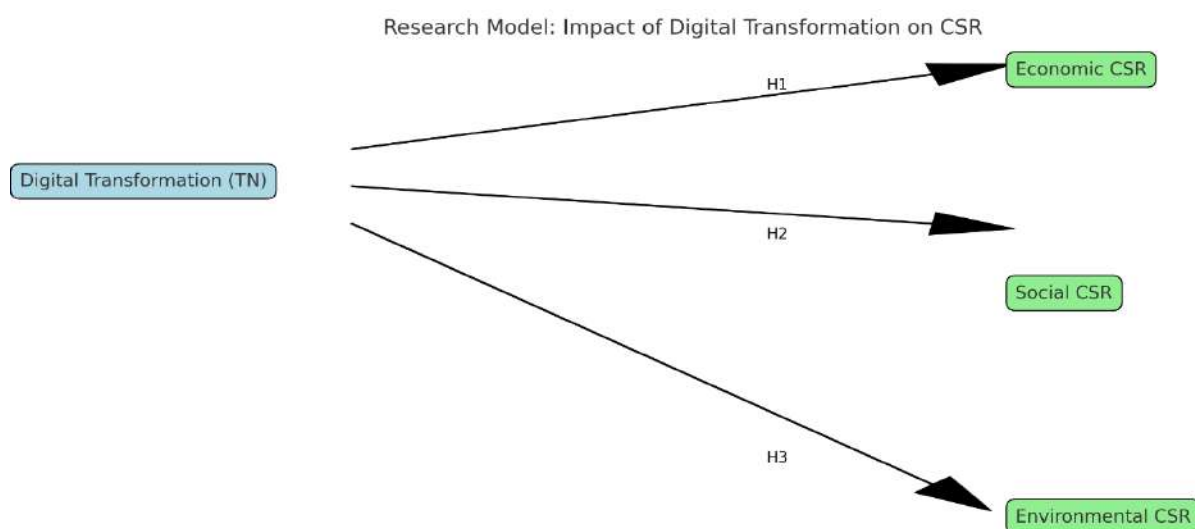
The second category of the environment is the autonomous environment or the post-purchase environment by the product's customer; at this level, modern technologies can help develop new methods of adaptation to large-scale waste. Thus, using BDA can reduce costs, reduce waste, and improve industry efficiency. The BDA has also been used to analyze construction and demolition waste management performance and identify illegal dumping of construction waste.

Likewise, the Internet of Things and big data have been applied as solutions to manage waste electrical and electronic equipment. The Internet of Things has also been used to process food waste generated or design a city waste collection model. On the other hand, Artificial Intelligence algorithms can improve the efficiency of electronic waste collection from systems intelligent waste classification systems, and blockchain technology can also be used in waste management because it can offer integrity, resilience, transparency, and audit functionalities in a reliable environment and a formalized and secure, blockchain also offers the possibility of further extending the life cycle of products. (Truong, 2022,)

2.4 Summaries of empirical studies

The following diagram presents an overview of the meaning of the work which dealt with the impact of digital transformation on CSR components.

Figure N°1: Model and hypothesis



Source: established by the authors

3. Research Methodology

3.1 Sample and source of collected data

The empirical study focused on 45 companies listed on the Casablanca Stock Exchange, selected due to the availability of data in annual reports and CSR disclosures. These companies represent various sectors, including banking, construction, agri-food, telecommunications, energy, and others, offering a comprehensive view of the relationship between digital transformation and CSR.

The data sources are ESG Scores established by Refinitiv to measure CSR and annual reports for the year 2023 to measure digital transformation (see section 3.3)

3.2 Design model

This research is based on the premise that digital transformation (TN) significantly impacts Corporate Social Responsibility (CSR) across various dimensions. Specifically, three hypotheses have been formulated to guide the empirical analysis. Hypothesis 1 (H1) posits that digital transformation positively impacts the economic dimension of CSR, suggesting that adopting digital technologies enhances a company's financial performance while contributing to its economic responsibilities. Hypothesis 2 (H2) asserts that digital transformation positively influences the social dimension of CSR, indicating that digital tools and platforms can improve stakeholder engagement, employee well-being, and social equity. Finally, Hypothesis 3 (H3) proposes that digital transformation positively impacts the environmental dimension of CSR, implying that digital technologies can lead to more sustainable and eco-friendly business practices.

To test the validity of these hypotheses, we used the linear regression method detailed by the following regression equations:

$$\begin{aligned} \text{ESG Environmental} &= \beta_0 + \beta_1 * TN + \beta_2 * Age + \beta_3 * Salarie + \varepsilon \\ \text{ESG Governance: ESG Governance} &= \beta_0 + \beta_1 * TN + \beta_2 * Age + \beta_3 * Salarie + \varepsilon \\ \text{ESG Social: ESG Social} &= \beta_0 + \beta_1 * TN + \beta_2 * Age + \beta_3 * Salarie + \varepsilon \end{aligned}$$

With age and employees as control variables

3.3 Data analysis methods

We assigned each company an ESG governance, social, and environmental score collected from the website¹ which provides access to the scores of Moroccan companies listed on the Casablanca stock exchange.

On the other hand, there are several methods to measure digital transformation. In this thesis, we have opted for the content analysis method by counting the keywords related to digital transformation. The method involves counting words to study textual content, allowing us to reveal trends, recurring themes, and main concerns in a set of textual data. Its main objective is quantifying textual content to identify linguistic patterns, themes, or sentiments (Garten and al., 2018) (Hsieh and Shannon, 2005).

To use this method, we proceeded as follows:

Selection of the corpus: Choose the texts to analyze (articles, speeches, books, i.e.) (Hsieh & Shannon, 2005). In our case, we selected the annual reports of the 45 companies listed on the Casablanca Stock Exchange for the fiscal year 2023.

Data preparation: Clean the textual data by removing irrelevant elements (e.g., punctuation, stop words) (Carroll, 1981).

Development of the word list: Create a list of words or phrases to search for and count in the text (Roberts, 1989). In this thesis, we opted for the list of keywords related to digital

¹ <https://www.lseq.com/en/data-analytics/sustainable-finance/esg-scores?esq=Sigmaroc+PLC>

transformation established by Chen and Li (2022) and Teng and al. (2022)

Word counting: Use software tools to count the occurrences of words or phrases in the text (Dicle & Dicle, 2018). In this thesis, we used Python software to count the frequency of the words in this lexicon in the annual reports for the 2023 fiscal year. Each of the 45 companies will be assigned a score corresponding to the words' frequency.

This method is characterized by its objectivity, reducing subjective bias through a systematic approach (Weber, 1984), its simplicity as it is easy to apply with software tools (Dicle & Dicle, 2018), and its quantification capacity to process and analyze large amounts of textual data quickly (Kostov and al., 2014).

All data analysis results are provided using python

The Table N °1 presents the measurement method chosen for each variable

Table N°1: Measure of variables

Variable	Measure
CSR	ESG- GLOBAL (Refinitiv)
CSR-Economic dimension	ESG-GOV (Refinitiv)
CSR-Social dimension	ESG-SOCIAL (Refinitiv)
CSR-Environmental dimension	ESG-ENVI (Refinitiv)
Digital transformation (TN)	Frequency of words related to digital transformation in annual report/total word

Source: established by the authors

4. Results and discussion

At this point, we will start with the descriptive statistics of each variable, and subsequently, we will try to test the validity of the hypotheses by the linear regression methods

4.1. Descriptive statistics and correlation

Table N°2 provides descriptive statistics of ESG variables and digital transformation. The descriptive statistics of the ESG variables provide a detailed view of the CSR performance among the 45 companies studied. The results show substantial variability across CSR's environmental, social, and governance dimensions.

- ESG Overall: The average ESG score is 38.84, with a standard deviation 14.56. Scores range from 9 to 71, indicating wide variation in companies' ESG practices.
- Environmental ESG: The average is 30.71, with a standard deviation of 18.38. Scores range from 3 to 84, suggesting widely varying environmental efforts among companies.
- ESG Governance: The average is 48.84, with a standard deviation 20.11. Scores range from 9 to 90, indicating a wide range of governance practices.
- ESG Social: The average is 37.58, with a standard deviation 17.99. Scores range from 1 to 75, showing varied efforts in social responsibility.
- The average value of 'TN' is 0.209. This indicates that, on average, the companies in the sample have a level of 'TN' close to 0.209. The standard deviation 0.215 shows that the 'TN' values vary moderately around the mean. A high standard deviation would indicate a more excellent dispersion of values, while a low standard deviation would indicate that the values are more concentrated around the mean.

Table N° 2: Descriptive statistics of CSR

Component	Count	Mean	Std Dev	Min	25th Percentile	Median	75th Percentile
ESG Overall	45	38.84	14.56	9	28	39	48
ESG Environmental	45	30.71	18.38	3	16	30	39
ESG Governance	45	48.84	20.11	9	34	49	61
ESG Social	45	37.58	17.99	1	27	34	49
TN (Digital Transformation)	45	0.209	0.215	0.001	0.102	0.141	0.211

Source: established by the authors

Analyzing the average ESG scores by sector (**Table N° 3**) reveals how different industries perform regarding CSR. The banking, finance, and insurance sectors generally outperform other sectors in overall ESG scores, particularly in governance, while sectors like construction and retail lag behind.

Table N° 3: Score ESG By Sectors

Sector	ESG Overall	ESG Environmental	ESG Governance	ESG Social
Agri-food	36.00	22.14	51.43	35.57
Construction	29.38	24.50	33.63	31.50
Banking, Finance, and Insurance	47.17	41.83	50.67	46.75
Energy	35.67	24.33	71.67	31.67
Retail	32.00	28.00	33.00	34.00
Hospitality	46.00	54.00	56.00	34.00
Mining	37.50	37.00	47.00	32.50
Health	40.50	20.50	37.00	52.50
Telecommunications and IT	37.80	29.40	53.00	30.00
Auto Sales	36.33	23.33	48.00	32.33
Ports	56.00	42.00	80.00	49.00

Source: established by the authors

Table N 4 presents the average digital transformation score of the companies in the sample according to their sector of activity

Table n° 4: Distribution of Digital Transformation Scores by Sector

Sector	Average TN
Agri-food	0.129657
Construction	0.143600
Banking, Finance, and Insurance	0.333857
Energy	0.233000
Retail	0.125000
Hospitality	0.154000
Mining	0.199000
Health	0.151000
Telecommunications and IT	0.211800
Auto Sales	0.079333
Ports	0.362000

Source: established by the authors

TN (Digital Transformation) scores also show significant variation across sectors. For example, the "Banking-finance and insurance" sector has a high Digital Transformation average (0.333857); however, the "Port" sector displays an even higher average (0.362000). In contrast, the "Auto Sales" sector has a lower TN score (0.079333), suggesting more modest levels of digital transformation.

The analysis of the correlation table (Table N°5) shows the following points.

- The ESG Environmental, ESG Governance, and ESG Social subcomponents are strongly correlated with the overall ESG score, with high coefficients: 0.874 for ESG Environmental, 0.867 for ESG Governance, and 0.817 for ESG Social. This is expected since these dimensions contribute directly to the overall ESG score.
- There are also significant correlations between the subcomponents, although these are weaker than their correlation with the overall ESG score. For example, ESG Governance and ESG Social have a correlation of 0.712, indicating a moderate relationship between these two dimensions.
- The ESG score has a moderate correlation with digital transformation (TN) (0.620), suggesting that companies investing in digital transformation initiatives tend to achieve better ESG scores. The ESG subcomponents also show moderate correlations with TN, ranging from 0.590 to 0.650.
- Age has a weak correlation with the overall ESG score (0.160) and its subcomponents and digital transformation (0.009). This suggests that the age of companies or structures does not play a significant role in ESG performance or digital transformation initiatives.
- The number of employees shows a weak negative correlation with the ESG score (-0.105), and the ESG subcomponents also have slightly negative correlations with the number of employees. Digital transformation has virtually no correlation with the number of employees (0.001).

Table N°5 : The correlation between the variables

Variable	ESG	ESG Envi	ESG Gov	ESG Social	TN	Age	Salarie
ESG	1.000	0.874	0.867	0.817	0.620	0.160	-0.105
ESG Envi	0.874	1.000	0.654	0.622	0.650	0.129	-0.159
ESG Gov	0.867	0.654	1.000	0.712	0.610	0.084	-0.110
ESG Social	0.817	0.622	0.712	1.000	0.590	0.153	-0.135
TN	0.620	0.650	0.610	0.590	1.000	0.009	0.001
Age	0.160	0.129	0.084	0.153	0.009	1.000	0.008
Salaries	-0.105	-0.159	-0.110	-0.135	0.001	0.008	1.000

Source: established by the authors

4.2. Regression results

The results of the regression (Table N°6) and robustness analyses validate the following hypotheses:

- H 1: TN positively impacts ESG Governance**: TN significantly enhances ESG Governance ($\beta = 49.83$, $p < 0.001$).

Table N°6: Table of regression

Variable	ESG Environmental model	ESG Governance model	ESG Social model
TN	55.144 (4.27)	49.833 (3.18)	46.821 (3.49)
Age	0.123 (1.69)	-0.016 (-0.18)	0.110 (1.46)
Salaries	-0.000819 (-1.24)	-0.000588 (-0.73)	-0.000614 (-0.89)
Sector Effect	Yes	Yes	Yes
Adj R ²	0.324	0.167	0.238
F (p-value)	8.03 (0.0003)	3.95 (0.0146)	5.58 (0.0026)
Observations	45.0	45.0	45.0

Source: established by the authors

- H 2: TN positively impacts ESG Social**: TN has a strong positive effect on ESG Social ($\beta = 46.82$, $p < 0.001$).

- H 3 : TN positively impacts ESG Environmental**: TN substantially impacts ESG Environmental ($\beta = 55.14$, $p < 0.001$)

The Variance Inflation Factor (VIF) values (Table N°7) indicate that all **VIF** values for the independent variables are below 5, the commonly accepted threshold indicating no multicollinearity concerns. This means that the independent variables (TN, Age, Salaries) do not excessively influence each other, and the regression coefficients can be interpreted reliably. So, we can use these models confidently without worrying that relationships between the independent variables will skew the results.

Table N°7: Table of VIF analysis

Variable	VIF (ESG Environmental)	VIF (ESG Governance)	VIF (ESG Social)
TN	1.49	1.49	1.49
Age	1.01	1.01	1.01
Salaries	1.49	1.49	1.49
Sector Effect	Yes	Yes	Yes
Adj R ²	0.324	0.167	0.238
F p-value	0.0003	0.0146	0.0026
Observations	45	45	45

Source: established by the authors

Therefore, we adopt another solution for dealing with multicollinearity. Propensity Score Matching (PSM) was conducted to compare the impact of Digital transformation (TN) on various ESG components (Environmental, Governance, Social) by accounting for potentially confounding factors like Age and Salaries (Number of Employees). The objective was to ensure that companies with high TN were matched with companies having similar characteristics but with low TN to isolate the effect of TN on ESG outcomes.

The propensity score for each company was calculated based on Age and Salaries. Companies were then matched using nearest-neighbor matching, ensuring that each company in the high-TN group (treatment) was paired with a company from the low-TN group (control) that had a similar propensity score.

After matching, the two groups were balanced in terms of Age and Salaries, meaning that differences in ESG outcomes between the groups could be attributed to the impact of TN rather than other confounding variables. The matching process yielded 22 treatment group observations and equal control group matches. (Table N°8)

Once matching was completed, separate regression models were run for each ESG component using the matched sample. (Table N°9, N°10, N°11)

Table N 8: PSM Results

Variable	Treatment (Mean); N=22	Control (Mean); N=22	p-value
TN	0.346	0.0931	3.138
Age	63.681	69.863	0.526
salaries	3704.636	2968.727	0.188
PSCORE	0.508	0.495	1.0

Source: established by the authors

The positive and statistically significant coefficients for TN in all three models suggest that companies with higher levels of Digital Transformation tend to perform better in all ESG dimensions (Environmental, Governance, Social). The matching process ensures that this relationship is not confounded by differences in company age or size (measured by Salarie).

The adjusted R² values suggest that the models explain a moderate amount of the variance in ESG scores, with the ESG Environmental model showing the most explanatory power. These findings underscore the importance of TN as a driver of ESG performance, reinforcing the idea

that companies that embrace digital and transformational changes are likely to improve their sustainability and governance outcomes.

Table N° 9: ESG Environmental model (Regression results with propensity score matched samples)

Variable	Coefficient	t-statistic
Intercept	17.576	3.161
TN	46.849	4.061
Age	0.107	1.58
Salarie	-0.000475	-0.882
Secteur Effect	Yes	
Adj R ²	0.291	
F-statistic	6.901	
F p-value	0.0007	
Observations	44.0	

Source: established by the authors

Table N° 10: ESG Governance model (Regression results with propensity score matched samples)

Variable	Coefficient	t-statistic
Intercept	33.397	4.554
TN	58.118	3.82
Age	0.064	0.719
Salarie	-0.000926	-1.303
Secteur Effect	Yes	
Adj R ²	0.227	
F-statistic	5.217	
F p-value	0.0039	
Observations	44.0	

Source: established by the authors

Table N° 11: ESG Social model (Regression results with propensity score matched samples)

Variable	Coefficient	t-statistic
Intercept	18.969	3.524
TN	44.406	3.976
Age	0.13	1.982
Salarie	-0.000137	-0.262
Secteur Effect	Yes	
Adj R ²	0.321	
F-statistic	7.778	
F p-value	0.0003	
Observations	44.0	

Source: established by the authors

4.3 Discussion

The results of this study provide evidence that digital transformation positively impacts Corporate Social Responsibility (CSR) performance among companies listed on the Casablanca Stock Exchange. The positive relationship between digital transformation and ESG scores, particularly in governance and social responsibility, suggests that companies that invest in digital technologies are more likely to improve their CSR performance.

The result of regression models and the PSM approach strengthens the validity of these results by ensuring that the treatment and control groups are comparable, thus allowing for a more accurate estimation of TN's impact on ESG outcomes. The consistent positive effect of TN across all ESG dimensions highlights the strategic value of transformation initiatives in driving corporate social responsibility and sustainability performance.

The empirical study's results showed the validity of the hypotheses tested and the postulates resulting from the literature review: digital transformation has a positive impact on the scores

of the companies in our sample, i.e., the scores relating to governance, social, and environmental.

5. Conclusion

In this research, we intend to define the concepts of CSR and digital transformation and then conduct a literature review of studies that examine the impact of digital transformation on CSR in its three components: economic, social, and environmental.

This study has demonstrated that digital transformation significantly improves the CSR performance of companies listed on the Casablanca Stock Exchange. The findings suggest that sectors with higher levels of digital transformation tend to achieve better ESG scores, particularly in governance and social responsibility.

The implications for businesses are clear: investing in digital transformation is not just about modernizing technology but is also a strategic imperative for enhancing CSR performance. As companies continue integrating digital technologies, they will likely see improvements in their sustainability practices, stakeholder engagement, and overall ESG performance.

Future research could explore the digital strategies that are most effective in improving CSR performance and investigate the potential non-linear relationships in greater detail. Additionally, expanding the sample to include companies from other regions could provide a more global perspective on the impact of digital transformation on CSR.

References:

- (1). AFNOR (2006), Doc DDRS80, relatif à la définition du périmètre de la RSE dans le cadre de l'élaboration de la norme ISO 26000.
- (2). Akter, S., Wamba, S. F., Gunasekaran, A., Dubey, R., & Childe, S. J. (2016). How to improve firm performance using big data analytics capability and business strategy alignment. *International Journal of Production Economics*, 182, 113-131. <https://doi.org/10.1016/j.ijpe.2016.08.018>
- (3). Arunachalam, D., Kumar, N., & Kawalek, J. P. (2018). Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges, and implications for practice. *Transportation Research Part E: Logistics and Transportation Review*, 114, 416-436. <https://doi.org/10.1016/j.tre.2017.04.001>
- (4). Benaïcha, S. (2017). *Les principes de la responsabilité sociale et la gestion éthique intégrée*. Paris: Presses Universitaires de France.
- (5). Court, D. (2015). Getting big impact from big data. *McKinsey Quarterly*, 2015(3), 55-66.
- (6). Deltour, F., & Lethiais, V. (2014). L'impact des technologies de l'information et de la communication sur la performance des PME: Une analyse de la dépendance aux ressources. *Management & Avenir*, 67(7), 33-51. <https://doi.org/10.3917/mav.067.0033>
- (7). Dussart, C. (2015). Innovation par la transformation complète: Comment les TIC peuvent structurer une innovation en profondeur. *Revue française de gestion*, 41(254), 149-167.
- (8). ElMassah, S., & Mohieldin, M. (2020). Digital transformation and localizing the sustainable development goals (SDGs). *Review of Economics and Political Science*, 5(3), 186-203. <https://doi.org/10.1108/REPS-10-2019-0132>
- (9). Ferhan, A. (2019). Le rôle des stratégies d'innovation dans la transformation numérique des entreprises. *Revue internationale de gestion*, 23(1), 45-63.

- (10). Feroz, A. K., Zo, H., & Chiravuri, A. (2021). Digital transformation and environmental sustainability: A review and research agenda. *Sustainability*, 13(3), 1530. <https://doi.org/10.3390/su13031530>
- (11). Garten, J., & Li, Y. (2018). Text mining and the new economy: From keywords to insights. *Journal of Data Science and Management*, 6(2), 112-130.
- (12). Gunasekaran, A., Papadopoulos, T., Dubey, R., & Childe, S. J. (2017). Big data and predictive analytics for supply chain and organizational performance. *Journal of Business Research*, 70, 308-317. <https://doi.org/10.1016/j.jbusres.2016.08.004>
- (13). Gupta, M., & George, J. F. (2016). Toward the development of a big data analytics capability. *Information & Management*, 53(8), 1049-1064. <https://doi.org/10.1016/j.im.2016.07.004>
- (14). Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288. <https://doi.org/10.1177/1049732305276687>
- (15). Kıymalıoğlu, A. (2020). Leveraging artificial intelligence for enhancing CSR strategies. *Journal of Business Ethics*, 167(4), 643-659. <https://doi.org/10.1007/s10551-019-04164-w>
- (16). Na, Z., Wang, Y., & Zhang, D. (2021). The impact of digital transformation on corporate social responsibility. *Sustainability*, 13(4), 2146. <https://doi.org/10.3390/su13042146>
- (17). Oumil, M. (2020). La transformation numérique : Enjeux et perspectives. *Revue des Sciences de Gestion*, 23(6), 50-67.
- (18). Roberts, C. W. (1989). *Content analysis: The state of the art and the future directions*. Springer.
- (19). Robertsons, J., & Lapiņa, I. (2023). Digital workplace: New paths for work safety and stress management. *Journal of Occupational Health Psychology*, 28(1), 13-27. <https://doi.org/10.1037/ocp0000304>
- (20). Rosário, P., Castro, R., & Azevedo, G. (2022). Reducing environmental impact through digital innovation: A case study of the energy sector. *Journal of Cleaner Production*, 324, 129314. <https://doi.org/10.1016/j.jclepro.2021.129314>
- (21). Shdifat, L. (2022). A systematic review of Big Data Analytics (BDA) capabilities and their impact on business performance. *International Journal of Information Management*, 60, 102356. <https://doi.org/10.1016/j.ijinfomgt.2020.102356>
- (22). Truong, T. N. (2022). Blockchain and waste management: Exploring the role of digital technologies in addressing environmental challenges. *Journal of Cleaner Production*, 345, 130652. <https://doi.org/10.1016/j.jclepro.2022.130652>
- (23). Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2019). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889-901. <https://doi.org/10.1016/j.jbusres.2019.09.022>
- (24). Vogler, D., & Eisenegger, M. (2021). The impact of digitalization on CSR communication: A framework for stakeholder engagement and reputation management. *Corporate Communications: An International Journal*, 26(4), 794-809. <https://doi.org/10.1108/CCIJ-01-2020-0015>