



## Research article

# The moderating effect of liquidity on the relationship between sustainability and firms' specifics: Empirical evidence from indian manufacturing sector

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## ABSTRACT

The current study attempts to examine the moderating effect of liquidity on the relationship between firms' specific and sustainability expenses. The study is based on secondary data over a period from 2015 to 2021. The results are estimated using panel data with fixed-effect models. The results indicate that liquidity enhances and strengthens the ability of a company to spend more on environmental, social, and employee compensation sustainability expenses. In the same context, the results reveal that there is an insignificant moderation effect of liquidity with the financial performance of a company, indicating that the liquidity of companies with higher financial performance does not enhance and strength their ability to spend more on sustainability expenses. Further, the extent of liquidity in larger companies affects positively and significantly the level of employee compensation but not environmental and social spending. Finally, the findings show that greater leverage with less liquidity negatively affects the levels of sustainability spending. This study provides a unique contribution to the existing literature by introducing the moderating effect of liquidity on the relationship between firms' specific and sustainability expenditures. It highlights the direct effect of firms' specific determinants and the moderating effect of liquidity on three categories of sustainability expenses which are environmental expenses, social expenses, and employee compensations. Therefore, this research has valuable implications for company managers, financial analysts, policymakers, and other stakeholders.

## 1. Introduction

Sustainable development is defined as the usage of resources to satisfy human economic, social, and environmental demands that benefit both current and future generations [1,2]. Long-term corporate success while contributing to economic and social progress, a healthy environment, and a stable society is what sustainability is all about. It is about making a constructive contribution to society

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while safeguarding the environment and society in which the company works [3,4]. On the other hand, rapid urbanization has resulted in a rise in slum inhabitants, insufficient and overloaded infrastructure and services, increased air pollution, and uncontrolled urban growth (United Nations, 2021). As a result, new restrictions are being implemented at the industry level to encourage businesses to become more sustainable. Globally, the United Nations Global Compact, the United Nations Guiding Principles on Business and Human Rights, the Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises, and the International Labour Organization's Declaration of Principles Concerning Multinational Enterprises on Social Policy are all popular guidelines for influencing companies to be more sustainable. Regulators and stakeholders continue to encourage businesses to pay attention to social and environmental concerns [5–7].

Sustainability is more important than ever in the manufacturing industry. When used properly, green innovation reduces waste and pollution while also generating financial benefits and improving public perception [8]. The manufacturer's sustainability and existence are primarily threatened by globalization and the rapid advancement of technology. Thus, Manufacturers must increasingly pay attention to resource utilization, waste treatment, water pollution, employee welfare, air emissions, etc. Failure to address these sustainability challenges may severely harm the company's reputation and, as a result, its performance. For example, Coca-Cola Company has been chastised for polluting local water resources in India; Apple Inc. has been criticized for exploiting child labour in the production of its iPhones and Macintosh computers; and Dell Inc. has been chastised for improperly disposing of electronic garbage [9]. Environmental and safety issues have plagued Chinese dairy producers [10]. Misconduct in environmental and social management by these firms has harmed their business performance and damaged their brand.

These Misconducts demonstrate the significance of comprehending sustainability spending and its link to a company's reputation and success.

Thus, studying sustainability concerns is vital for organizations functioning in a competitive global context, and it should be emphasized in corporate management's decision-making processes. Companies will not be able to preserve their competitive edge in the long term if this is not done [11]. Because sustainability is so important to businesses, the authors look at the factors that influence sustainability expenditure in Indian manufacturing enterprises. The manufacturing sector is regarded as one of the cornerstones of any economy's development [12]. The sector must be socially aware since it produces items and handles complicated equipment and dangerous chemicals, making it more likely to generate environmental, labor, and community concerns [13]. The manufacturing sector in India has exploded as a high-growth industry. Because of the energy consumption, pollutants, and other wastes emitted throughout the procedures, the industry is expected to have major environmental consequences. Concerns about worker health and safety are another critical concern plaguing the sector, which is characterized by labor-intensive operations [14]. Further, India is one of the manufacturing hubs for the whole world; thus, the authors attempt to investigate the manufacturing firms' specific and its impact on sustainability expenditure. Moreover, India is the first country to make CSR mandatory. Under the Companies Act of 1956, 2013, the Ministry of Business Affairs (MCA) of the Government of India controls and regulates the corporate sector. The Companies Act 1956 was amended in 2013 to add a CSR Policy under Section 135. This policy, known as the 'CSR Rules,' lays forth the criteria that firms must follow while performing CSR. Since April 1, 2014, Indian corporate enterprises have been subject to CSR regulations [15, 16]. Hence, the study has taken liquidity into account and sought to examine the moderation effect of liquidity on the association between firms' specific and sustainability expenditures.

Numerous studies have attempted to evaluate corporate sustainability performance, e.g. Refs. [7,17,18]. Nevertheless, no study tried to examine the determinants of sustainability expenditure in manufacturing firms' businesses. Therefore, this study intends to shed light on two specific questions. What are the determinants of sustainability expenditure of Indian manufacturing firms? And does liquidity moderate the association between firms' specific and sustainability expenditure of Indian manufacturing firms? Based on the literature review, our paper proposes the following contributions. Firstly it seeks to examine the determinates of sustainability expenditure of Indian manufacturing firms. This inquiry is critical because, despite the growing research into sustainability, e.g. Refs. [6,19–21], no research attempted to explore the factors that influence sustainability spending. Secondly, it evaluates the moderation effect of firms' liquidity on the association between firms' specific and sustainability expenditure of Indian manufacturing firms. The manufacturing sector is regarded as one of the cornerstones of any economy's development [12]. Understanding the moderating impacts of liquidity on firms' specific and sustainability expenditures assists in placing the sustainability expenditure literature in perspective and gives fresh insights into relevant sustainability challenges. Thirdly, this research is distinguished from previous research which was based on primary data, e.g. Ref. [22], who evaluated the impact of CEOs' attitudes on companies' sustainability spending [6], who analyzed the relationship between financial resource slack and sustainability spending.

Further, this research is notable from other studies that focused only on government spending on sustainability, e.g. Refs. [23–25]. Fourthly, this study focuses only on manufacturing firms. Because various sectors have diverse business circumstances, single sector-focused research would give deeper and unique insights [26]. Finally, unlike previous research which measured sustainability by disclosure indices such as environmental index, social index, and governance index; this study is contributing to the existing literature by measuring sustainability in monetary terms using variables such as the amount of money that manufacturing firms are spending on environmental, social, economic aspects.

The sample of this research consists of 75 listed manufacturing firms. The data was retrieved from the Prowess IQ database for the period from 2015 to 2021. This research found that the company's age, market capitalization, company size, and sales growth are significant positive determinants of total sustainability expenses, liquidity, financial performance, leverage, and total expenses are significant negative determinants of sustainability spending. Further, the results indicate that the moderation effect of liquidity with both market capitalization and sales growth enhances a company's ability to spend more on sustainability expenses.

To this end, the next section reviews previous research on sustainability expenditures; the third section provides a brief description of the methodological approach and is followed by data analysis, then discussion and implications; finally, the research is summarized,

and implications are provided.

## 2. Literature review

Today's corporate world and most firms are grappling with the problem of sustainability. Sustainability research has gotten a lot of interest from companies and scholars all around the world. The majority of sustainability research is focused on sustainability in general, e.g. Refs. [7,17,18,27,28] or country wise research on the role of governments in sustainability expenditure, e.g. Refs. [23–25]. [17] sought to measure the worldwide chemical industry's sustainability trend from 2004 to 2014 and determine the main forces driving the framework of Green Total Factor Productivity (GTFP). The results demonstrate that the most developed nations scored well in chemical industry sustainable production, whereas the developing nations performed poorly [23]. focused on the long-term viability of military spending and the link between military expenditure and economic development in large nations. It was discovered that certain nations, such as France and South Korea, have strong military spending sustainability, while others are in bad condition [29]. presented solutions and recommendations on how to advance China's sustainable development in the post-epidemic age after analyzing the chances and problems it confronts for GER. In the same area, from January to May 2020 [30], looked into the relationship between the volatility of the World, the USA, Europe, China, and Emerging Markets ESG Leaders indexes and the Coronavirus Panic Index (PI). Wavelet coherence and wavelet phase difference techniques were used in the study. The results revealed medium to high coherence between the PI and the other ESG indicators. These indices do, however, exhibit periods of reduced coherence throughout a range of time and frequency ranges. In the same vein [31], used wavelet analysis to investigate how the Covid-19 pandemic social media coverage affected the volatility of ESG (Environmental, Social, and Governance) leaders' indexes covering the world, the United States, Europe, China, and Emerging Markets. The Media Coverage Index and the price changes of the ESG Leaders indexes showed periods of low, medium, and high coherence throughout the research. The low coherence intervals show the ESG investments' ability to diversify portfolios amid a systemic epidemic like COVID-19. The study noticed variations in the behaviour of several geographic indexes, demonstrating their potential use in creating cross-geography hedging strategies [32]. conducted an empirical study of the ECB deposit rate dynamics between 2014 and 2020 to determine how far this rate may be decreased without resulting in persistent yield curve inversions (YCI), or lower yields over longer horizons. It speaks to the long-term viability of conventional banking. This analysis discovered that the ECB deposit rate is likely to produce full YCIs starting from the bottom boundary of 80 basis points below zero.

Another area of research in the field of suitability that attracted the attention of research scholars is corporate sustainability performance, e.g. Refs. [21,27,28]. [21] aimed to conceptual and empirically broaden the argument regarding the linearity assumption around the curvilinear relationship between corporate sustainability performance and reporting practices (CSPR) and corporate financial performance (CFP). To achieve this goal, the research looked at the financial and non-financial characteristics of the top global energy companies from 2006 to 2018. The findings indicated that CSPR and CFP had a significant inverted U-shaped association [27]. investigated the sustainability and corporate performance of the 29 major multinational firms in the transportation manufacturing sector. The findings revealed that sustainability positively correlates with corporate performance on average and that sustainability performance outperforms corporate success for all international firms [33]. analyzed the effect of creative activities by firms and ESG variables on export intensity across a large sample of emerging economies. The study sample's foundation was the BEEPS indexes. Customer certification or environmental standard compliance requirements have a big beneficial effect. The use of energy-saving technology also benefits society. At the same time, the study reached the counterintuitive conclusion that having a manager in charge of preserving the environment and the climate has a considerable detrimental effect on accessing overseas markets. Similarly [34], examined the influence of ownership structure, institutional environment development, and debt market profile on how members of corporate top management from 28 former communist nations perceived financial limitations. The study provided evidence that foreign ownership eases the limits on access to financial resources during and after the crisis. The significance of state ownership was also covered in the study. The study discovered a nonlinear U-shape association between local currency bond market volumes.

As public concern about the environment grows, the government pushes businesses to take more responsibility for fixing environmental issues [35,36]. For instance, governments push firms to spend more money on the environment. This has motivated researchers to investigate businesses' environmental expenditure, e.g. Refs. [37–39]. [37] examined environmental expenditures in the chemical sector to see whether businesses had outstanding financial success. Data Envelopment Analysis is used to compare the efficiency of enterprises with and without environmental spending. The findings showed that there is a link between environmental expenditures and financial performance. Moreover, businesses that spend money on the environment are more efficient and productive. From a natural-resources perspective [38], described the mixed link between environmental spending and economic performance. Environmental spending has a detrimental influence on financial performance, according to the research, due to pollution prevention capabilities [39]. investigated the link between environmental spending, innovation, and revenue in the Malaysian manufacturing sector. The findings of panel data analysis revealed that, across all industrial sectors, both environmental spending and creation had a significant impact on revenue.

Other studies examined the impact of corporate social responsibility expenditure on firms' performance, e.g. Refs. [40–43]. [40] used the Ohlson model to analyze a worldwide and listed sample of 8992 company-year data from 2012 to 2017 and found that environmental expenditures have a U-shaped connection with firm value. In contrast, social expenditures have an inverted U-shaped association [41]. sought to investigate the link between corporate social responsibility (CSR) expenditures and both financial and non-financial performance of Jordanian commercial banks. The research discovered a statistically significant positive association between CSR spending and financial success [42]. investigated whether CSR expenditures by public firms in Indonesia are oriented

towards charity and, second, if CSR spending is connected to future corporate performance. The findings show that Indonesian firms' CSR spending is primarily for charitable purposes and has little impact on their future performance. Furthermore, the CFO is unconnected to CSR spending [43]. explored the link between corporate social responsibility (CSR) spending and business financial performance in an emerging market. The data reveal that CSR spending is strongly and positively related to corporate financial success as measured by changes in return on assets.

Some other researchers attempted to examine the determinants of corporate sustainability performance such as [44–47]. [44] used panel data for 12 Asian nations from 1990 to 2014 to analyze the elements that contribute to sustainable development as assessed by adjusted net savings. The results of the random-effect estimation demonstrate a more significant and better overall fit, indicating a significant and positive impact of per capita income and financial development on sustainable development and a significant and negative impact on the inflation rate, natural resource rent, and time. The findings indicated that sustainable development requires maintaining a suitable balance of natural resources. Similarly [45], examined the elements that influence high levels of corporate sustainability performance (CSP), as measured by inclusion in the Dow Jones Sustainability World Index. Compared to traditional organizations, the data showed that leading CSP firms are much larger, growing at greater rates, and have higher returns on equity. Leading CSP businesses do not have lower leverage or more free cash flows than other firms, as we had anticipated. In the same vein [46], looked at what motivates strong business sustainability performance in Brazil, a developing nation. The findings are in line with earlier research for US corporations and show that Brazilian leading corporate sustainability performance enterprises are much larger and have a higher return on equity than their peers. According to research, business sustainability performance is more likely to be influenced by finance features in emerging markets like Brazil than in industrialized nations [47]. evaluated and ranked the many aspects of business sustainability performance. The study found that the key element for businesses is an economic indicator. Innovation is seen to have the greatest impact on economic success, whereas shareholder responsibility and environmental management strategies have a significant impact on social and environmental performance, respectively.

Based on the reviewed literature, it is noticed that a lot of research has been carried out in the field of sustainability. Some researchers focused on government sustainability expenditures; others researched the association between sustainability performance and its asocial corporate performance. Moreover, some scholars examined the impact of corporate social responsibility expenditure on firms' performance, and few others reviewed the effect of environmental expenditure on firms' performance. The lack of studies on the determinants of sustainability expenditures by firms is evident. Thus, this study seeks to examine the determinants of sustainability expenditure in Indian manufacturing firms.

### 3. Research design/methodology

#### 3.1. Data and sample description

Unlike previous studies based on primary data, this research utilizes secondary data retrieved from the Prowess IQ database (India's leading financial information source) for the period from 2015 to 2021. The database is extensively used by several researchers for collected data, e.g. Refs. [48–51]. This research focuses on the Indian manufacturing sector. It is believed that a single sector-focused study would give deeper and unique insights, as different sectors have different business operations [26]. The sample size of this research consists of 75 manufacturing firms with 525 years observations. Some researchers employed functional linear forms such as [52], other researchers used panel data analysis e.g., Refs. [53–55]. Following these studies, the data of the present research are analyzed using a panel regression model. According to Ref. [56], Panel data have superior control over individual multicollinearity and heterogeneity. All of the multiple regression's underlying assumptions were found and satisfied. Further, the study runs a robust regression analysis to examine the absence of heterogeneity. To estimate the outcomes, the current study uses numerous phases and analytical methods. In the first stage, we calculated the effect of firms' specific on sustainable expenditures. In the following stage, we assessed how liquidity affected the link between a firm's sustainability and its specifics. Robustness tests were thus carried out at the third step of the analysis. In order to assess the sensitivity of the findings, we included some extra analyses using different metrics in the last step of our research. Table (1) below demonstrates the sample distribution over the manufacturing industries.

**Table 1**  
Industry-Wise distribution of the sample.

Industry name	Number of firms	Number of observations	The relative importance of the sample
food and agro-based product	6	42	8%
Textiles	7	49	9.333%
chemical and chemical products	37	259	49.333%
consumer goods	4	28	5.333%
construction materials	7	49	9.333%
others	14	98	12.8%
Total	75	525	100%

Number of observations = number of firms \* number of years (period of the study).

Relative importance of the sample = number of firms from each industry/sample size.

### 3.2. Variables and measurement

#### 3.2.1. Dependent variable: sustainability expenditure

Most researchers mention three interrelated dimensions of sustainability, e.g., economic, social, and environmental dimensions [57,58,58,59]. This study is following these researchers and takes economic, social, and environmental dimensions for measuring sustainability. More specifically, the study took social and community expenses for measuring the social dimension, environment, and pollution control-related expenses for measuring the environmental dimension and employees' compensation expenses for measuring the economic dimension.

**3.2.1.1. The social dimension.** A company may manage its influence on society in two ways: first, by eradicating or at least limiting any harmful effects; and second, by taking suitable actions to benefit communities via its hiring policies, fundraising, volunteering, and charity giving. In this research, this diminution of sustainability is measured by social and community expenses and employees' compensation expenses that a manufacturing firm spends every year to manage the impact of its activities on society.

**3.2.1.2. The environmental dimension.** The environment is the second component of any straightforward sustainability program, especially climate change. Firms should minimize any adverse environmental effects of their operations and, if possible, guarantee that they have no negative impact at all. In other circumstances, they may attempt to repair the harm that already occurred. In this research, this diminution of sustainability is measured by Environment and Pollution Control Related Expenses that a manufacturing firm spends every year to mitigate Environment and Pollution risks in its operations. According to Cost Accounting Standard on Pollution Control Cost (CAS-14), "Pollution control means the control of emissions and effluents into the environment. It constitutes the use of materials, processes, or practices to reduce, minimize, or eliminate the creation of pollutants or wastes. It includes practices that reduce the use of toxic or hazardous materials, energy, water, and other resources".

**3.2.1.3. The economic dimension.** A firm needs to have Activities that fit under the economic pillar, including compliance, proper governance, and risk management. Sometimes, this pillar is referred to as the governance pillar, referring to good [corporate governance](#). Due to the non-availability of governance data in the prowess IQ database, this dimension was not measured in this research.

#### 3.2.1.4. Independent variables

Following previous studies, e.g. Refs. [60–63], this research used firms' specific such as firms' age (AGE), current ratio (CR), leverage (LEV), total expenses (EXP), market capitalization (MCAP), return on assets (ROA), sales and firms size (TA) as firm-specific determinates as predictors of the dependent variable. [Table \(2\)](#) provides the operational definition for the variables of the study.

### 3.3. Model specification

The sample size of this research consists of 75 manufacturing firms with 525 years observations, which is adequate for panel data analysis. According to Ref. [64], panel data analysis offers various advantages, including more accurate estimates than cross-sectional and time-series methodologies. Similarly [56], stated that panel data analysis best controls individual multicollinearity and heterogeneity. Thus, this research applied a seven-year panel data analysis on 75 manufacturing firms. Based on this background, regression models with fixed effects are used in this study. Based on the above context and following the application of panel data analysis by Refs. [49,65–70] the study is applying panel data analysis.

**Table 2**  
Variables description.

Measurements	Symbol	Definition
<b>Dependent variable</b>		
Social and community expenses	SOCIAL	They refer to expenses incurred by companies to benefit society or the community in general. They may be like expenses on building or maintaining public parks, garden maintenance, building temples, constructing roads or contributing to social occasions, etc
Environment and Pollution Control Related Expenses	ENV	It refers to all expenses spent to control or reduce pollution caused during the manufacturing process. These expenses can be for effluent disposal, environment development, etc.
Employees' Compensation Expenses	EMPCOM	It refers to the expenses apart from salary, which results in employee benefits such as direct expenditure on maternity, education, cultural, recreational facilities, etc.
<b>Independent variables</b>		
Firms' age	AGE	The total number of years in which the firm has been operating
Leverage	LEV	Is the ratio of total debt to equity
Total expenses	EXP01	The total expenses of a firm
Market capitalization	MCAP	It is the share price multiplied by the number of shares outstanding
Return on assets	ROA	It is the ratio of net income divided by total assets
Firms' size	TA	It is the logarithm of total assets
<b>Moderating variable</b>		
Current ratio	CR	The ratio of current assets to current liabilities

To investigate the effect of firms' specific on sustainability expenses, the following models are framed as shown in regression equations (1)–(3):

$$FS_{it} = \alpha + \beta_1 \sum_{j=1}^8 X_{it} + \epsilon_{it} \tag{1}$$

Where  $X_t$  represents firms' specifics, and  $i, t$ , and  $\epsilon_{it}$  measure the individual effect, the temporal effect, and the stochastic error, respectively, where:

$$\sum_{j=1}^8 X_{it} = \alpha + \beta_1 MACP_{it} + \beta_2 LIQ_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 EXP_{it} + \beta_6 SIZE_{it} + \beta_7 SALES_{it} + \beta_8 AGE_{it} + \epsilon_{it} \tag{2}$$

Accordingly, *Sustainability* is functioned by  $\sum_{j=1}^8 X_{it}$  as an indicator of firms' specifics +  $\epsilon_{it}$ . Based on these equations, the following primary model is formulated:

$$SUS_{it} = \alpha + \beta_1 MACP_{it} + \beta_2 LIQ_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 EXP_{it} + \beta_6 SIZE_{it} + \beta_7 SALES_{it} + \beta_8 AGE_{it} + \epsilon_{it} \text{ (Model 1)} \tag{3}$$

To estimate the moderating effect of liquidity on the relationship between firms' specific and sustainability expenses the following regression modes is used as shown in equation (4).

$$SUS_{it} = \alpha + \beta_1 MACP_{it} + \beta_2 MACP_{it} * LIQ_{it} + \beta_3 LIQ_{it} + \beta_4 ROA_{it} + \beta_5 ROA_{it} * LIQ_{it} + \beta_6 LEV_{it} + \beta_7 LEV_{it} * LIQ_{it} + \beta_8 EXP_{it} + \beta_9 EXP_{it} * LIQ_{it} + \beta_{10} SIZE_{it} + \beta_{11} SIZE_{it} * LIQ_{it} + \beta_{12} SALES_{it} + \beta_{13} SALES_{it} * LIQ_{it} + \beta_{14} AGE_{it} + \beta_{15} AGE_{it} * LIQ_{it} + \epsilon_{it} \text{ (Model 2)} \tag{4}$$

#### 4. Data analysis

##### 4.1. Descriptive statistics

Table (3) provides minimum, maximum, mean, and standard deviation statistics. The results show that sustainability expenses vary between 9.90 million and 17161.71 million, with an average of 179.42 million and a standard deviation of 18202.62 million. The standard deviation of sustainability spending indicates a high variation among the sampled companies regarding their spending on sustainability expenses. Sustainability expenditures are divided into three types of expenses: employee compensation, social spending, and environmental expenses. Notably, the results demonstrate that employee compensation is the highest compared to social and environmental expenditures. While the minimum spending on employee compensation is 3.50, the minimum spending on social is 0.40, and environmental is 0.10. However, the maximum expenditure on employee compensation is 15470.10, which is greater than social and environmental expenses, 1020 and 1410, respectively. Further, the average employee compensation expenses are 713.33. However, the social average expenditure is 116.74, and environmental expenses is 49.35.

**Table 3**  
Descriptive statistics.

Variables	Minimum	Maximum	Mean	Std. Dev.
<b>Dependent variables</b>				
SUS	9.90	17161.71	879.42	1822.62
SOCIAL	0.40	1020.00	116.74	117.43
ENV	0.10	1410.00	49.35	131.86
EMCOM	3.50	15470.10	713.33	1693.33
<b>Independent variables</b>				
MCAP	3.90	963664.20	26728.98	85687.29
ROA	-85.59	53.71	5.72	9.47
LEV	0.01	1220.60	3.93	53.80
EXP	256.83	115814.70	9408.90	20125.63
TA	42.10	233509.60	13256.93	30772.30
AGE	7.00	74.00	32.69	11.75
<b>Moderating Variable</b>				
LIQ	0.04	12.71	1.66	1.42
SUS/EXP	0.04	0.15	0.10	0.09
SOCIAL/EXP	0.027	0.01	0.01	0.01
ENV/EXP	0.019	0.01	0.01	0.01
EMCOM/EXP	0.054	0.13	0.08	0.08

(SUS) stands for total sustainability expenditure, (SOCIAL) stands for Social and community expenses, (ENV) stands for Environment and Pollution Control Related Expenses, (EMPCOM) stands for Employees' Compensation Expenses, (AGE) stands for Firms' age, (LEV) stands for Leverage, (EXP) stands for Total expenses, (MCAP) stands for Market capitalization, (ROA) stands for Return on assets, (TA) stands for Firms' size, (CR) stands for Current ratio.

Regarding firms' specifics, the results show that the average market capitalization is 26728.98 million with a standard deviation of 85687.29, indicating a high variation in the market capitalization of these companies. In the same context, financial performance as measured by ROA has an average of 5.72 with a standard deviation of 9.47. Leverage has an average of 3.93, and total assets have an average of 14256.93 million. The age of sampled companies varies between a minimum of 4 and a maximum of 74, with an average of 33 years. Notably, the minimum total expenses is 256.83 million, with a maximum of 115814.70 million and an average of 9408.9 million. These expenses are the total expenses spent by the sampled companies, excluding total sustainability expenses. The total sustainability expenses of these companies form 10% of the average total expenses. More specifically, employee expenses constitute 8% of the total average expenses, and both social and environmental expenses each represent 1% of the total average expenses.

4.2. Correlation matrix

Table (4) presents the Spearman correlation of the variables. The results indicate that all dependent variables positively correlate with all company specifics except for leverage. This suggests that sustainability expenses have a high correlation with firms' specifics, and an increase or greater value of firms' specifics leads to higher sustainability spending. Independent variables are satisfactorily independent as long as there is no correlation coefficient with a value of more than 0.70. In other words, values below 0.70 indicate the absence of multicollinearity (Almaqatari et al., 2018). The result shows that the maximum correlation coefficient value between the independent variables in this study is 0.67, which indicates the absence of multicollinearity.

4.3. Main analysis – direct effect models

To evaluate the direct effect of firms' specific on sustainability spending, three OLS regressions are developed (models (1a), (1b), and (1c)) as shown in equations (5)–(7). First, the impact of  $\sum_{j=1}^8 X_{it}$  as indicators of firms' specifics on sustainability, environmental expenses are estimated. Second and third, the impact of  $\sum_{j=1}^8 X_{it}$  as indicators of firms' specifics on social and employee sustainability spending are estimated.

$$SENV_{it} = \alpha + \beta_1 MACP_{it} + \beta_2 LIQ_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 EXP_{it} + \beta_6 SIZE_{it} + \beta_7 SALES_{it} + \beta_8 AGE_{it} + \epsilon_{it} \text{ (Model 1a)} \tag{5}$$

$$SOCIAL_{it} = \alpha + \beta_1 MACP_{it} + \beta_2 LIQ_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 EXP_{it} + \beta_6 SIZE_{it} + \beta_7 SALES_{it} + \beta_8 AGE_{it} + \epsilon_{it} \text{ (Model 1b)} \tag{6}$$

$$EMP_{it} = \alpha + \beta_1 MACP_{it} + \beta_2 LIQ_{it} + \beta_3 ROA_{it} + \beta_4 LEV_{it} + \beta_5 EXP_{it} + \beta_6 SIZE_{it} + \beta_7 SALES_{it} + \beta_8 AGE_{it} + \epsilon_{it} \text{ (Model 1c)} \tag{7}$$

The results in Table (5) model (1a) show that environmental spending is significantly influenced by market capitalization, total assets, total expenses, sales growth, and liquidity. Market capitalization has a significant positive effect on environmental spending at the level of 1% ( $\beta = 0.001, p < 0.01$ ), total assets has a significant positive effect at the level of 5% ( $\beta = 0.003, p < 0.05$ ), total expenses impacts environmental expenses positively at the level of 10% ( $\beta = 0.009, p < 0.10$ ), and liquidity has a significant positive effect at the level of 5% ( $\beta = 1.432, p < 0.05$ ) however, sales growth has a negative influence on sustainability expenses at the level of 5% ( $\beta = -0.010, p < 0.05$ ). This indicates that companies with high market capitalization, total assets, expenses, and liquidity tend to increase their spending on environmental expenses. However, the results reveal that the companies' financial performance as measured by ROA, leverage, age, and sales growth are not significant determinants ( $p > 0.10$ ) of environmental spending in the sampled companies.

The results in Table (5) model (1b) also show that while age and financial performance (ROA) are negative determinants of social spending, market capitalization, total assets, leverage, and liquidity of a company are positive determinants of social spending. Age influences significantly and positively social spending at the level of 10% ( $\beta = -0.579, p < 0.10$ ), and ROA has a significant negative

Table 4  
Correlation matrix.

Variables	SUS	SOCIAL	ENV	EMPCOM	AGE	CR	LEV	EXP	MCAP	ROA	TA
SUS	1										
SOCIAL	0.47***	1									
ENV	0.62***	0.45***	1								
EMPCOM	1.00***	0.40***	0.56***	1							
AGE	0.22***	-0.04	0.13***	0.23***	1						
CR	0.26**	0.11***	0.02	0.03	0.15***	1					
LEV	-0.02	0.05	-0.02	-0.02	0.05	-0.05	1				
EXP	0.63***	0.34***	0.53***	0.62***	0.19***	-0.03	-0.02	1			
MCAP	0.61***	0.48***	0.64***	0.61***	0.10**	0.09**	-0.02	0.66**	1		
ROA	0.12**	-0.15***	0.09*	0.13***	0.09**	0.21***	-0.06	0.09**	0.14***	1	
TA	0.60***	0.43***	0.61***	0.49***	0.14***	0.01	-0.02	0.54***	0.67***	0.09**	1

(SUS) stands for total sustainability expenditure, (SOCIAL) stands for Social and community expenses, (ENV) stands for Environment and Pollution Control Related Expenses, (EMPCOM) stands for Employees' Compensation Expenses, (AGE) stands for Firms' age, (LEV) stands for Leverage, (EXP) stands for Total expenses, (MCAP) stands for Market capitalization, (ROA) stands for Return on assets, (TA) stands for Firms' size, (CR) stands for Current ratio.

Notes: \*, \*\*, and \*\*\* indicate significance at the 0.10, 0.05 and 0.01 level, respectively.

**Table 5**  
The impact of firms' specific on sustainability Expenditure.

Variable	Model (1a)	Model (1b)	Model (1c)
	Environmental Expenditure	Social Expenditure	Employee Compensations
AGE	0.522 1.309	-0.579* -1.753	9.835*** 7.424
ROA	0.244 1.307	-1.854*** -3.262	-1.879 -1.041
MCAP	0.001*** 6.919	0.000*** 4.552	0.003*** 4.688
TA	0.003** 2.124	0.002*** 2.940	0.022** 2.275
LEV	-0.001 -0.211	0.071*** 4.458	-0.082*** -4.166
EXP	0.009* 1.931	-0.001 -0.348	-0.121*** -4.518
SALES	-0.010** -1.991	0.000 -0.129	0.131*** 4.995
CR	1.432** -1.328	9.436*** -4.298	30.499** -2.111
C	-3.964 -0.310	137.710*** 6.641	-172.889*** -2.759
R-squared	0.509	0.296	0.874
Adjusted R-squared	0.501	0.286	0.872
F-statistic	66.753	27.130	448.352
Prob(F-statistic)	0.000	0.000	0.000

(AGE) stands for Firms' age, (LEV) stands for Leverage, (EXP) stands for Total expenses, (MCAP) stands for Market capitalization, (ROA) stands for Return on assets, (TA) stands for Firms' size, (CR) stands for Current ratio.

Notes: \*, \*\*, \*\*\*indicate significance at the 0.10, 0.05 and 0.01 level, respectively.

effect on social spending at the level of 1% ( $\beta = -1.854, p < 0.01$ ); however, market capitalization ( $\beta = 0.000$ ), leverage ( $\beta = 0.071$ ), and liquidity ( $\beta = 9.436$ ) have a significant positive effect on social spending at the level of 1% ( $p < 0.01$ ). This signifies that higher market capitalization, total assets, and company liquidity lead to higher social spending. On the other hand, companies with higher financial performance and greater age tend to spend less on social expenses.

This could be because smaller companies with low financial performance tend to spend more on social expenses to enhance their image and performance. Further, the results report that both the company's total expenses and its sales growth have no significant influence on the extent of social spending. With regards to the impact of firms' specifics on employee benefits and compensations, the results in Table (5) model (1c) reveal that age, market capitalization, sales growth, total assets, and liquidity are positive and significant determinants of employee benefits at compensations. However, the leverage of a company and total expenses are negative significant determinants of employee benefits and compensation of a company. The results show that age ( $\beta = 9.853$ ), market capitalization ( $\beta = 0.003$ ), and sales growth ( $\beta = 0.131$ ) have a significant positive effect at the level of 1% ( $p < 0.01$ ), however total assets ( $\beta = 0.022$ ) and liquidity ( $\beta = 30.499$ ) have a significant positive effect at the level of 5% ( $p < 0.01$ ). In the same context, both leverage ( $\beta = -0.082$ ) and total expenses ( $\beta = -0.121$ ) have a significant negative effect at the level of 1% ( $p < 0.01$ ). However, financial performance has an insignificant negative effect ( $\beta = -0.1879, p > 0.10$ ) on employee compensation, indicating that a company's performance does not influence employee benefits and compensation.

#### 4.4. The moderating effect of liquidity

In order to assess the moderating effect of liquidity on the relationship between firms specific ( $\sum_{j=1}^8 X_{it}$ ) and sustainability expenditure, the following OLS regression models are estimated as shown in equation (8) and (9) and 10:

$$ENV_{it} = \alpha + \beta_1 MACP_{it} + \beta_2 MACP_{it} * LIQ_{it} + \beta_3 LIQ_{it} + \beta_4 ROA_{it} + \beta_5 ROA_{it} * LIQ_{it} + \beta_6 LEV_{it} + \beta_7 LEV_{it} * LIQ_{it} + \beta_8 EXP_{it} + \beta_9 EXP_{it} * LIQ_{it} + \beta_{10} SIZE_{it} + \beta_{11} SIZE_{it} * LIQ_{it} + \beta_{12} SALES_{it} + \beta_{13} SALES_{it} * LIQ_{it} + \beta_{14} AGE_{it} + \beta_{15} AGE_{it} * LIQ_{it} + \epsilon_{it} \text{ (Model2a)} \tag{8}$$

$$SOCIAL_{it} = \alpha + \beta_1 MACP_{it} + \beta_2 MACP_{it} * LIQ_{it} + \beta_3 LIQ_{it} + \beta_4 ROA_{it} + \beta_5 ROA_{it} * LIQ_{it} + \beta_6 LEV_{it} + \beta_7 LEV_{it} * LIQ_{it} + \beta_8 EXP_{it} + \beta_9 EXP_{it} * LIQ_{it} + \beta_{10} SIZE_{it} + \beta_{11} SIZE_{it} * LIQ_{it} + \beta_{12} SALES_{it} + \beta_{13} SALES_{it} * LIQ_{it} + \beta_{14} AGE_{it} + \beta_{15} AGE_{it} * LIQ_{it} + \epsilon_{it} \text{ (Model2b)} \tag{9}$$

$$EMP_{it} = \alpha + \beta_1 MACP_{it} + \beta_2 MACP_{it} * LIQ_{it} + \beta_3 LIQ_{it} + \beta_4 ROA_{it} + \beta_5 ROA_{it} * LIQ_{it} + \beta_6 LEV_{it} + \beta_7 LEV_{it} * LIQ_{it} + \beta_8 EXP_{it} + \beta_9 EXP_{it} * LIQ_{it} + \beta_{10} SIZE_{it} + \beta_{11} SIZE_{it} * LIQ_{it} + \beta_{12} SALES_{it} + \beta_{13} SALES_{it} * LIQ_{it} + \beta_{14} AGE_{it} + \beta_{15} AGE_{it} * LIQ_{it} + \epsilon_{it} \text{ (Model2c)} \tag{10}$$



The results show that liquidity has a significant positive influence on environmental ( $\beta = 5.039$ ), social ( $\beta = 8.530$ ), and employee compensation ( $\beta = 50.373$ ) sustainability expenses at the level of 1% ( $p < 0.01$ ), which indicates that liquidity enhances and strengthens the ability of a company to spend more on sustainability expenses. On the other hand, the moderating effect of liquidity shows a statistically negative significant impact when interacting with younger companies. It exhibits a statistically significant negative moderating effect with age at the level of 1% ( $p < 0.01$ ) on environmental ( $\beta = -1.000$ ) and social sustainability expenses; however, it is at the level of 5% in the case of employees' compensation sustainability expenses ( $\beta = -5.002$ ,  $p < 0.05$ ).

This means that the moderating effect of liquidity with the age of a company negatively affects its ability to spend more on sustainability expenses in older companies compared to younger ones. This could be because older age companies have more liabilities and expenses that require higher levels of liquidity to meet these expenses and liabilities, which in turn affect their ability to spend more on environmental expenses. In the same context, the results reveal that there is an insignificant moderation effect of liquidity with the financial performance of a company ( $p > 0.10$ ) in all three cases, indicating that the liquidity of companies with higher financial performance does not enhance and strength their ability to spend more sustainability expensive. Further, it suggests no association between the moderation effect of liquidity and its financial performance on one hand and its sustainability expenses on the other.

The results also indicate that there is a significant positive moderation effect ( $p < 0.01$ ) between liquidity and market capitalization, which strengthens a company's ability to spend more on sustainability, environmental ( $\beta = 0.001$ ), social ( $\beta = 0.000$ ), and employee compensation ( $\beta = 0.002$ ) sustainability expenses. This indicates that companies with higher market capitalization and liquidity exhibit higher sustainability expenses. However, the moderation effect between company size and liquidity has an insignificant effect ( $\beta = 0.001$ ,  $p > 0.10$ ) on environmental and social spending ( $\beta = 0.001$ ,  $p > 0.10$ ), this moderation effects reveals a positive significant effect in the case of employee compensation ( $\beta = 0.030$ ,  $p < 0.10$ ). This indicates that the extent of liquidity in larger companies affects positively and significantly the level of employee compensation. Further, the results show that higher leverage

**Table 6**

The moderating effect of liquidity on the relationship between firms' specific and sustainability.

Variable	Model (2a)	Model (2b)	Model (2c)
	Environmental Expenditure	Social Expenditure	Employee Compensation
CR	5.039*** -4.607	8.530*** -3.635	50.373*** -4.714
AGE	0.330 1.165	-0.966*** -5.722	10.844*** 7.066
MAGE	-1.000*** -6.140	-0.726*** -4.582	-5.002** -1.766
ROA	0.613** 2.333	-2.297*** -3.488	-2.551 -1.222
MROA	-0.802 -1.494	-0.527 -0.533	4.738 2.301
MCAP	0.001*** 4.341	0.000*** 2.968	0.003*** 3.152
MCA	0.001*** -10.194	0.000*** -6.031	0.002*** 0.009
TA	0.006*** 3.937	0.003*** 4.171	0.007** 0.315
MTA	0.001 0.002	0.001 0.001	0.030* 0.027
LEV	0.556 -0.039***	1.417 0.092***	-0.062 -0.272***
MLEV	-2.678 -0.042***	6.328 -0.104***	-4.369 -0.364**
EXP	5.684 0.011**	-6.851 0.002	6.699 -0.145***
MEXP	1.899 -0.012**	1.254 -0.002**	-5.732** -0.058***
SALES	-2.482 -0.014**	-0.876 0.003**	2.243 0.167***
MSALES	-2.246 0.013**	-2.143 0.003**	4.557 0.057***
C	2.487 -9.228	1.139 136.105***	-1.564 -134.910***
R-squared	-1.166	11.843	-4.503
Adjusted R-squared	0.576	0.350	0.900
F-statistic	0.563	0.331	0.897
Prob(F-statistic)	45.922	18.266	304.418
	0.000	0.000	0.000

(AGE) stands for Firms' age, (LEV) stands for Leverage, (EXP) stands for Total expenses, (MCAP) stands for Market capitalization, (ROA) stands for Return on assets, (TA) stands for Firms' size, (CR) stands for Current ratio.

Notes: \*, \*\*, \*\*\* indicate significance at the 0.10, 0.05 and 0.01 level, respectively.

interacts negatively with liquidity, which in turn influence significantly and negatively the level of environmental expenses ( $\beta = -0.042$ ,  $p < 0.01$ ), social expenses ( $\beta = -0.104$ ,  $p < 0.01$ ), and employee compensations ( $\beta = -0.364$ ,  $p < 0.05$ ). This signifies that greater leverage with less liquidity negatively affects the levels of sustainability spending. Similarly, higher total expenses interact negatively with liquidity at the level of 5% in the case of the environment ( $\beta = -0.012$ ,  $p < 0.05$ ) and social expenses ( $\beta = -0.002$ ,  $p < 0.05$ ), but at the level of 1% in the case of employee compensation ( $\beta = -0.058$ ,  $p < 0.01$ ), this results in fewer sustainability expenses as companies with higher expenses may have more expenses requiring higher levels of liquidity to meet these expenses, which negatively affects its ability to spend more on sustainability expenses.

Furthermore, higher sales growth indicates a significant and positive moderation effect at the level of 5% ( $p > 0.05$ ) on environmental spending ( $\beta = 0.013$ ) and social ( $\beta = 0.003$ ) sustainability expenses; however, it has a significant positive effect on the level of 1% on employee compensation ( $\beta = 0.057$ ,  $p > 0.01$ ), this indicates that an increasing level of sales growth leads to higher sustainability spending.

#### 4.5. Additional analysis

##### 4.5.1. Robustness analysis

Table (7) presents a robust regression analysis, which provides a similar estimation to the OLS regression analysis in Table (6). The outputs of robust regression, specifically coefficient estimates and standard errors, are not substantially different from OLS regression outputs. The outputs of robust regression further show that data is not contaminated with outliers, and some influential observations do not impact the yielded results.

**Table 7**  
Robustness analysis.

Variable	Robustness analysis		
	Environmental Expenditure	Social Expenditure	Employee
	Coefficient	Coefficient	Coefficient
CR	0.712*	-8.622**	-4.753*
	1.843	-2.667	-1.877
AGE	0.119	-0.541***	2.765***
	-1.268	-0.689	4.496
MAGE	-0.035**	-0.297***	-1.109**
	-0.291	-0.293	-1.398
ROA	0.089*	-2.440***	-0.379
	1.275	-4.157	-0.824
MROA	-0.074	-0.223	0.388
	-0.821	-0.295	0.656
MCAP	0.001***	0.001***	0.002***
	7.610	3.852	5.468
MCAP	0.000***	0.001***	0.002***
	-2.684	-3.045	-4.641
TA	0.001***	0.001***	0.026**
	13.946	0.745	37.624
MTA	0.001*	-0.001	0.005**
	6.894	-0.525	5.208
LEVE	-0.005**	0.090***	-0.022**
	0.537	1.109	-0.344
MLEV	-0.001***	-0.099**	0.035**
	-0.118	-0.944	0.430
EXP	0.003***	0.003	-0.110***
	-9.597	1.151	-58.521
MEXP	-0.000***	-0.002***	-0.011***
	-0.566	-0.761	4.650
SALES	-0.002***	0.003**	0.125***
	5.630	-1.222	63.861
MSALES	0.001***	0.004***	0.014***
	-1.417	1.341	-5.871
C	5.422*	137.239***	-77.397***
	1.744	5.273	-3.796
R-squared	0.072	0.143	0.407
Adjusted R-squared	0.045	0.118	0.390
Prob(Rn-squared stat.)	0.000	0.000	0.000

(AGE) stands for Firms' age, (LEV) stands for Leverage, (EXP) stands for Total expenses, (MCAP) stands for Market capitalization, (ROA) stands for Return on assets, (TA) stands for Firms' size, (CR) stands for Current ratio.

Notes: \*, \*\*, \*\*\* indicate significance at the 0.10, 0.05 and 0.01 level, respectively.

**Table 8**  
Alternative measure.

Variable	Alternative measure: Total Sustainability Expenditure		
	Direct Effect	Moderation Effect	Robustness
	Model 3	Model 4	
CR	−41.950*** 3.027	−16.107*** 7.899	−21.319*** 4.636
AGE	10.066*** 6.746	−3.078*** 10.165	−0.922*** 0.826
MAGE		−1.366*** 0.368	−4.774*** 3.313
ROA	−3.514** 1.703	−2.877*** 1.010	−1.916** 0.835
MROA		−0.394 −0.367	−0.620 −0.577
MCAP	0.004*** 5.714	0.002*** 6.117	0.001*** 3.510
MCAP01		0.004*** 0.014	0.080*** 0.900
TA	0.027** 2.347	0.036*** 16.270	0.045*** 35.061
MTA		0.000 0.083	0.005*** 2.903
LEV	−0.016** 0.817	0.061*** 2.294	0.032** 0.273
MLEV		−0.049*** −1.324	−0.016** −0.110
EXP	−0.114*** 4.417	−0.088*** 5.986	−0.124*** 36.334
MEXP		−0.016** 2.422	−0.023*** 5.408
SALES	0.122*** 4.037	0.092*** 7.646	0.117*** 33.103
MSALES		0.013*** −1.027	0.030*** −6.689
C	−47.240 0.752	125.844*** 8.067	244.724*** 6.611
R-squared	0.881	0.869	0.393
Adjusted R-squared	0.879	0.863	0.375
Prob(Rn-squared stat.)	0.000	0.000	0.000

(AGE) stands for Firms' age, (LEV) stands for Leverage, (EXP) stands for Total expenses, (MCAP) stands for Market capitalization, (ROA) stands for Return on assets, (TA) stands for Firms' size, (CR) stands for Current ratio.

Notes: \*, \*\*, \*\*\* indicate significance at the 0.10, 0.05 and 0.01 level, respectively.

#### 4.5.2. Alternative measures of sustainability

The results in Table (8) show the direct effect of firms' specific on the total sustainability Expenditure. The results also show the moderating effect of liquidity on the relationship between firms' specific and sustainability expenditures. The results demonstrate consistent results with prior estimated models. The results indicate that while age, market capitalization, company size, and sales growth are significant positive determinants of total sustainability expenses, liquidity, financial performance, leverage, and total expenses are significant negative determinants of sustainability Expenditure. Further, the results indicate that the moderation effect of liquidity with both market capitalization and sales growth enhances a company's ability to spend more on sustainability expenses. However, the results reveal that the moderation effect of liquidity with older company age, negative or low financial performance, higher leverage, and greater total expenses weakens a company's ability to spend more sustainability expenses. Overall, the results of the robustness total sustainability expenses model are consistent with the findings of all previous models.

## 5. Results and discussion/implication

Firms around the world are implementing ESG measures to stay competitive in a changing environment (Yadav and Prashar, 2022). Firms that consider ESG measures when making decisions will be wary of a number of factors related to the environment. For example, when introducing new products and services to the market, they must minimize any negative impact on the environment while aligning their strategic objectives with the needs of the community. This can eventually help them gain a competitive advantage [71]. Prior research has shown that ESG performance increases positive corporate values toward environmental issues [72,73]. Accordingly, we propose that liquidity plays a significant relationship between firms' specific and sustainability expenses. The findings revealed that the moderation effect of liquidity with both market capitalization and sales growth enhances a company's ability to spend more on sustainability expenses. The results also indicate that the moderation effect of liquidity with older company age, negative or low

financial performance, higher leverage, and greater total expenses weakens a company's ability to spend more sustainability expenses. This implies that younger companies may increase their sustainability expenses to increase their competitive advantage. Further, companies with low or negative financial performance tend to decrease their sustainability expenses. This could be due to that the managements of these companies try to control their expenses on account of their ESG spending. In the same context, companies that are highly leveraged and companies that have high expenses tend to cut their liquidity spent on sustainability issues. This has an implication for regulators and policy makers that sustainability spending should be prioritized and regulated irrespective of firms' performance and liquidity. These findings imply that institutional time horizons and liquidity issues drive differences in institutional investors' influence [74]. Management is particularly interested in the personal benefits of increasing the liquidity of their stock price in order to issue equities or sell shares of their firm stock obtained as part of their compensation plans, in addition to the firm's differentiation benefits from voluntary disclosure [75]. For example, one reason why firm size is related to institutional ownership is that institutions avoid small stocks due to liquidity concerns [76]. Another reason this could happen is that if an institution decides to invest in a stock in a specific industry, it may also invest in comparable in the same industry for liquidity or diversification purposes [76]. Managers may disclose more in order to improve transparency, according to legitimacy and stakeholder theory. Increased stock liquidity is one way to improve transparency. Managers are motivated to increase stock liquidity in order to issue or sell shares obtained through options or other compensation plans [77].

Policy interventions should be made by the government to enact more requirements about sustainability spending. These policy interventions should be made in light of company size, listing status, market capitalization, and some other factors. The government already issued some rule regarding the level of CSR spending however, the level of environmental spending is still not well regulated and needs more policy interventions. More government regulations regarding sustainability spending especially, environmental spending should be introduced to mandate companies to disclose their sustainability spending. This type of spending should be made mandatory to companies based on their market listing, capitalization, size, and some other factors irrespective of their level of liquidity. In brief, sustainability spending should not be a function of liquidity however, it should be a priority by government and companies irrespective of their liquidity levels.

## 6. Conclusion, policy recommendation, limitations, and directions for future research

The current study attempted to examine the moderating effect of liquidity on the relationship between firms' specific and sustainability expenses. The study is based on secondary data extracted from the Prowess IQ database over a period from 2015 to 2021. Firms' specific has been measured using market capitalization, financial performance, companies age, size, total express, sales growth, and liquidity; however, sustainability was measured using the company's spending on environmental expenses, social expenses, and employee expenses. The results have been estimated using panel data ordinary least squares regression with fixed-effect models.

The findings revealed while age, market capitalization, company size, and sales growth are significant positive determinants of total sustainability expenses, liquidity, financial performance, leverage, and total expenses are significant negative determinants of sustainability spending. Further, the results indicate that the moderation effect of liquidity with both market capitalization and sales growth enhances a company's ability to spend more on sustainability expenses. This indicates that companies with higher market capitalization and sales growth tend to increase environmental, social, and employee compensation expenses. However, the extent to which that companies with higher market capitalization and sales growth spend on sustainability expenses is strengthened by the level of liquidity. This is consistent with the stakeholders' theory where companies with higher market capitalization tend to spend more on sustainability expenses to meet their stakeholders' expectations. However, the results reveal that the moderation effect of liquidity with older company age, negative or low financial performance, higher leverage, and greater total expenses weakens a company's ability to spend more sustainability expenses. This means that older companies spend more on sustainability expenses than younger companies. This could be due to that older companies tend to meet their stakeholders' expectations and maintain their reputation. However, the level of spending of these companies is strengthened or weakened by the level of liquidity. In the same context, it is observed that companies reduce their sustainability expenses as a result of low or negative financial performance. This could be due to that these companies need to cut their expenses due to low levels of liquidity which in turn affect negatively their levels of sustainability spending. This is also the same case for companies that have high levels of expenses or are highly leveraged. This could be due to that highly leveraged companies tend to signal better performance and a good level of liquidity which in turn affect their levels of sustainability spending.

This research adds to the literature in various ways. First, it identifies firms' specific determinants that play a significant role in the level of companies' sustainability expenses. Second, a unique contribution of the present study is the introduction of the moderating effect of liquidity on the relationship between firms' specific and sustainability spending. Third, the study contributes to the strand literature of sustainability studies in which there is a dearth of office studies that investigate the determinants of sustainability expenses of companies. Finally, the current study attempts to assess the direct effect of firms' specific determinants and the moderating role of liquidity on three categories of sustainability expenses which are environmental expenses, social expenses, and employee compensations, which provide a comprehensive examination in this regard. Therefore, the study offers valuable insights for legislators, company managers, policymakers, shareholders, and analysts. Policy interventions should be made by the government to enact more requirements for sustainability spending. These policy interventions should be made in light of company size, listing status, market capitalization, and some other factors. The government already issued some rules regarding the level of CSR spending however, the level of environmental spending is still not well regulated and needs more policy interventions. More government regulations regarding sustainability spending especially, environmental spending should be introduced to mandate companies to disclose their sustainability spending. This type of spending should be made mandatory for companies based on their market listing, capitalization,

size, and some other factors irrespective of their level of liquidity. In brief, sustainability spending should not be a function of liquidity however, it should be a priority by governments and companies irrespective of their liquidity levels. Thus, regulators and policy makers should prioritize sustainability spending irrespective of firms' performance and liquidity.

This study has some limitations that shed light on possible future research directions. First, the study did not include some other variables like corporate governance attributes and some other measures of firms' specific determinants. Future studies may build on the models of the present study to explore more firms' specific determinants of sustainability expenses. Further, future studies may provide industry and country dummy variables to assess the determinants of sustainability expenses across countries or industries. Moreover, the study includes some data which are affected by the Covid-19 pandemic; future studies can segregate the data and make a comparison before and after covid-19. Further, other studies could examine the impact of Covid-19 on sustainability expenditures. Finally, this study presents empirical evidence from a developing country. Hence other studies may wish to investigate and compare the evidence from developed and developing countries.

## Declaration

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## Author contribution statement

Najib H.S. Farhan; Faozi A. Almaqtari: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

SADDAM HAZAEA: Contributed reagents, materials, analysis tools or data; Wrote the paper.

## Data availability statement

Data included in article/supp. material/referenced in article.

## Declaration of interest's statement

The authors declare no competing interests.

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