

Innovation is the solution that allows digital transformation to be implemented in many industrial sectors. With digital innovation, companies can move more freely in achieving sustainability performance, because digitalization is a cross-border discipline. Empirical studies that directly link digital innovation, sustainability and accounting are still very limited. To fill this gap, this study aims to examine the role of green accounting in the influence of human capacity building, digital innovation, and sustainability strategy on sustainability performance. This study employs quantitative content analysis on the annual reports and sustainability in the industrial sector listed on the IDX 2021–2022, comprising a total of 792 observational data using the PLS. The research results indicate that an increase of 32 % in human capacity building, 14 % in digital innovation and 12 % in sustainability strategy has a significant impact on sustainability performance. Another finding shows the results that green accounting is only able to strengthen the influence of digital innovation on sustainability performance and the rest weakens and does not even have a role as a moderating variable. The implications of this study are theoretically the development of new measures of digital innovation for the industrial sector. The practical implications suggest that to enhance sustainability performance, digital innovation is needed, starting from a pervasive digital culture extending to various aspects, including digital products, services & solution, digital supply chains, and digital accounting. The implications of implementing green accounting for industries indicate a 6.9 percent increase in the influence of digital innovation on sustainability performance

Keywords: human capacity building, digital innovation, green accounting, sustainability strategy & sustainability performance

IMPLEMENTATION OF DIGITAL INNOVATION ON SUSTAINABILITY PERFORMANCE: THE MODERATING ROLE OF GREEN ACCOUNTING IN THE INDUSTRIAL SECTOR

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1. Introduction

At a time when the global community is grappling with health force majeure due to Covid-19, the issue of climate change is also being addressed with efforts to achieve net zero emissions by 2050. Consequently, the formulation of business strategies that align with sustainable finance, digital era payment systems, and digital financial inclusion are initiatives aimed at supporting the achievement of net-zero emissions for sustainability performance. When companies are fully aware of the adverse impacts of climate change and the need to win markets in the digitalization era, digitalization adaptation and environmental mitigation through digital innovation become crucial. Digitalization capabilities are considered a solution that can help address environmental issues [1, 2]. According to [3], digital innovation is defined as the use of digital technology in various innovations.

Digital innovation is a practice that involves information technology (IT) both as a means and an end to develop new or modified products [4–6]. A firm's digitization capabilities have a positive impact on open innovation, cooperation strategies, and sustainable performance [7–9]. Therefore, it is crucial to conduct research on the topic of digital innovation related to accounting and sustainability. Where the research findings are needed in practical applications within

companies to develop broader digital innovations, ultimately enhancing efficiency and productivity in the industrial sector. This research enables the identification of the best methods for implementing digital innovation and maximizing its benefits through expansion across various aspects of the industrial sector. Digital security also becomes a crucial concern to highlight within the industrial sector to formulate the best policies and strategies related to cybersecurity.

The existing research [10] indicates that the dimensions of digital innovation are limited, consisting only of one dimension, digital product, services and solution. This limitation process challenges in the face of competition in the era of digitalization and hybrid 4.0 and 5.0, which combine the extremes of automation and human-based value-driven processes, inheriting the most valuable features of both. Furthermore, these studies are highly relevant in the modern era to map the potential, risks, and impacts of technological developments in contributing to sustainability and addressing global challenges such as pandemics, climate change and inequality. The development of digital innovations in environmentally friendly and sustainable business processes is imperative to support long-term sustainable development efforts. Therefore, research on digital innovation and green accounting on a broader scale to achieve sustainability performance is highly relevant to be explored.

2. Literature review and problem statement

This research adopts the Resource-Based Theory to analyze the implementation of digital innovation and the Legitimacy Theory to examine green accounting in relation to sustainability performance. The Resource-Based View (RBV) is a managerial framework used to identify strategic resources that organizations can leverage to gain a competitive advantage [11]. Digital innovation has not yet been considered as part of the resources included in RBV. Therefore, in this study digital innovation is incorporated into the technological resource category to enrich the resource perspective within RBV. Meanwhile, the legitimacy theory emphasizes that organizations continuously strive to ensure the operation within the boundaries and norms of society, taking into account social values and environmental issues [12]. Operating within normal boundaries entails environmental costs, which are accounted for in green accounting.

Green accounting involves the evaluation of financial assets and economic performance, taking into account environmental, social, economic and institutional responsibilities [13]. The study [14] indicates that the implementation of green accounting in companies as a sustainability tool has an impact on the company's performance. The paper suggests that the implementation of green accounting in companies needs to be enhanced by integrating environmental costs into the financial accounting framework. This can assist managers in formulating policies for a more substantial contribution to environmental protection. This aligns with research in another paper [15], which found that green accounting incorporates environmental costs into the calculation of operating costs. The same paper also explains the existence of a system as part of digital innovation used by teams to assess a company's success concerning environmental concerns. However, the paper does not extensively elaborate on the highlighted system, making it an interesting topic for further research. In a broader study [16] involving a sample of a company in ASEAN, it can be observed that the implementation of green accounting using emission dimensions significantly influences corporate performance. This indicates that many countries within the ASEAN region have adopted green accounting. The study provides a broader perspective that there is no gap in the implementation of green accounting to achieve sustainability performance. Unfortunately, the paper does not address the use of digital innovation that could be employed to achieve sustainability performance.

The number of countries implementing green accounting in the ASEAN, consisting of developing nations, has not progressed simultaneously with the implementation of digital innovation. This is due to limitations in adapting to digital disruptions in developing countries and is only confined to specific sectors. The study [17] explains how the implementation of technology innovation in transportation companies includes the development of sustainable modernization and service automation. However, technological innovation is only limited to the transportation sector, necessitating broader research to assess suitable innovations for development in the industrial sector, whether operating in developing countries.

Various disparities in the implementation of digital innovation between developed and developing countries. The implementation of innovation varies between developed and developing countries, presenting different challenges in

each context [18]. According to data presented by Global Finance in 2023, the most advanced countries in technology adoption with widespread innovation, having a composite score above four, include South Korea, the United States and Taiwan. Digital innovation implementation can be applied in various sectors, including the industrial sector. In the paper by [19], challenges related to innovation implementation in both developed and developing countries are highlighted, such as a lack of attention to human resources, insufficient top management support, resistance to change, and power dynamics. Therefore, the industrial sector needs to address emerging challenges as opportunities to expand digital innovation in the industrial sector in developing countries.

Digital innovation is defined as the creation of market offerings, business processes, or models resulting from the use of digital technology [10]. The digital innovation dimension from the paper [10] has only one digital dimension: product, services and solution. Additionally, the existing research [10] has not considered comprehensive innovation aspects ranging from material provision, processing to the receipt of goods by consumers, including its accounting processes, and has only been applied to technology sector companies. In this research, the digital innovation dimension is modified by adding digital supply chain, digital accounting, and digital culture. This is an effort to synergize the business patterns from upstream to downstream, achieving an industry with overall digital transformation and reducing ecological crisis impacts. Digital supply chain is defined as a set of interconnected activities involved in the supply chain process between suppliers and customers, handled with new technology [20]. The addition of digital supply chain dimension in this digital innovation is crucial due to the massive innovation in responding to disruptive technology and automation in the hybrid 4.0 and 5.0 era. This is also in line with government efforts in technological transformation in the industrial sector, one of which is the transformation of technology in the supply chain. Digital accounting is the representation of accounting information in digital format, which can then be transmitted electronically [21]. Digital accounting is important to be added because innovation in the field of accounting, especially utilizing technology, is massive. This is also supported by standard financial reporting regulations using XBRL (Extensible Business Reporting Language), which is the integration of information systems with the needs of standard reporting formats. Digital culture is an organization with a strong tendency towards change and analytical thinking, usually guided by the principles of collaboration and the willingness of its members to exchange information, resources, and knowledge related to digital [22]. Digital culture is important to be added because there needs to be a change in behavior from being aware of technological disruption conditions to its application in the organization.

The change in human resources behavior, which are resources owned in the Resource-Based View (RBV), is expected to increase the company's competitive advantage. Competitive advantage has a positive influence on sustainability performance [23]. Meanwhile, research related to human capacity building has a positive effect on performance [24]. However, the presence of human resources with capacities related to technology and sustainability to achieve sustainable performance is still very limited. This is because they are still in the adaptation and transformation phase towards the digital and sustainability era. To overcome these difficulties, significant efforts are required from stakeholders

to build human capacity through education and training, motivation enhancement, improvement of communication skills, and adherence to work ethics [25]. This approach needs to be undertaken to assess which efforts have the most significant impact on human capacity building. Due to the limited empirical research, a study is required to provide guidance for the implementation of human capacity enhancement in digitalization and sustainability within companies.

Digital resources are resources within the Resource-Based View (RBV) framework, comprising systems, tools, applications, and artificial intelligence. The system in question is related to the technology used for digital innovation. In a study by [26], it was found that digital innovation is a major contributor to the sustainability transition, through radical innovations that combine digital and sustainability innovations. However, there are unresolved issues related to the limitations of digital innovation that are only applied to the product and service aspects. This is because product and service are the primary prevalence in achieving sustainability, rendering the research irrelevant when applied to industries with high levels of business process complexity. One way to address the implementation of innovation in complex business processes is through comprehensive identification of each process requiring broad innovation to achieve sustainability. It can be implemented because digitalization is a cross-disciplinary field. In the study on the relationship between sustainability and technology, it is found that the existence of technology has the potential to help implement sustainability and encourage the three pillars of sustainability [27]. Digitalization capabilities enhance corporate sustainability by extensively integrating digital assets and business resources, and leveraging digital networks for product, service and process innovation [28]. This not only contributes to organizational learning but also to customer value creation. Sustainability performance is considered achievable in line with financial performance. To make this happen, financial management needs to recognize the costs arising from environmental, social, and economic performance. Therefore, financial management is needed that can accommodate these aspects of sustainability. One solution is to implement sustainability-based or green accounting.

Various studies [29–32] show that digital innovation has a positive influence on competitive advantage and firm performance. However, the research findings in the paper [29–32] indicate that the implementation of digital innovation is not comprehensive, as it only identifies some aspects of product-related innovation and is limited to specific sectors. The causes include, among others, limited adaptation to technological disruption and digital culture. To overcome these limitations, collaboration among leaders is needed to bring about changes in digital awareness through the externalization and internalization of digital culture, enabling agility in the face of rapid technological disruption. This approach is necessary to impact sustainability performance. Due to the limited research on the relationship between digital innovation and sustainability, this evaluation is crucial. Therefore, it is recommended to conduct a broader study to address the limitations of previous research.

In another study, digital capacity has a positive impact on sustainability performance through the mediation of open innovation [7, 33]. This specifically indicates that to enhance sustainability performance, open innovation is required, which not only relies on internal resources and knowledge but also seeks external contributions to broaden

the scope of new ideas. The problem lies in the limited ability of the company to explore internal and external capabilities in digital innovation efforts. Companies need to develop appropriate strategic plans to identify digital innovations. Therefore, broader research is needed to identify open innovation aspects that can support digital innovation and sustainability. The other studies have shown that the measurement of digital innovation is often limited to specific sectors, such as the technology sector [10]. Because the technology sector is quick in adapting to technological changes. Therefore, there is a need for the development of dimensions, indicators, and measurements of digital innovation that are more comprehensive and can encompass various sectors through the expansion of digital innovation. This approach is crucial to enable industrial sectors to implement innovation across multiple aspects of their operations. This study is conducted to develop dimensions, indicators and measurements of digital innovation for industrial classification. So that it can be utilized to formulate a sustainability strategy in an effort to achieve sustainable performance.

Findings from several studies [34, 35] show that sustainability strategies contribute positively to sustainability performance. However, the study does not specifically explain the stages and steps of sustainability strategy employed to achieve sustainability performance. The reason may be that the development of strategies at the company level is general, lacking detailed plans and involvement of strategy teams/divisions, making the research relevant but not practical. To overcome these limitations, an exploration of the strategies formulated by companies is needed in a study to assess the extent of the company's sustainability strategy stages. This approach is undertaken in an effort to test the influence of sustainability strategy implementation on sustainability performance. This study is structured using the dimensions of awareness, developing, practicing and optimizing [36]. Sustainability strategy is interconnected with green accounting in the context of organizational efforts to integrate environmentally friendly business practices. Green accounting aids in monitoring and measuring environmental performance by providing tools to assess the impact of business activities on the environment.

Green accounting is capable of identifying environmental costs that impact sustainability indicators [37]. Other findings indicate that the performance of green accounting influences company performance [38, 39]. However, the specific implementation of green accounting is still limited in the industrial sector, as industry readiness needs to be guided by precise standards. Currently, there is an urgent need for green accounting to address the conservatism of conventional accounting, requiring separate standards from existing ones [40]. Moreover, there is minimal empirical research directly linking the impact of green accounting to sustainability. Therefore, a more in-depth investigation is necessary to determine whether the existence of green accounting can enhance sustainability performance. This study is crucial for understanding the influence of green accounting on sustainability performance and providing insights for the development of relevant standards.

Green accounting is a new paradigm in accounting that emphasizes that the accounting process is not only about transactions, events, and financial objects, but also takes into account social and environmental transactions or events [40]. However, research placing green accounting as a moderating factor is still quite limited. This is due to the

difficulty in estimating environmental and social costs as a measure for evaluating green accounting. Consequently, similar studies are scarce, making it challenging to address this issue. One way to overcome this difficulty is by conducting empirical research to explore evidence of the significance of green accounting as a moderation factor in sustainability.

3. The aim and objectives of the study

The aim of the study is to identify the impact of human capacity building, digital innovation implementation, and sustainability strategy on sustainability performance, with green accounting as a moderating variable. This will provide a stimulus for the implementation of digital innovation in various aspects to achieve sustainable performance in the industrial sector.

To achieve this aim, the following objectives are accomplished:

- to obtain and analyze the statistic descriptive in this study;
- to obtain and analyze the validity and reliability of observational data;
- to obtain and analyze the hypothesis test using the main structural model and expansion model.

4. Materials and methods

4. 1. Object and hypothesis of the study

The research object is companies within the industrial sector that have annual reports and sustainability reports. As for research hypotheses, we can identify them as follows:

- hypothesis 1: human capacity building has a positive effect on sustainability performance;
- hypothesis 2: digital innovation has a positive effect on sustainability performance;
- hypothesis 3: sustainability strategy has a positive effect on sustainability performance;
- hypothesis 4: green accounting has a positive effect on sustainability performance;
- hypothesis 5: green accounting moderates the influence of human capacity building on sustainability performance;
- hypothesis 6: green accounting moderates the influence of digital innovation on sustainability performance;
- hypothesis 7: green accounting moderates the influence of sustainability strategy on sustainability performance;
- hypothesis 8: digital products, services and solutions have a positive effect on sustainability performance;
- hypothesis 9: digital supply chain has a positive effect on sustainability performance;
- hypothesis 10: digital accounting has a positive effect on sustainability performance;
- hypothesis 11: digital culture has a positive effect on sustainability performance.

The assumptions made in the study necessitate the use of specific methods, which can be categorized depending on the research direction namely, theoretical approach, quantitative approach, analytical approach, and pragmatic approach. Substantiating through theoretical, quantitative, analytical, and pragmatic methods will provide guidance for practical applications in the industrial field, aiming to streamline business processes by leveraging widespread digital innovations in various aspects to achieve sustainability.

4. 2. Sampling and data

The selection of Indonesian companies and industry classifications is based on the fact that Indonesia is undergoing a digital transformation towards the 4.0 and 5.0 era, where companies have a very important role in supporting this transformation. In addition, the need to examine digital innovation across industry sectors is a key consideration, given that it can help companies achieve sustainability performance. The sample selection criteria involved companies that are listed on the Indonesia Stock Exchange (IDX) and publish sustainability reports and annual reports consecutively during the 2021–2022 period (as of September 5, 2023). The sample includes companies with any industry classification, except the financial sector. In addition, companies that are not experiencing technical or administrative problems such as delisting, website inaccessibility, website login requests, blank data, undergoing maintenance, etc., are also included in the sample selection criteria.

4. 3. Measurement

The results of the content analysis measure were derived based on the definitions of all research variables after conducting trial and error on the instrument developed in the feasibility study. The measurement used in this study to assess digital innovation is adapted from previous research [10]. The modified measure comprised 21 indicators and four dimensions. The variable representing human capacity building was derived from a five-dimensional measure proposed in previous research [27]. The sustainability strategy variable was constructed using a four-dimensional measure proposed in previous research [36]. The green accounting variable was formulated using a four-dimensional measure described in previous research [37]. The sustainability performance variable was derived from a six-dimensional measure proposed in previous research [41].

This research uses an instrument that focuses on meaning with scores used to measure the research indicators, with a score range from 1 to 7. After that, an index is conducted to measure the next dimension, and classification is carried out according to the concept of disclosure from the previous study [42, 43], which has been modified. The following is a scoring scheme that can be used to measure research indicators as modified [42]:

- 0 – score 0 is given if the information in the report is not disclosed in accordance with the measurement of the meaning of the indicator;
- 1 – score 1 is given if the disclosure contains at least one word;
- 2 – score 2 is given if the disclosure contains at least 2 to 3 words;
- 3 – score 3 is given if the disclosure contains 1 sentence, diagrams (pictures, tables or charts) disclose one word, which is considered a sentence;
- 4 – score 4 is given if the disclosure contains 2 sentences (which is considered 1 paragraph);
- 5 – score 5 is given if the disclosure contains 2 to 5 paragraphs;
- 6 – score 6 is given if the disclosure contains 6 to 7 paragraphs;
- 7 – score 7 is given if the disclosure contains more than 7 paragraphs.

Based on the indicator score, the dimension is calculated using the disclosure index with the formula:

$$I_i = \sum_{i=1}^n \frac{X_{in}}{M_{in}}$$

where I_i – index; X_{in} – score obtained by company i in year n ; M_{in} – maximum expected score for each category of company i in year n .

The disclosure index is classified as follows:

1. Information disclosed is less than 10 % (very little disclosure).
2. Information disclosed is less than 25 % (little disclosure).
3. Information disclosed is less than 50 % (moderate disclosure).
4. Information disclosed is less than 75 % (fair disclosure).
5. Information disclosed is less than or equal to 100 % (full disclosure).

Content analysis was conducted on 406 companies for two years, resulting in a total of 812 observation data. Of the 812 observation data, 20 observation data were identified as outliers with a scoring value of 0 and 1. Therefore, the data processed in this study amounted to 792 observation data after removing outliers. The disclosure results from the observation data show that there are no companies that get a score of more than five. From this result, it can be concluded that the sample companies disclose the variables of this study concisely, with a range of disclosures ranging from 1 word to 5 paragraphs.

This study successfully developed more flexible meanings for each indicator in the coding process, resulting in a more comprehensive interpretation of the disclosure. In addition, this study provides scoring guidelines and criteria with lower requirements, ensuring that even small disclosures can still be scored.

4. 4. Data analysis method

Partial Least Squares-Structural Equation Modeling (PLS-SEM) was used for data analysis by utilizing Smart PLS software.

Main testing model:

$$SF_{it} = \beta_0 + \beta_1 HCB_{it} + \beta_2 DI_{it} + \beta_3 SS_{it} + \beta_4 GA_{it} + \beta_5 HCB * GA_{it} + \beta_6 DI * GA_{it} + \beta_7 SS * GA_{it} + \beta_8 CBD_{it} + \beta_9 FS + e_{it} \quad (1)$$

Expansion testing model:

$$SF_{it} = \beta_0 + \beta_1 HCB_{it} + \beta_2 DPSS_{it} + \beta_3 DSC_{it} + \beta_4 DA_{it} + \beta_5 DC_{it} + \beta_6 SS + \beta_7 CBD_{it} + \beta_8 FS + e_{it} \quad (2)$$

The interpretation of the formula is as follows:

β_0 – beta/intercept/constant; β_1 – β_9 – regression coefficient indicating the average change for each one-unit change in X ; SF – sustainability performance; HCB – human capacity building; DI – digital innovation; SS – sustainability strategy; GA – green accounting; CBD – corporate board diversity; FS – firm size; $DPSS$ – digital product, services and solution; DSC – digital supply chain; DA – digital accounting; DC – digital culture; i – represents observation/company data; t – observation time; e – error.

5. Results of research on digital innovation implementation

5. 1. Descriptive statistics

Descriptive statistics in this study serve as a presentation of data to provide information regarding the minimum,

maximum, mean and standard deviation. These will be presented in Table 1 as follows.

Table 1

Descriptive Statistics

Value Description	HCB	DI	SS	GA	SF
Minimum	2.000	2.000	2.000	2.000	2.000
Maximum	5.000	5.000	5.000	5.000	5.000
Mean	4.240	4.419	4.357	4.338	4.235
SD	0.603	0.533	0.553	0.583	0.532

Note: HCB – human capacity building; DI – digital innovation; SS – sustainability strategy; GA – green accounting; SF – sustainability performance

Based on Table 1, it is known that the independent, dependent and moderating variables in this study have a minimum value of 2 (minimal disclosure) and a maximum value of 5 (full disclosure). This implies that no company disclosed information in the ‘very minimal’ classification (less than 10 %). From these results, the overall mean values of the research variables are above the standard deviation, indicating that the data distribution is homogeneous, signifying a good representation of the entire dataset. The mean values for all four variables mentioned above indicate that the disclosure of each variable is high, approaching the maximum value. This suggests that companies consider the disclosure of human capacity building, digital innovation, sustainability strategy, green accounting and sustainability performance as important.

5. 2. Validity and reliability test

Convergent validity uses a loading factor with a rule of thumb >0.7 . In this study, the loading factor value shows results >0.7 for all variables, except for the green accounting dimension, namely the contingent environmental and social liabilities dimension, which has a loading factor <0.7 .

Based on the Cronbach’s alpha test for all variables, the results are greater than 0.5, indicating that the research variables have been considered reliable. The composite reliability test also produces a value greater than 0.7 for all research variables. Therefore, it can be concluded that the internal consistency of the measuring instrument shows the accuracy, consistency, and accuracy of a measuring instrument in making measurements can be considered reliable.

5. 3. Hypotheses test

5. 3. 1. Main structural models

The structural model test or inner model is employed to predict the causal relationships among latent variables through the process of bootstrapping and t-statistic parameter testing. Below are the results of hypotheses 1 to 7 presented in Table 2 as follows.

Based on the evaluation of the structural model, the regression model is obtained as follows:

$$SF = \beta_0 + 0.317HCB + 0.143DI + 0.120SS + 0.193GA - 0.095HCB * GA + 0.069DI * GA + 0.006SS * GA + 0.148CBD + 0.086FS \quad (3)$$

The coefficient of determination is 47.9 %, which according to Chin (1998) can be classified as a moderate value. This means that the variation of the dependent variable (SF) can be explained by the independent variable by 47.9 %,

while the remaining 52.1 % is influenced by other variables not examined in this study.

Table 2
Hypothesis Test Results (Hypothesis 1-Hypothesis 7)

Variable	Predicted direction	Coefficient	t-statistic (>1.96)	P values
<i>HCB</i> → <i>SF</i>	+ (H1)	0.317	9.225	0.000***
<i>DI</i> → <i>SF</i>	+ (H2)	0.143	4.254	0.000***
<i>SS</i> → <i>SF</i>	+ (H3)	0.120	4.115	0.000***
<i>GA</i> → <i>SF</i>	+ (H4)	0.193	6.048	0.000***
<i>HCB*GA</i> → <i>SF</i>	+ (H5)	-0.095	3.148	0.001***
<i>DI*GA</i> → <i>SF</i>	+ (H6)	0.069	2.087	0.049**
<i>SS*GA</i> → <i>SF</i>	+(H7)	0.006	0.237	0.814
<i>CBD</i> → <i>SF</i>	+	0.148	4.218	0.000***
<i>FS</i> → <i>SF</i>	+	0.086	2.850	0.005***
<i>R</i> ²	0.479			

Note: *** – sig 0.01; ** – sig 0.05; *HCB* – human capacity building; *DI* – digital innovation; *SS* – sustainability strategy; *GA* – green accounting; *SF* – sustainability performance; *CBD* – corporate board diversity; *FS* – firm size.

Source: SMART PLS

5. 3. 2. Expansion models

The expansion model used in this study involves expanding the digital innovation variable to assess which dimensions have the greatest influence on sustainability performance. The expansion test for hypotheses 8 through 11 is presented in Table 3 as follows.

Table 3
Hypothesis Test Results (Hypothesis 8-Hypothesis 11)

Variable	Predicted direction	Coefficient	P values (<0.05)
<i>HCB</i> → <i>SF</i>	+	0.378	0.000***
<i>DI_DPSS</i> → <i>SF</i>	+ (H8)	0.021	0.594
<i>DI_DSC</i> → <i>SF</i>	+ (H9)	0.150	0.000***
<i>DI_DA</i> → <i>SF</i>	+(H10)	-0.060	0.116
<i>DI_DC</i> → <i>SF</i>	+(H11)	0.125	0.005***
<i>SS</i> → <i>SF</i>	+	0.167	0.000***
<i>CBD</i> → <i>SF</i>	+	0.158	0.000***
<i>FS</i> → <i>SF</i>	+	0.078	0.003***
<i>R</i> ²	0.437		

Note: *** – sig 0.01; *HCB* – human capacity building; *DI* – digital innovation; *SS* – sustainability strategy; *SF* – sustainability performance; *CBD* – corporate board diversity; *FS* – firm size

Source: SMART PLS

Based on the expansion test above, the regression equation obtained is as follows:

$$SF = \beta_0 + 0.378HCB + 0.021DPSS + 0.150DSC - 0.060DA + 0.125DC + 0.167SS + 0.158CBD + 0.078FS. \quad (4)$$

Based on the results of the expansion test conducted above, it can be concluded that the dimensions that have the greatest influence on sustainability performance in order are digital culture and digital supply chain.

6. Discussion of research results on the implementation of digital innovation

Based on Table 1, it can be concluded that companies in the industrial sector have extensive disclosure on specific themes in their sustainability reports. The digital theme disclosed by companies varies depending on the company's openness to change. The massive digital transformation has become one of the causes of changes in sustainability achievement patterns. Additionally, stakeholders' openness to building human capacity concerned with sustainability is a key factor in achieving sustainability performance.

Based on Table 2, this study provides evidence that human capacity building can have a positive and significant effect on sustainability performance. The better the human capacity building, the higher the sustainability performance. The most impactful efforts that stakeholders should undertake to build human capacity can commence with decision-making during the general meeting of shareholders, adherence to work ethics, motivation instilled by leadership, and the continuous implementation of employee education and training. These measures can serve as solutions to overcome limitations in human capacity to respond to technology and sustainability.

This finding is in line with previous research [26] and supports the Resource-Based View theory (RBV) [11]. RBV emphasizes that human capacity building is a strategic human resource that can improve competitive advantage, financial performance, and non-financial performance, including sustainability performance.

Based on Table 2, the existence of digital innovation is proven to have a positive and significant effect on sustainability performance. The wider the digital innovation implemented by the company, the better the sustainability performance. The digital innovation expansion process implemented by the company includes the application of externalization and internalization of digital culture in various aspects such as supply chain, production, and accounting. These results prove that industrial sector companies in Indonesia are ready and open to digital transformation in accordance with the requirements stipulated in the Minister of Industry and Trade Regulation No. 21 of 2020.

The expansion of digital innovation refers to the previous study [10], which had only one dimension with four indicators. This research successfully expanded the dimension, indicators and measurements of digital innovation. First, the development of digital product, services and solution dimension has successfully evolved into five indicators, including:

1. Product quality.
2. Product features.
3. Service quality.
4. Service features.
5. Innovation and development of new products/services supported by industrialization 4.0.

Second, the development of the digital supply chain dimension consists of six indicators, namely:

1. Utilization of IT and technology.
2. Supplier selection policy.
3. The company maintains good relationships with suppliers.
4. Payment to suppliers using digital payment.
5. Maintain healthy inventory levels.
6. Explain performance in accordance with ISO 9001 quality management.

Third, the development of the digital accounting dimension involves two indicators:

1. Using digital-based accounting.
2. Express XBRL digital format.

Fourth, the development of the digital culture dimension encompasses eight indicators, including:

1. Externalization of openness to change.
2. Externalization of analytical approach.
3. Externalization of cooperation.
4. Externalization of tolerance.
5. Externalization of learning orientation.
6. Externalization of customer orientation.
7. Internalization of digital culture.
8. Organizations encourage workers to be aware of digital risks.

This is also the company's effort to meet the demands of stakeholders who are not only thinking about economic benefits, but also how to play an active role in maintaining environmental and social sustainability. Digital utilization to carry out production activities without ignoring resource sustainability, the use of environmentally friendly materials, and automation for savings is one of the efforts that can be made to support efforts to reduce the adverse effects of climate change and achieve clean emissions in 2024. Thus, the existence of digitalization can be utilized as optimally as possible to innovate in various aspects of the company as part of efforts to achieve sustainability performance.

This finding is consistent with previous research [29] and supports the Resource-Based View theory [11]. The theory explains that the existence of strategic resources, such as technology, and trust in the technology can increase competitive advantage and organizational performance.

Based on Table 2, sustainability strategy is proven to have a significant positive effect on sustainability performance. The better the sustainability strategy prepared by the company, the higher the sustainability performance. The sustainability strategy in the industrial sector is already aware of the importance of strategies in achieving sustainability performance and requires time to reach the stage of optimizing and leading. This can start by developing connectivity in sustainability strategies among divisions within the company, so that achieving sustainability performance can be attained by involving all divisions in the company without exception.

These results are consistent with previous research [34, 35, 44], which state that sustainability strategy affects sustainability performance. Sustainability strategy is the initial stage that cannot be ignored in achieving sustainability performance. With the proven influence of sustainability strategy on sustainability performance, it indicates that the companies sampled have implemented good sustainability governance starting from strategy preparation to achieving sustainability performance.

Based on Table 2, it is evident that green accounting has a positive and significant influence on sustainability performance, it shows that the sample companies have started to measure their investment and spending levels towards social and environmental activities. The dimensions proposed by previous researchers [37] to measure green accounting variables cannot be fully used, because contingent liabilities have not been disclosed by entities in the sample. Therefore, they need to be excluded from the dimensions of green accounting [37], and only three dimensions that can measure

green accounting should be used, namely natural resource assets, CSR donations, and environmental costs.

The proven impact of green accounting on sustainability performance serves as input for the industrial sector to begin preparing for the recognition of environmental cost, ranging from assets to CSR expenses. Although environmental contingencies are not yet recognized in the industrial sector, this serves as a consideration to start paying attention to potential government regulations that may tighten environmental standards for companies in order to achieve sustainable development goals. With this result, it is hoped to provide input for stakeholders to promptly develop the necessary green accounting standards required by the industry sector.

Based on Table 2, this study has not succeeded in proving that the existence of green accounting can strengthen the influence of human capacity building on sustainability performance. In addition, this study also shows that green accounting functions as a quasi-moderation, which means that green accounting variables act as independent variables and moderating variables at the same time.

Human capacity building has a significant positive effect on sustainability performance. However, when green accounting is included as a moderating variable, the direction of its influence changes to negative. This indicates that with the implementation of green accounting in the company, the influence of human capacity building on sustainability performance becomes weaker. A further explanation can be given, namely that company personnel may not have received training related to green accounting. On the other hand, companies entrust the measurement of green accounting to consultants. As a result, personnel may not consider it necessary to maximize their capacity to achieve sustainability performance because they believe that green accounting already includes sustainability performance measurement and has been left to outsiders. Instead, personnel only carry out the standard operating procedures in their job descriptions.

Based on Table 2, this study successfully proves that green accounting can moderate (strengthen) the effect of digital innovation on sustainability performance. In addition, these results also show that green accounting functions as a quasi-moderation, which means that green accounting variables act as independent variables and moderating variables at the same time.

The existence of green accounting as a moderating variable can strengthen the effect of digital innovation on sustainability performance. This happens because digital innovation can be applied in various aspects, including accounting. Green accounting, conceptually, focuses on environmental and social accounting measurements, and its implementation can use digital facilities for automation and accuracy in report presentation. With green accounting in practice, digital innovations can be made to improve sustainability performance. Digital elements are widely disclosed by companies as one of the achievements of sustainability performance. In addition, the existence of green accounting can be used as a measurement of costs arising from digital innovation.

Based on Table 2, this study failed to prove that green accounting does not play a role in moderating the effect of sustainability strategy on sustainability performance. Green accounting is proven to be a quasi-moderation because it acts as both an independent variable and a moderating variable. This conclusion may be due to the fact that the adopted sustainability strategy does not yet include green account-

ing measurements, and there are no personnel assigned to implement the strategy in achieving sustainability performance. This result also does not support legitimacy theory, as legitimacy as an environmentally and socially concerned company should be accompanied by aligned strategy, measurement implementation, and performance achievement.

Based on Table 3, digital culture and digital supply chain have the most significant impact on sustainability performance. Meanwhile, digital accounting and digital products, services, and solutions have no influence on sustainability performance. This situation shows that the existence of digital innovation in the sample companies is still in the phase of digital transformation that takes place gradually. The recommendation that can be taken from this result is the need to include the digital accounting dimension in the Minister of Industry and Trade Regulation No. 21 of 2020. This is important as one of the pillars of assessing industrial readiness in digital transformation 4.0 to be more comprehensive and in accordance with the practices carried out by industrial companies, especially related to digital accounting.

Previous research on digital innovations has limitations as it can only be applied in more restricted sectors, and there is no dimension and measurement available for general use across diverse sectors. Therefore, this study conducted an in-depth review and successfully expanded the dimensions and measurements of digital innovation by modifying previous research [10]. The expansion of digital innovation dimensions, including digital product, services and solution, digital supply chain, digital accounting and digital culture, can be applied across all sectors in industry classification and has not yet been proven in the financial industry. Hence, in the future, it is essential to reevaluate whether the dimensions and measurements developed in this study can be applied to companies in the financial sector.

Theoretically, the implication of this research is the development of new measures of digital innovation for the industrial sector. As an improved measurement compared to the previous one, this research generates three novelty dimensions and five novelty indicators. The research implication for regulation is the Ministry of Industry and Trade Regulation No. 21 of 2020 concerning industrial readiness in facing digital transformation 4.0 to provide input related to INDI 4.0 by adding digital accounting aspects. The practical implications suggest that to enhance sustainability performance, digital innovation is needed, starting from a digital culture and subsequently expanding to various aspects, including digital products, services and solutions, digital supply chain and digital accounting.

The limitation of this research is, firstly, that the study uses a sample of companies within the industrial classification, therefore further testing is needed to determine whether it can be applied to the financial sector. Second, there is a dimension that has a score value of 0, namely the green accounting dimension related to environmental and social contingent liabilities, which has not been disclosed at all by the sample companies. Third, the presence of data outliers results in a decrease in the total quantity of observation data.

Suggestions for further research are, first, in terms of data collection using content analysis, it should be rigorous to avoid subjectivity in the obtained data. Second, this research encourages future studies to explore more in-depth information to establish indicators for digital accounting and green accounting.

7. Conclusions

1. Descriptive statistics have a minimum value of 2 (minimal disclosure) and a maximum value of 5 (full disclosure). This indicates that companies consider complete and informative information disclosure important.

2. Validity and reliability testing uses the outer loading approach, and the overall dimensions, they are able to measure their variables. This is indicated by the outer loading values exceeding 0.7 in line with the required rule of thumb.

3. The improvement of human capacity, digital innovation and sustainability strategy has been proven to impact sustainability performance. Meanwhile, green accounting is able to strengthen the impact of digital innovation on sustainability performance. On the other hand, environmental accounting has also been proven to weaken the impact of increasing human capacity on sustainability performance. Additionally, this research indicates that green accounting does not play a role in influencing the relationship between sustainability strategy and sustainability performance. The expansion test results for the digital innovation dimension show that digital culture and digital supply chain have a significant impact on sustainability performance, while digital products, services and solution do not affect sustainability performance.

Conflict of interest

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its result presented in this paper.

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Data availability

Data will be made available on reasonable request.

Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the current work.

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