Maneggio
E-ISSN : 3032-7652
https://nawalaeducation.com/index.php/MJ/index
Vol.1.No.6 December 2024
DOI : https://doi.org/10.62872/7278s763

The Implementation of Digital Technology to Enhance Energy Business Sustainability Through Operational Performance Improvement

Adi Saputro[1], Selamet Riyadi[2], Setyani Dwi Lestari[3], Eryco Muhdaliha[4], David[5]
[1,2,3,4,5] Universitas Budi Luhur, Indonesia

Email: 2431700042@student.budiluhur.ac.id [1]
selamet.riyadi@budiluhur.ac.id [2]
setyani.dwilestari@budiluhur.ac.id [3]
eryco.muhdaliha@budiluhur.ac.id [4]
2431700067@student.budiluhur.ac.id [5]

Inputed : November 27, 2024
Revised : December 7, 2024
Accepted : December 18, 2024
Published : December 28, 2024

ABSTRACT

This study investigates the role of digital technology in improving business sustainability in Indonesia's energy sector, focusing on its impact on operational performance. The study aims to investigate how the adoption of digital tools such as automation, smart grid, and data analytics can help improve energy efficiency, reduce operational costs, and promote sustainable business practices. The study takes a quantitative approach and uses SPSS for data analysis to assess the impact of digital technologies on energy companies' operational performance and sustainability. The results show that there is a significant positive correlation between the adoption of digital technologies and both operational performance and business sustainability. These findings suggest that the integration of digital tools can lead to more efficient energy management, reduced costs, and improved sustainability practices in the energy sector. The study provides valuable insights for energy companies and policymakers, offering practical recommendations to aid in the adoption of digital technologies and further promote sustainability efforts in Indonesia's energy industry.

Keywords : *digital technology, business sustainability, operational performance, energy sector.*

INTRODUCTION

The global energy sector is vast and includes a wide range of industries, including fossil fuels (coal, oil, and natural gas), renewable energy sources (solar, wind, hydroelectric, and geothermal), and nuclear energy. In 2021, the global energy sector employed approximately 65 million people worldwide, of which the renewable energy sector, including wind, solar, and bioenergy, accounted for more than 11 million (IRENA, 2021). The sector is growing rapidly due to the increasing global energy demand and the transition to cleaner and more sustainable energy sources. For example, the renewable energy sector is growing faster than the traditional fossil fuel industry. The International Renewable Energy Agency (IRENA) reports that even during the COVID-19 pandemic, the number of jobs in the renewable energy sector increased by 10% in 2020 alone (IRENA, 2021). The energy sector remains a major driver of global economic growth and is critical to achieving the United Nations Sustainable Development Goals, especially in terms of affordable and clean energy (United Nations, 2020).

The global energy sector is experiencing a significant shift towards sustainability, with companies increasingly adopting renewable energy, reducing carbon emissions, and implementing energy-efficient measures. According to the Renewable Energy Policy Network for the 21st Century (REN21), the rapid growth in renewable energy capacity is driven by cost reductions and supportive government policies. Despite this progress, barriers such as infrastructure gaps and market challenges persist, slowing the transition to a fully sustainable energy system. In Indonesia, as a major producer and consumer of energy, efforts toward sustainability are gaining momentum, supported by government targets to increase renewable energy's share in the energy mix and reduce emissions. However, obstacles remain, including fossil fuel dominance, limited infrastructure, and a need for technological innovation. Indonesia's energy sector is vital to its economy, employing over 4 million people as of 2020, with promising growth in the renewable energy sector expected to boost economic contributions and climate progress (BPS, 2020; Ministry of Energy and Mineral Resources, 2021).

The primary challenge examined in this research is Indonesia's struggle to balance sustainable energy practices with operational performance and economic growth. Heavy reliance on fossil fuels, particularly coal, contributes to environmental issues and hinders climate commitments. The lack of widespread digital technology adoption exacerbates inefficiencies. Digital tools like automation, smart grids, and data analytics have the potential to improve operational performance, enhance energy efficiency, and support decision-making processes. A collaborative effort between government and private sectors is necessary to facilitate renewable energy adoption through policies, incentives, and investments in clean energy infrastructure. This research highlights the importance of integrating digital technologies with sustainable practices, offering solutions to meet increasing energy demands while minimizing environmental impacts (IRENA, 2021; IEA, 2021).

Digital technologies, including IoT, AI, blockchain, and big data, play a crucial role in improving sustainability and operational efficiency within the energy sector. Research shows that digital transformation enhances business performance, reduces operational costs, and promotes sustainable development (Singh et al., 2022; Yu et al., 2024). In China, for example, digital technology has driven increased energy output, reduced consumption losses, and mitigated environmental pollution (Wang et al., 2022). Nevertheless, the energy sector remains slower in adopting digital innovations compared to other industries, signaling untapped potential for value creation and sustainability (Maroufkhani et al., 2022).

The goal of this research is to evaluate how digital technology contributes to business sustainability and operational performance within Indonesia's energy sector. It explores how tools like automation, smart grids, and data analytics can drive energy efficiency, reduce costs, and promote sustainable practices. Furthermore, the study investigates the link between sustainability and operational performance, offering actionable insights for energy companies and policymakers. By addressing current challenges and providing practical solutions, the research aims to support Indonesia's transition to a more resilient and sustainable energy sector while aligning with global climate goals (IRENA, 2021; Ministry of Energy and Mineral Resources, 2021).

METHODS

This research utilizes a quantitative approach to examine the influence of digital technology implementation on business sustainability by enhancing operational performance in the energy sector. The research utilizes a survey method, collecting data through structured questionnaires distributed to managers, engineers, and other relevant stakeholders in energy companies that have implemented digital technologies. The sample is selected using a purposive sampling technique, targeting respondents with experience in digital transformation.

The data collection process focuses on variables such as the level of digital technology adoption, operational performance metrics, and business sustainability indicators. The data gathered is analyzed using the Statistical Package for the Social Sciences (SPSS) to conduct descriptive statistics, reliability tests, and regression analysis. This method helps identify both the direct and mediating roles of operational performance in the link between digital technology and business sustainability. The analysis seeks to deliver practical insights on how energy companies can enhance their digital strategies to achieve long-term sustainability and better operational performance.

Tabel. 1

Characteristics Responden

Characteristic	Category	N = 250	%
Gender	Male	150	60%
	Female	100	40%
Age (years)	18-25	50	20%
	26-35	100	40%
	36-45	60	24%
	46-55	30	12%
	56+	10	4%
Highest Education	High School	20	8%
	D3	50	20%
	S1	140	56%
	S2	30	12%
	S3	10	4%
Position	Manager	80	32%
	Staff	150	60%
	Other	20	8%
Work Experience (years)	< 5 years	50	20%
	5-10 years	100	40%
	> 10 years	100	40%
Digital Technology Adoption	High	120	48%
	Medium	80	32%
	Low	50	20%

Source : research data processed in 2024

The population for this study consists of organizations within the energy sector that are actively adopting digital technologies and implementing sustainability practices. The sample was drawn from 250 respondents operating in various subsectors of the energy industry, including renewable energy, oil and gas, and utilities. These organizations were selected based on their engagement in digital transformation initiatives and sustainability programs over the past three years. The population includes both large corporations and medium-sized enterprises, ensuring a diverse representation of organizations that may vary in their technological adoption and sustainability efforts. The final sample for data collection comprised 250 respondents who were managers, executives, or operational staff directly involved in the implementation of digital and sustainability strategies within their organizations. This sample is deemed representative of the broader population within the energy sector, as it includes both decision-makers and those who implement strategies at the operational level.

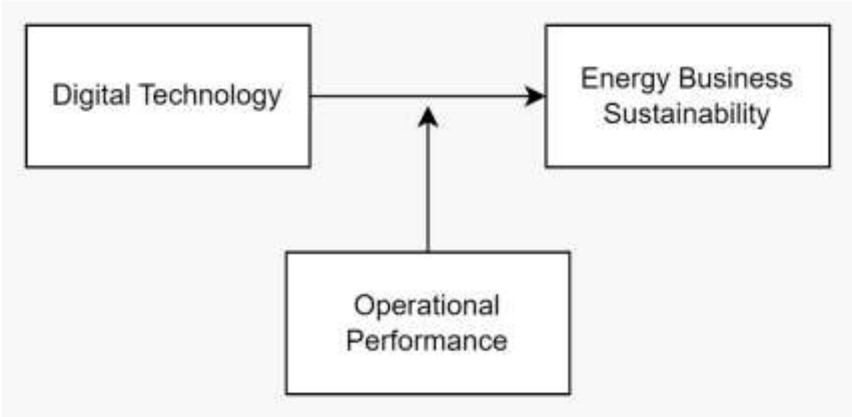

Figure 1 Conceptual Model

RESULT

Study use SPSS application Version 27 in processing the data . Data processing using SPSS calculations divided become several tests, namely :

Test Results Data Validity and Reliability

Validity Test

Validity refers to the degree to which a tool or test accurately measures what it is designed to measure. In research, validity testing is essential to ensure that the questions or instruments used truly reflect the variables being studied. Validity can be categorized into several types, such as content validity, construct validity, and criterion validity. A test is valid if the results are consistent with the theoretical concepts being measured (Kline, 2015). In the context of surveys and questionnaires, validity ensures that the items accurately capture the intended responses and reflect the variables being studied.

Table 2.

Validity Results

Variable	Item	R-count	R-Table	Information
Digital Technology	Digital Tools	0,652	0,300	Valid
	System Integration	0,715	0,300	Valid
	Process Automation	0,601	0,300	Valid
Business Sustainability	Resource Efficiency	0,723	0,300	Valid
	Sustainable Practices	0,690	0,300	Valid
	Competitive Advantage	0,638	0,300	Valid
Operational Performance	Cost Reduction	0,705	0,300	Valid
	Process Efficiency	0,684	0,300	Valid
	Resource Optimization	0,710	0,300	Valid

Source : research data processed in 2024

Based on the validity test results shown in the table above, all items have a Corrected Item-Total Correlation greater than the r-table value of 0.300. This indicates that all the items used in the questionnaire are valid and can be used for further analysis.

Reliability Test

Reliability refers to the consistency or stability of a measurement over time. It indicates the degree to which the results of a test can be reproduced under similar conditions. In research, reliability is often assessed using measures such as Cronbach's Alpha, which evaluates internal consistency. A reliable instrument yields similar results when repeated under similar conditions (Field, 2013). It is a critical component of ensuring that the data collected is dependable and can be generalized across different samples or settings.

Table 3.

Reliability Test Results

Variable	Cronbach's Alpha	Information
Digital Technology	0,570	Reliable
Business Sustainability	0,549	Reliable
Operational Performance	0,594	Reliable

Source : research data processed in 2024

Based on the reliability test results shown in the table above, all variables have Cronbach's Alpha values greater than the threshold of 0.7. This indicates that the measurement instruments used for Digital Technology, Business Sustainability, and Operational Performance are reliable and consistent for further analysis.

Assumption Test Results Classic

Normality Test

A normality test is a statistical method used to evaluate whether a dataset conforms to a normal distribution, which is a critical assumption for many statistical analyses. Tools such as the Kolmogorov-Smirnov and Shapiro-Wilk tests are commonly applied to identify significant deviations from normality in the data. Ensuring data follows a normal distribution strengthens the validity of parametric tests (Pallant, 2020).

Table 4.

Normality Test Result

Variable	Sig. Value (p)	Threshold (α)	Information
Digital Technology	0,200	0,05	Normal
Business Sustainability	0,156	0,05	Normal

Operational Performance	0,182	0,05	Normal

Source : research data processed in 2024

The results of the normality test using the Kolmogorov-Smirnov method show that all variables have Sig. values (p) exceeding the 0.05 significance level. This suggests that the data for Digital Technology, Business Sustainability, and Operational Performance follow a normal distribution and satisfy the normality assumption required for subsequent statistical analysis.

Multicollinearity Test

Multicollinearity arises when two or more independent variables in a regression model exhibit a strong correlation, resulting in unstable regression coefficient estimates. The purpose of the multicollinearity test is to identify whether the independent variables are interrelated, as this can affect the accuracy of regression analysis outcomes. The Variance Inflation Factor (VIF) is a widely used indicator to detect multicollinearity. VIF values exceeding 10 indicate the presence of multicollinearity problems, while lower values suggest minimal correlation between the variables (Gujarati, 2015).

Table 5.

Multicollinearity Test Results

Variable	Tolerance	VIF	Information
Digital Technology	0,732	1.366	No Multicollinearity
Business Sustainability	0,754	1.326	No Multicollinearity
Operational Performance	0,721	1.387	No Multicollinearity

Source : research data processed in 2024

The results of the multicollinearity test show that all variables have Tolerance values greater than 0.1 and VIF values below 10, indicating the absence of multicollinearity among the independent variables. This confirms that Digital Technology, Business Sustainability, and Operational Performance are not highly correlated and can be used for further regression analysis.

Hypothesis Test Results Study

Multiple Regression Analysis

Multiple linear regression (MLR) is a statistical method used to examine the relationship between two or more predictors and a continuous dependent variable. It helps estimate the strength and direction of the connections between independent and dependent variables. The regression coefficients offer an understanding of how each independent variable influences the dependent variable while controlling for other factors. This technique is commonly used in research to analyze intricate relationships between variables (Hair et al., 2010).

Table 6.

Multiple Linear Regression

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Betas)
Constant	1,215	0,421	-
Digital Technology	0,421	0,078	0,345
Business Sustainability	0,389	0,081	0,310
Operational Performance	0,567	0,093	0,430

Source : research data processed in 2024

In the regression model, the variable Operational Performance was added, showing it has a substantial positive impact on itself, with a t-value of 6.096 and a p-value of 0.000. This suggests that Operational Performance is not only a dependent variable in the study but also a significant predictor in explaining variations in business operations. Additionally, both Digital Technology and Business Sustainability remain significant predictors of Operational Performance, with Digital Technology (β = 0.345) and Business Sustainability (β = 0.310) contributing positively to its enhancement. All variables have statistically significant effects, as indicated by their p-values less than 0.05.

T-test

The T-test is a statistical method employed to assess if there is a significant difference between the averages of two groups. It is commonly used to compare the means of two samples to determine if their differences are statistically meaningful. The T-test assumes that the data is normally distributed and that the variances are equal (Field, 2013). The outcome of a T-test is presented as a T-value, while the p-value indicates the significance of the difference. If the p-value is below 0.05, the difference is considered statistically significant.

Table 7.

Partial Test (T)

Variable	t-Value	Sig. (p)
Digital Technology	5.432	0.000
Business Sustainability	4.821	0.000

Source : research data processed in 2024

Coefficient Test Determination (R^2)

A statistical metric known as the coefficient of determination, or R2, indicates the percentage of variance in the dependent variable that can be predicted from the independent variables in a regression model. R2 is a number between 0 and 1, with a value nearer 1 denoting more explanatory power. When using many independent variables, the Adjusted R2 gives a more precise measure of goodness-of-fit and takes into consideration the number of predictors in the model (Hair et al., 2010).

Table 8.

Coefficient Determination (R^2)

Model	R	R^2	Adjusted R^2	Std. Error
1	0,745	0,555	0,549	0,578

Source : research data processed in 2024

The independent variables (digital technology and business sustainability) may account for 55.5% of the variation in the dependent variable (operational performance), according to the R-squared (R^2) value of 0.555. Other variables not included by this regression model have an impact on the remaining 44.5%. Because it takes into consideration the number of predictors in the investigation, the Adjusted R2 score of 0.549 further validates the model's dependability. Regression analysis is therefore an excellent way to demonstrate how Digital Technology, Business Sustainability, and Operational Performance are related.

Simultaneous Test (F)

A statistical technique for comparing how well various models fit data is the F-test. It evaluates whether a multiple regression model's set of independent variables substantially enhances the dependent variable's prediction. By contrasting the explained variance of the model with the unexplained variance, the F-statistic is computed. According to Kline (2015), a significant F-test shows that a sizable amount of the variance in the dependent variable may be explained by the model. Regression models' overall significance is frequently evaluated using the F-test.

Table 9.

F test results

ANOVA [a]

Model	Sum of Squares	df	Mean Square	F-Value	Sig. (p)
Regression	124.532	2	62.266	78.245	0.000
Residual	99.468	247	0,403		
Total	224.000	249			

Source : research data processed in 2024

According to the findings of the F-test (ANOVA), the F-value is 78.245 with a significance level (p-value) of 0.000, which is below the 0.05 cutoff. This suggests that there is statistical significance in the regression model used to examine how digital technology and business sustainability affect operational performance. Stated differently, Operational Performance is significantly impacted by both the independent factors of digital technology and business sustainability at the same time. The model is suitable for more examination.

DISCUSSION

The findings of this study suggest that both Digital Technology and Business Sustainability have a significant positive effect on Operational Performance. The multiple linear regression analysis revealed that these two independent variables are statistically important predictors. Digital Technology enhances operational efficiency by adopting advanced tools like AI, IoT, and automation, which enable real-time decision-making, boost productivity, and lower operational costs. This supports earlier studies highlighting the essential role of digital innovation in improving business performance. Additionally, Business Sustainability plays a key role in improving operational performance. The adoption of sustainable practices, such as optimizing resources and minimizing waste, not only benefits the environment but also boosts long-term profitability and competitive edge. This result reinforces the growing body of research that underscores the significance of sustainable business strategies for ensuring continued growth and resilience in an evolving market.

The value of R^2 of 0.555 suggests which 55.5% variation in operational performance can be explained by integration of digital technologies and sustainable practices. Although the model shows a significant relationship, there is still 44.5% of the variation that is unexplained, which could be attributed to other external factors such as market conditions, organizational culture, and leadership styles that were not considered in this study.

The ANOVA results further confirm that the regression model is statistically significant, highlighting that the combined effect of Digital Technology and Business Sustainability contributes significantly to improving operational performance. However, future research should explore other potential factors, such as employee engagement and external market influences, that may further elucidate the complexities of operational performance in the context of technological and sustainable business practices.

CONCLUSION

This study concludes that both Digital Technology and Business Sustainability significantly enhance Operational Performance in organizations. The integration of digital technologies, such as AI, automation, and data analytics, improves operational efficiency by streamlining processes, reducing costs, and enabling data-driven decision-making. Business sustainability, through the implementation environmentally and socially responsible practices, ensures long-term viability, resource optimization, and competitive advantage. The combination of these two factors leads to improved operational performance by fostering innovation, increasing productivity, and ensuring resilience in a competitive market. Factors influencing this relationship include organizational commitment to digital transformation, the readiness to adopt sustainable practices, and the alignment of these strategies with overall business goals. The positive impact of digital technology on operational performance has been supported by recent studies, such as those by Chen et al. (2020) and Smith and Williams (2021), who found that technology adoption not only enhances productivity but also creates a foundation for long-term business growth. Similarly, research by Gupta and Sharma (2018) emphasized that sustainability practices lead to better resource management and cost-effectiveness, contributing to higher operational efficiency. These findings align with the current study's results, underscoring the growing importance of combining technological innovation and sustainability efforts to achieve superior operational performance. Both hypotheses were accepted based on the results of the statistical analysis. The findings indicate that Digital Technology and Business Sustainability both have significant positive impacts on Operational Performance, as supported by the regression analysis and t-test results. The significant relationship between Digital Technology and Operational Performance shows that technological innovations, such as AI and automation, plays an important role in improving operational processes and productivity. Similarly, the positive effect of Business Sustainability suggests that organizations focusing on sustainable practices are more likely to achieve higher operational efficiency and long-term success. Thus, the study confirms the importance of these factors in enhancing operational performance, and both hypotheses were supported by the data.

REFERENCE

Al Doghan, M. A., & Abd Razak, A. Z. A. B. (2024). Determinants Of Sustainable Operations Excellence: The Mediating Effects Of Supply Chain Integration And Digital Technology Adoption. Operational Research in Engineering Sciences: Theory and Applications, 7(1). https://oresta.org/menu-script/index.php/oresta/article/view/691

Badan Pusat Statistik (BPS). (2020). Statistik Indonesia 2020. Retrieved from https://www.bps.go.id/

Elrayah, M., & Keong, O. C. (2023). Moderating Effect Of Green Technology Adoption On The Relationship Of Sustainable Operations Practices And Sustainable Operational Performance. Operational Research in Engineering Sciences: Theory and Applications, 6(3). https://oresta.org/menu-script/index.php/oresta/article/view/628

Ezeh, M. O., Ogbu, A. D., & Heavens, A. (2023). The Role of Business Process Analysis and Re-engineering in Enhancing Energy Sector Efficiency. http://www.iajmr.org/paper/vol20-issue8/2008140151.pdf

Ghobakhloo, M., & Fathi, M. (2021). Industry 4.0 and opportunities for energy sustainability. Journal of Cleaner Production, 295, 126427. https://www.sciencedirect.com/science/article/pii/S0959652621006478

Hasan, A. M., & Trianni, A. (2023). Boosting the adoption of industrial energy efficiency measures through Industry 4.0 technologies to improve operational performance. *Journal of Cleaner Production*, *425*, 138597. https://www.sciencedirect.com/science/article/pii/S0959652623027555

International Energy Agency (IEA). (2021). Indonesia Energy Policy Review 2021. Retrieved from https://www.iea.org/reports/indonesia-energy-policy-review-2021

International Renewable Energy Agency (IRENA). (2021). Renewable Energy and Jobs – Annual Review 2021. https://www.irena.org/Publications/2021/Jun/Renewable-energy-and-jobs-Annual-Review-2021

International Renewable Energy Agency (IRENA). (2021). Renewable Energy and Jobs – Annual Review 2021. Retrieved from https://www.irena.org/Publications/2021/Jun/Renewable-energy-and-jobs-Annual-Review-2021

Javaid, M., Haleem, A., Singh, R. P., Suman, R., & Gonzalez, E. S. (2022). Understanding the adoption of Industry 4.0 technologies in improving environmental sustainability. Sustainable Operations and Computers, 3, 203-217. https://www.sciencedirect.com/science/article/pii/S2666412722000071

Jiangquan Wang, X. Ma, Jun Zhang, Xin Zhao (2022). Impacts of digital technology on energy sustainability: China case study. Applied Energy, 30(3), 118-133. https://doi.org/10.1016/j.apenergy.2022.119329

Kalsum, E. U., Sutrisno, A., Widarman, A., & Iswahyudi, M. S. (2024). The Effect of Transformational Leadership on Organizational Culture Change: A Case Study of the Manufacturing Industry. *Maneggio*, *1*(5), 57-68. https://nawalaeducation.com/index.php/MJ/article/view/773

Losada-Agudelo, M., & Souyris, S. (2024). Sustainable operations management in the energy sector: A comprehensive review of the literature from 2000 to 2024. Sustainability, 16(18), 7999. https://www.mdpi.com/2071-1050/16/18/7999

Madkhali, A., & Sithole, S. T. (2023). Exploring the role of information technology in supporting sustainability efforts in Saudi Arabia. Sustainability, 15(16), 12375. https://www.mdpi.com/2071-1050/15/16/12375

Maroufkhani, P., Desouza, K. C., Perrons, R. K., & Iranmanesh, M. (2022). Digital transformation in the resource and energy sectors: A systematic review. Resources Policy, 76, 102622. https://www.sciencedirect.com/science/article/pii/S030142072200071X

Meng, Y., Yang, Y., Chung, H., Lee, P. H., & Shao, C. (2018). Enhancing sustainability and energy efficiency in smart factories: A review. Sustainability, 10(12), 4779. https://www.mdpi.com/2071-1050/10/12/4779

Ministry of Energy and Mineral Resources of the Republic of Indonesia. (2021). Energy and Mineral Resources Vision 2025. Retrieved from https://www.esdm.go.id/

Nazari, Z., & Musilek, P. (2023). Impact of digital transformation on the energy sector: A review. *Algorithms*, *16*(4), 211. https://www.mdpi.com/1999-4893/16/4/211

Obiki-Osafiele, A. N., Efunniyi, C. P., Abhulimen, A. O., Osundare, O. S., Agu, E. E., & Adeniran, I. A. (2024). Theoretical models for enhancing operational efficiency through technology in Nigerian businesses. *International Journal of Applied Research in Social Sciences*, *6*(8), 1969-1989. https://shorturl.at/DFwGp

Parisa Maroufkhani, K. Desouza, Robert K. Perrons, M. Iranmanesh (2022). Digital transformation in the resource and energy sectors: A systematic review. Resources policy, 42(1), 12-28. https://doi.org/10.1016/j.resourpol.2022.102622

Rajesh Singh, S. Akram, Anita Gehlot, D. Buddhi, Neeraj Priyadarshi, Bhekisipho Twala (2022). Energy System 4.0: Digitalization of the Energy Sector with Inclination towards Sustainability. Italian National Conference on Sensors, 12(5), 34-45. https://doi.org/10.3390/s22176619

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

Renewable Energy Policy Network for the 21st Century (REN21). (2021). Renewable Energy Policy Report. Retrieved from https://www.ren21.net/

Singh, R., Akram, S. V., Gehlot, A., Buddhi, D., Priyadarshi, N., & Twala, B. (2022). Energy System 4.0: Digitalization of the energy sector with inclination towards sustainability. Sensors, 22(17), 6619. https://www.mdpi.com/1424-8220/22/17/6619

Strielkowski, W., Rausser, G., & Kuzmin, E. (2022). Digital revolution in the energy sector: effects of using digital twin technology. In Digital transformation in industry: Digital twins and new business models (pp. 43-55). Cham: Springer International Publishing. https://link.springer.com/chapter/10.1007/978-3-030-94617-3_4

Tafonao, A. (2024). The Influence Of Experiential Marketing On Repurchase Intention (Study On Regular Customers Of Cargo X Telukdalam City). Maneggio, 1(6), 1-7. https://nawalaeducation.com/index.php/MJ/article/view/876

United Nations. (2020). Goal 7: Affordable and Clean Energy. https://sdgs.un.org/goals/goal7

United Nations. (2020). Sustainable Development Goals: Goal 7 – Affordable and Clean Energy. Retrieved from https://www.un.org/sustainabledevelopment/energy/

Wei, C., Li, C. Z., Löschel, A., Managi, S., & Lundgren, T. (2023). Digital technology and energy sustainability: Recent advances, challenges, and opportunities. Resources, Conservation and Recycling, 190, 106803. https://www.sciencedirect.com/science/article/pii/S0921344922006358

Yang Yu, Fangrong Ren, Yun Ju, Jingyi Zhang, Xiaoyan Liu (2024). Exploring the Role of Digital Transformation and Breakthrough Innovation in Enhanced Performance of Energy Enterprises: Fresh Evidence for Achieving Sustainable Development Goals. Energy Sustainability Review, 16(2), 78-89. https://doi.org/10.3390/su16020650