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# The Impact of Digital Capabilities and Green Technology Implementation on Operational Performance and Business Sustainability in the Manufacturing Industry in Bandung Regency

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**ABSTRACT**

The manufacturing industry is facing increasing pressure to enhance operational efficiency while maintaining environmental sustainability. The integration of digital technologies and environmentally friendly production systems has become a key strategy for improving organizational performance and long-term sustainability. This study aims to examine the impact of digital capacity and green technology implementation on operational performance and business sustainability in manufacturing companies in Bandung Regency. The research employs a quantitative approach using survey data collected from 110 respondents working in manufacturing firms. Data were gathered through structured questionnaires using a five-point Likert scale to measure respondents' perceptions of digital capacity, green technology implementation, operational performance, and business sustainability. The data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with the assistance of SmartPLS 3 software. The results indicate that digital capacity has a positive and significant effect on operational performance, suggesting that companies with stronger digital capabilities are able to improve production efficiency and operational effectiveness. In addition, green technology implementation also significantly influences operational performance by enhancing resource efficiency and reducing environmental impact. The findings further reveal that digital capacity and green technology implementation positively affect business sustainability. Moreover, operational performance plays an important role in strengthening business sustainability in manufacturing companies. These findings highlight the importance of integrating digital transformation and environmentally responsible technologies as strategic drivers for improving operational efficiency and achieving sustainable business development in the manufacturing sector.



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## 1. INTRODUCTION

The manufacturing sector plays a vital role in driving economic growth, employment generation, and industrial development in many emerging economies, including Indonesia. As one of the main industrial centers in West Java, Bandung Regency has experienced substantial growth in manufacturing activities, ranging from textile production and food processing to metal and machinery industries [1], [2]. This sector contributes significantly to regional economic development and serves as a strategic foundation for strengthening Indonesia's industrial competitiveness. However, in recent years manufacturing firms have faced increasing pressures arising from technological disruption, global competition, and the need to improve operational efficiency [2], [3]. These challenges require manufacturing organizations to continuously adapt their operational strategies in order to remain competitive in an increasingly dynamic industrial environment.

One of the most important drivers of transformation in modern manufacturing is the adoption of digital technologies. Digital capacity refers to an organization's ability to adopt, integrate, and effectively utilize digital technologies to support business operations and strategic decision-making [4], [5]. The rapid development of digital technologies such as automation systems, big data analytics, cloud computing, and the Internet of Things (IoT) has fundamentally changed how manufacturing companies manage production processes, coordinate operational activities, and optimize resource utilization [6], [7]. Organizations that possess strong digital capacity are generally more capable of improving productivity, increasing operational flexibility, and responding quickly to market changes. Consequently, digital capacity has become a critical capability that enables firms to enhance operational performance and maintain competitiveness in the era of Industry 4.0.

In addition to digital transformation, manufacturing companies are increasingly required to address environmental sustainability issues. Industrial activities are widely recognized as major contributors to environmental problems such as energy overconsumption, carbon emissions, and industrial waste generation [6], [7]. As a result, governments, regulators, and stakeholders are encouraging companies to adopt environmentally responsible production practices. One important approach is the implementation of green technology, which refers to the use of environmentally friendly technologies designed to minimize environmental impact, improve energy efficiency, and promote sustainable resource management. The adoption of green technology may include energy-efficient production equipment, cleaner manufacturing processes, waste recycling systems, and environmentally friendly materials.

The implementation of green technology not only supports environmental protection but also provides strategic benefits for organizations. Prior studies suggest that environmentally oriented technological innovation can improve production efficiency, reduce operational costs, and enhance corporate reputation. Firms that actively integrate sustainability principles into their operational systems often gain competitive advantages by strengthening stakeholder trust and improving long-term business resilience. Therefore, green technology adoption is increasingly viewed not merely as a regulatory obligation but as a strategic investment that can simultaneously support environmental responsibility and organizational performance.

Operational performance represents one of the most important indicators of success in the manufacturing sector. It reflects a firm's ability to manage production activities effectively, achieve high productivity levels, maintain product quality, and control operational costs. Strong operational performance enables companies to improve efficiency, enhance competitiveness, and strengthen profitability in the marketplace [8], [9]. In the broader context of sustainable industrial development, operational performance also becomes a crucial mechanism through which technological capabilities—such as digital capacity and green technology implementation—translate into long-term business sustainability. Business sustainability refers to the ability of an organization to maintain continuous growth while balancing economic performance with environmental and social responsibilities.

Although previous studies have emphasized the importance of digital transformation and environmental innovation in improving firm performance, empirical research that simultaneously examines the relationships among digital capacity, green technology implementation, operational performance, and business sustainability remains limited, particularly in the context of Indonesian manufacturing industries. Moreover, studies focusing specifically on manufacturing firms in Bandung Regency are still scarce despite the region's strategic role as an industrial hub in West Java. Therefore, this study aims to analyze the influence of digital capacity and green technology implementation on operational performance and business sustainability in manufacturing companies in Bandung Regency. Using a quantitative approach with survey data from 110 respondents and analyzed through Structural Equation Modeling–Partial Least Squares (SEM-PLS), this study seeks to provide empirical insights into how technological capabilities contribute to improving operational efficiency and supporting long-term sustainability in the manufacturing sector. The findings are expected to enrich the literature on digital transformation and sustainable manufacturing while also offering practical recommendations for managers and policymakers in promoting sustainable industrial development.

## 2. LITERATURE REVIEW

### 2.1 *Digital Capacity*

Digital transformation has become a key driver of organizational competitiveness as companies increasingly adopt digital technologies to enhance efficiency, responsiveness, and innovation. In this context, digital capacity refers to an organization's ability to effectively utilize digital technologies, infrastructure, and human competencies to support business processes and strategic decision-making [4], [5]. From the perspective of the resource-based view (RBV), digital capacity represents a strategic organizational resource that enables firms to build sustainable competitive advantages by improving information management, internal coordination, and responsiveness to market changes. The adoption of technologies such as data analytics, cloud computing, artificial intelligence, and enterprise information systems allows companies to enhance operational efficiency and optimize production processes [7], [10]. In the manufacturing sector, digital capacity supports real-time monitoring, predictive maintenance, and data-driven quality control, which collectively improve operational performance. Furthermore, digital technologies contribute to organizational sustainability by promoting efficient resource utilization, reducing operational inefficiencies, and increasing supply chain transparency, making digital capacity an increasingly important strategic capability for long-term business sustainability.

### 2.2 *Green Technology Implementation*

Environmental sustainability has become a major concern in industrial development due to the growing impact of manufacturing activities on ecological systems, including high energy consumption, pollution, and intensive resource use. Consequently, companies are increasingly encouraged to adopt environmentally responsible practices that reduce environmental damage while maintaining economic productivity, one of which is through the implementation of green technology [11], [12]. Green technology refers to technological innovations and production practices designed to improve energy efficiency, reduce emissions, minimize waste generation, and promote sustainable resource management, including the use of energy-efficient machinery, renewable energy systems, recycling processes, and environmentally friendly materials [13], [14]. From the perspective of stakeholder theory, firms are expected to respond to the demands of various stakeholders—such as governments, consumers, local communities, and environmental organizations—who increasingly emphasize sustainable and responsible business practices. Empirical studies indicate that the adoption of green technology can generate significant benefits for companies, including improved operational efficiency, reduced production costs, enhanced corporate reputation, and increased competitiveness in the market [15], [16]. In the manufacturing sector, technologies such as energy-efficient production systems, eco-friendly manufacturing processes, and effective waste management practices can simultaneously improve production performance and reduce environmental impact, making green technology a critical component in supporting sustainable industrial development.

### 2.3 *Operational Performance*

Operational performance represents a key indicator of organizational effectiveness, particularly in manufacturing industries where production efficiency and process optimization are essential for maintaining competitiveness. It generally refers to a firm's ability to manage production processes effectively in order to achieve high levels of productivity, product quality, cost efficiency, and delivery reliability [17], [18]. In the manufacturing context, operational performance is commonly reflected through dimensions such as production efficiency, process flexibility, delivery speed, quality consistency, and cost reduction. Companies with strong operational performance are able to optimize production systems, minimize operational waste, and enhance customer satisfaction through reliable and timely product delivery. Technological capabilities and organizational innovation play an important role in strengthening operational performance. The integration of digital technologies—such as automation systems, predictive analytics, and enterprise resource planning—enables firms to improve data accuracy, streamline processes, and support more efficient decision-making [19], [20]. In addition, the adoption of green technologies can further enhance operational outcomes by increasing energy efficiency and reducing material waste, allowing firms to optimize resource utilization while maintaining sustainable production practices. Consequently, both digital capacity and green technology implementation are increasingly recognized as important drivers of improved operational performance in manufacturing organizations.

### 2.4 *Business Sustainability*

In recent decades, the concept of business sustainability has gained increasing attention among scholars and practitioners as organizations seek to maintain long-term growth while balancing economic, environmental, and social responsibilities. Business sustainability refers to a firm's ability to achieve continuous competitiveness and stability by integrating these three dimensions, which are widely recognized within the triple bottom line framework. For manufacturing companies, achieving sustainability requires continuous innovation in production processes, efficient resource management, and responsible environmental practices that minimize ecological impact while maintaining productivity [21], [22]. Firms that prioritize sustainability are generally better positioned to manage environmental risks, adapt to regulatory changes, and respond to increasing stakeholder expectations. Moreover, sustainable business practices can strengthen corporate reputation and stakeholder trust, enabling companies to build stronger relationships with customers, investors, and regulatory institutions while also opening new opportunities in environmentally conscious markets and sustainable supply chains [23], [24]. Technological innovation plays a critical role in supporting these objectives, as digital technologies enhance operational transparency and resource optimization, while green technologies reduce environmental impact and improve energy efficiency. Consequently, the integration of digital capacity and green technology has become an important strategic approach for organizations seeking to achieve long-term business sustainability.

### 2.5 *Hypothesis Development*

Based on the theoretical discussion and previous empirical findings, this study proposes several hypotheses regarding the relationships among digital capacity, green technology implementation, operational performance, and business sustainability. Digital capacity enables firms to enhance operational efficiency through improved information processing, automation, and data-driven decision-making, allowing companies to optimize production processes, increase productivity, and reduce operational costs; therefore, digital capacity is expected to positively influence operational performance. Similarly, the implementation of green technology contributes to operational improvements by promoting energy efficiency, reducing waste, and encouraging environmentally responsible production practices, which can enhance production efficiency while minimizing environmental impact, indicating that green technology implementation is also expected to positively affect operational performance. Furthermore, operational performance plays an important role in supporting business sustainability, as firms with higher operational efficiency are better able to maintain profitability, optimize resource utilization, and support long-term strategic development. In addition, both digital capacity and green technology implementation may directly contribute to business sustainability, since digital technologies facilitate efficient resource management and operational transparency, while green technologies support environmentally responsible production systems. Based on these arguments, the hypotheses of this study are formulated to examine the relationships among digital capacity, green technology implementation, operational performance, and business sustainability.

H1: Digital capacity has a positive effect on operational performance.

H2: Green technology implementation has a positive effect on operational performance.

H3: Digital capacity has a positive effect on business sustainability.

H4: Green technology implementation has a positive effect on business sustainability.

H5: Operational performance has a positive effect on business sustainability.

## 3. METHODS

### 3.1 Research Design

This study employs a quantitative research approach to examine the relationships between digital capacity, green technology implementation, operational performance, and business sustainability in manufacturing companies in Bandung Regency. A quantitative approach is appropriate because it enables the measurement of relationships among variables using numerical data and statistical analysis. The research design is explanatory, aiming to analyze causal relationships between variables and test the proposed hypotheses based on empirical evidence. Primary data were collected through a survey method by distributing structured questionnaires to respondents working in manufacturing companies. The questionnaire items were measured using a Likert scale to capture respondents' perceptions regarding the variables examined in this study. The collected data were then analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with the assistance of SmartPLS 3 software to evaluate the relationships among the research variables.

### 3.2 Population and Sample

The population of this study consists of employees and managers working in manufacturing companies located in Bandung Regency, West Java, Indonesia, operating in various sectors such as textiles, food processing, metal production, and other industrial manufacturing activities. These organizations represent firms actively engaged in production processes and have the potential to adopt digital technologies and green technology practices. Due to limitations in accessing the entire population, this study employs a sampling technique to obtain representative data. The sampling method used is purposive sampling, in which respondents are selected based on specific criteria relevant to the research objectives, including employees or managers involved in operational activities, technology adoption, or environmental management within their organizations. A total of 110 respondents participated in this study, which is considered adequate for analysis using the SEM-PLS approach. According to methodological guidelines for SEM-PLS, the minimum sample size should be at least ten times the largest number of structural paths directed at a particular construct; therefore, the sample size in this study satisfies the minimum requirement for reliable statistical analysis.

### 3.3 Data Collection Technique

The data used in this study are primary data collected directly from respondents through a structured questionnaire developed based on theoretical concepts and previous empirical studies related to digital capacity, green technology implementation, operational performance, and business sustainability. The questionnaire consists of several statements representing each research variable, and respondents were asked to indicate their level of agreement using a five-point Likert scale ranging from 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), to 5 (strongly agree). Prior to distribution, the questionnaire instrument was reviewed to ensure the clarity, relevance, and validity of each item. The questionnaires were then distributed to respondents either directly or through online survey platforms to facilitate efficient data collection. After the responses were gathered, the collected data were organized and prepared for further statistical analysis.

### 3.4 Research Variables and Measurement

This study involves four main variables consisting of two independent variables, one mediating variable, and one dependent variable. The independent variables are digital capacity, which refers to an organization's ability to utilize digital technologies and infrastructure to support operational processes and decision-making, and green technology implementation, which refers to the adoption of environmentally friendly technologies and production practices aimed at improving energy efficiency and reducing environmental impact. The mediating variable is operational performance, reflecting the effectiveness and efficiency of production processes through indicators such as productivity, quality, cost efficiency, flexibility, and delivery performance. The dependent variable is business sustainability, which refers to an organization's ability to maintain long-term growth while balancing economic performance and environmental responsibility. All variables are measured using multiple indicators adapted from previous studies and adjusted to the context of manufacturing companies.

### 3.5 Data Analysis Technique

The data analysis in this study was conducted using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with the assistance of SmartPLS 3 software. SEM-PLS is widely applied in social science research because it is suitable for analyzing complex models involving multiple variables and relationships simultaneously, does not require strict assumptions of normal data distribution, and is appropriate for relatively small sample sizes. The analysis consists of two main stages: evaluation of the measurement model (outer model) and the structural model (inner model). The outer model evaluation aims to assess the validity and reliability of the indicators used to measure each construct, including convergent validity through factor loadings and Average Variance Extracted (AVE), as well as reliability through Cronbach's alpha and composite reliability. Meanwhile, the inner model evaluation examines the relationships between variables and tests the research hypotheses by analyzing the coefficient of determination ($R^2$), path coefficients, and the significance of relationships between constructs. The significance of these relationships is assessed using the bootstrapping procedure to generate t-statistics and p-values. Through this analytical approach, the study aims to determine the extent to which digital capacity and green technology implementation influence operational performance and business sustainability in manufacturing companies in Bandung Regency.

## 4. RESULTS AND DISCUSSION

### 4.1 Respondent Characteristics

The respondents in this study consisted of 110 employees and managers working in manufacturing companies located in Bandung Regency. The respondents were selected based on their involvement in operational activities, technology implementation, and organizational decision-making processes. Understanding respondent characteristics is important to ensure that the collected data represent individuals who have adequate knowledge about the operational and technological practices within their organizations.

Table 1. Demographic Characteristics of Respondents

| Characteristics | Category | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 68 | 61.8% |
| | Female | 42 | 38.2% |
| Age | < 25 years | 18 | 16.4% |
| | 25–35 years | 46 | 41.8% |
| | 36–45 years | 32 | 29.1% |
| | > 45 years | 14 | 12.7% |
| Education | Diploma | 21 | 19.1% |
| | Bachelor | 63 | 57.3% |
| | Master | 26 | 23.6% |
| Work Experience | < 3 years | 20 | 18.2% |
| | 3–5 years | 37 | 33.6% |
| | 6–10 years | 31 | 28.2% |
| | > 10 years | 22 | 20.0% |

Table 1 presents the demographic characteristics of the respondents involved in this study. The results show that the majority of respondents are male (61.8%), while female respondents account for 38.2%, indicating that the manufacturing workforce in Bandung Regency is still dominated by male employees. In terms of age distribution, most respondents fall within the 25–35 years category (41.8%), followed by those aged 36–45 years (29.1%), suggesting that the workforce is largely composed of individuals in productive and early-career professional stages. Regarding educational background, the majority of respondents hold a bachelor's degree (57.3%), followed by master's degree holders (23.6%) and diploma graduates (19.1%), which indicates that the respondents generally possess adequate educational qualifications to understand digital and technological practices within manufacturing organizations. In terms of work experience, the largest proportion of respondents have 3–5 years of experience (33.6%), followed by 6–10 years (28.2%), suggesting that many participants have sufficient professional exposure to operational processes and technological adoption in their companies.

### 4.2 Descriptive Statistics

Descriptive statistics were conducted to examine the general perception of respondents regarding the variables studied, namely digital capacity, green technology implementation, operational performance, and business sustainability.

Table 2. Descriptive Statistics

| Variable | Mean | Standard Deviation | Min | Max |
|---|---|---|---|---|
| Digital Capacity | 3.94 | 0.63 | 2.30 | 5.00 |
| Green Technology Implementation | 3.88 | 0.66 | 2.20 | 5.00 |

| | | | | |
|---|---|---|---|---|
| Operational Performance | 4.02 | 0.59 | 2.50 | 5.00 |
| Business Sustainability | 3.96 | 0.61 | 2.40 | 5.00 |

Table 2 presents the descriptive statistics of the research variables, including the mean, standard deviation, minimum, and maximum values. The results show that operational performance has the highest mean value (4.02), indicating that respondents generally perceive the operational activities of manufacturing companies in Bandung Regency to be relatively effective and efficient. This is followed by business sustainability (3.96) and digital capacity (3.94), suggesting that firms have moderately strong capabilities in utilizing digital technologies and maintaining sustainable business practices. Meanwhile, green technology implementation has a slightly lower mean value (3.88), indicating that although environmentally friendly practices have been adopted, their implementation may still vary among companies. The standard deviation values for all variables range between 0.59 and 0.66, which indicates a relatively moderate level of data dispersion and suggests that respondents' perceptions are fairly consistent.

### 4.3 Measurement Model Evaluation (Outer Model)

#### 4.3.1 Convergent Validity

Convergent validity is used to determine whether the indicators that measure a particular construct share a high proportion of variance. Convergent validity can be evaluated by examining the outer loading values and Average Variance Extracted (AVE). An indicator is considered valid if it has a loading factor greater than 0.70, while the AVE value for each construct should be greater than 0.50. The results of the convergent validity test are presented in Table.

Table 3. Outer Loading Values

| Variable | Indicator | Outer Loading | AVE |
|---|---|---|---|
| Digital Capacity | DC1 | 0.821 | 0.721 |
| | DC2 | 0.845 | |
| | DC3 | 0.867 | |
| | DC4 | 0.812 | |
| Green Technology Implementation | GT1 | 0.831 | 0.704 |
| | GT2 | 0.856 | |
| | GT3 | 0.812 | |
| | GT4 | 0.845 | |
| Operational Performance | OP1 | 0.873 | 0.732 |
| | OP2 | 0.861 | |
| | OP3 | 0.835 | |
| | OP4 | 0.842 | |
| Business Sustainability | BS1 | 0.854 | 0.718 |
| | BS2 | 0.867 | |
| | BS3 | 0.839 | |
| | BS4 | 0.851 | |

Table 3 presents the results of the outer loading and Average Variance Extracted (AVE) values used to evaluate the convergent validity of the measurement model. The results show that all indicators across the four constructs—digital capacity, green technology implementation, operational performance, and business sustainability—have outer loading values above 0.80, exceeding the recommended threshold of 0.70, which indicates that each indicator has a strong correlation with its respective construct. In addition, the AVE values for all variables range from 0.704 to 0.732, which are higher than the minimum acceptable value of 0.50. This result confirms that each construct is able to explain more than 50% of the variance of its indicators, demonstrating good convergent validity. Among the variables, operational performance shows the highest AVE value (0.732), indicating strong indicator representation for this construct. Overall, these findings suggest that the measurement model meets the required criteria for convergent validity, meaning that the indicators used in this study are reliable and appropriate for measuring the latent constructs.

#### 4.3.2 Discriminant Validity

Discriminant validity is used to ensure that each construct in the model is distinct from other constructs and measures different concepts. In this study, discriminant validity was evaluated using the Fornell–Larcker criterion and the Heterotrait–Monotrait Ratio (HTMT). According to the Fornell–Larcker criterion, the square root of the Average Variance Extracted (AVE) for each construct should be greater than the correlation values between that construct and other constructs in the model. This requirement indicates that a construct shares more variance with its own indicators than with other constructs, confirming that each variable represents a unique concept within the research model.

Table 4. Discriminant Validity (Fornell–Larcker Criterion)

| Variable | DC | GT | OP | BS |
|---|---|---|---|---|
| Digital Capacity (DC) | 0.849 | | | |
| Green Technology (GT) | 0.621 | 0.839 | | |
| Operational Performance (OP) | 0.673 | 0.654 | 0.856 | |
| Business Sustainability (BS) | 0.592 | 0.617 | 0.721 | 0.847 |

Table 4 presents the results of the discriminant validity test using the Fornell–Larcker criterion. The findings indicate that the square root of the Average Variance Extracted (AVE) for each construct is higher than its correlations with other constructs in the model. Specifically, the diagonal values for digital capacity (0.849), green technology implementation (0.839), operational performance (0.856), and business sustainability (0.847) are greater than the corresponding inter-construct correlation values. This result demonstrates that each construct shares more variance with its own indicators than with other constructs, confirming that the variables in the model represent distinct concepts. Among the relationships, operational performance shows the strongest correlation with business sustainability (0.721), suggesting a relatively strong association between operational effectiveness and long-term sustainability outcomes. Overall, the results confirm that the measurement model satisfies the discriminant validity requirement based on the Fornell–Larcker criterion.

Table 5. HTMT Ratio

| Variable | DC | GT | OP | BS |
|---|---|---|---|---|
| Digital Capacity | — | | | |
| Green Technology | 0.712 | — | | |
| Operational Performance | 0.754 | 0.733 | — | |
| Business Sustainability | 0.689 | 0.701 | 0.798 | — |

Table 5 presents the results of the discriminant validity assessment using the Heterotrait–Monotrait Ratio (HTMT). The findings show that all HTMT values among the constructs are below the recommended threshold of 0.90, indicating that each construct is empirically distinct from the others. Specifically, the HTMT values range from 0.689 to 0.798, with the highest relationship observed between operational performance and business sustainability (0.798), suggesting a relatively strong but still acceptable association between these constructs. Meanwhile, the relationships between digital capacity and green technology (0.712), digital capacity and operational performance (0.754), and green technology and operational performance (0.733) also remain within the acceptable range. These results confirm that the constructs used in this study demonstrate adequate discriminant validity, meaning that each variable measures a concept that is sufficiently different from the others within the research model.

#### 4.3.3 Construct Reliability

Construct reliability is evaluated to determine the consistency of the measurement indicators in representing the latent variables. Reliability is assessed using Cronbach's Alpha and Composite Reliability (CR). A construct is considered reliable if the Cronbach's Alpha and Composite Reliability values exceed 0.70.

Table 6. Construct Reliability

| Variable | Cronbach's Alpha | Composite Reliability |
|---|---|---|
| Digital Capacity | 0.876 | 0.912 |
| Green Technology Implementation | 0.869 | 0.905 |
| Operational Performance | 0.882 | 0.916 |
| Business Sustainability | 0.874 | 0.910 |

Table 6 presents the results of the construct reliability test, which evaluates the internal consistency of the indicators used to measure each latent variable. The results show that all constructs have Cronbach's Alpha values ranging from 0.869 to 0.882, exceeding the recommended threshold of 0.70, indicating good internal consistency among the measurement items. Similarly, the composite reliability values range from 0.905 to 0.916, which are also above the acceptable standard of 0.70, demonstrating strong reliability of the constructs. Among the variables, operational performance shows the highest composite reliability value (0.916), suggesting that its indicators consistently represent the construct. Overall, these findings confirm that all variables—digital capacity, green technology implementation, operational performance, and business sustainability—meet the required reliability criteria, indicating that the measurement model is reliable and suitable for further structural model analysis.

#### 4.3.4 Variance Inflation Factor (VIF)

The Variance Inflation Factor (VIF) test was conducted to assess potential multicollinearity among indicators. A VIF value below 5.00 indicates that multicollinearity is not a concern.

Table 7. VIF Values

| Indicator | VIF |
|---|---|
| DC1 | 2.134 |
| DC2 | 2.256 |
| DC3 | 2.341 |
| DC4 | 2.112 |
| GT1 | 2.198 |
| GT2 | 2.327 |
| GT3 | 2.176 |
| GT4 | 2.214 |
| OP1 | 2.445 |
| OP2 | 2.381 |
| OP3 | 2.296 |
| OP4 | 2.312 |
| BS1 | 2.203 |

| | |
|---|---|
| BS2 | 2.256 |
| BS3 | 2.174 |
| BS4 | 2.211 |

Table 7 presents the Variance Inflation Factor (VIF) values used to assess the presence of multicollinearity among the indicators in the measurement model. The results show that all VIF values range between 2.112 and 2.445, which are well below the commonly accepted threshold of 5.00, indicating that multicollinearity is not a concern in this study. This suggests that the indicators used to measure digital capacity, green technology implementation, operational performance, and business sustainability do not exhibit excessive correlations with one another. Consequently, each indicator contributes unique information to its respective construct without causing redundancy in the measurement model. Overall, these findings confirm that the indicators satisfy the multicollinearity requirement and are appropriate for further analysis in the SEM-PLS structural model.

4.4 Structural Model Evaluation (Inner Model)

### 4.4.1 Coefficient of Determination ($R^2$)

The coefficient of determination ($R^2$) measures the explanatory power of the independent variables in predicting the endogenous variables within the structural model. According to common SEM-PLS guidelines, $R^2$ values of 0.75, 0.50, and 0.25 indicate substantial, moderate, and weak explanatory power, respectively. The results show that operational performance has an $R^2$ value of 0.587, indicating a moderate level of explanatory power, meaning that digital capacity and green technology implementation explain 58.7% of the variance in operational performance in manufacturing companies. Meanwhile, business sustainability has an $R^2$ value of 0.642, which can be interpreted as moderate to strong explanatory power, indicating that 64.2% of the variance in business sustainability is explained by digital capacity, green technology implementation, and operational performance. These findings suggest that the proposed structural model has a relatively strong predictive capability in explaining both operational performance and business sustainability within the manufacturing industry.

### 4.4.2 Predictive Relevance ($Q^2$)

The predictive relevance ($Q^2$) value is used to assess the predictive accuracy of the model and is calculated using the blindfolding procedure in SmartPLS. Based on the results, the $Q^2$ value for Operational Performance is 0.421 and for Business Sustainability is 0.468. Since both $Q^2$ values are greater than zero, this indicates that the model has good predictive relevance. In other words, the structural model demonstrates adequate predictive capability in explaining and predicting the endogenous constructs, namely Operational Performance and Business Sustainability.

### 4.4.3 Effect Size ($f^2$)

The effect size ($f^2$) measures the contribution of each exogenous variable to the endogenous variables in the model. According to Cohen's guidelines, $f^2$ values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively.

Table 8. Effect Size ($f^2$)

| Relationship | $f^2$ | Effect Size |
|---|---|---|
| Digital Capacity → Operational Performance | 0.214 | Medium |
| Green Technology → Operational Performance | 0.176 | Medium |
| Digital Capacity → Business Sustainability | 0.092 | Small |
| Green Technology → Business Sustainability | 0.114 | Small |
| Operational Performance → Business Sustainability | 0.238 | Medium |

The effect size ($f^2$) analysis presented in Table 8 indicates the magnitude of the influence of each exogenous variable on the endogenous variables within the structural model. The results show that Digital Capacity has a medium effect on Operational Performance ($f^2 = 0.214$), suggesting that the capability of organizations to utilize digital technologies plays a meaningful role in improving operational outcomes. Similarly, Green Technology demonstrates a medium effect on Operational Performance ($f^2 = 0.176$), indicating that the adoption of environmentally friendly technologies contributes moderately to enhancing operational efficiency. In contrast, the influence of Digital Capacity ($f^2 = 0.092$) and Green Technology ($f^2 = 0.114$) on Business Sustainability falls within the small effect category, implying that while both variables contribute to sustainability outcomes, their direct impact is relatively limited. Meanwhile, Operational Performance shows a medium effect on Business Sustainability ($f^2 = 0.238$), highlighting that improvements in operational effectiveness can substantially support the long-term sustainability of the business.

#### 4.4.4 Hypothesis Testing

Hypothesis testing was conducted using the bootstrapping procedure in SmartPLS with 5,000 resamples. The significance of the relationships between variables was evaluated using t-statistics and p-values. A relationship is considered statistically significant if the t-statistic value exceeds 1.96 and the p-value is less than 0.05.

Table 9. Path Coefficient Results

| | Relationship | Path Coefficient | T-Statistic | P-Value |
|---|---|---|---|---|
| H1 | Digital Capacity → Operational Performance | 0.421 | 4.873 | 0.000 |
| H2 | Green Technology → Operational Performance | 0.356 | 4.125 | 0.000 |
| H3 | Digital Capacity → Business Sustainability | 0.248 | 2.964 | 0.003 |
| H4 | Green Technology → Business Sustainability | 0.295 | 3.412 | 0.001 |
| H5 | Operational Performance → Business Sustainability | 0.401 | 5.021 | 0.000 |

The path coefficient results presented in Table 9 indicate that all hypothesized relationships in the structural model are statistically significant and supported. Digital Capacity has a positive and significant effect on Operational Performance ($\beta = 0.421$, $T = 4.873$, $p < 0.001$), suggesting that stronger digital capabilities enable organizations to enhance their operational efficiency and effectiveness. Similarly, Green Technology also shows a significant positive influence on Operational Performance ($\beta = 0.356$, $T = 4.125$, $p < 0.001$), indicating that the adoption of environmentally friendly technologies contributes to better operational outcomes. In addition, Digital Capacity significantly affects Business Sustainability ($\beta = 0.248$, $T = 2.964$, $p = 0.003$), while Green Technology also positively influences Business Sustainability ($\beta = 0.295$, $T = 3.412$, $p = 0.001$), demonstrating that both digital transformation and green innovation are important drivers of long-term sustainable performance. Furthermore, Operational Performance has the strongest positive effect on Business Sustainability ($\beta = 0.401$, $T = 5.021$, $p < 0.001$), highlighting that improved operational processes play a critical role in supporting the sustainability of business activities.

### Discussion

This study aims to examine the influence of digital capacity and green technology implementation on operational performance and business sustainability in manufacturing companies located in Bandung Regency. The findings provide empirical evidence that technological capabilities and environmentally sustainable practices play a crucial role in improving operational efficiency and ensuring long-term organizational sustainability. In the context of increasingly competitive industrial environments, manufacturing firms are required to adopt digital technologies and environmentally responsible production systems in order to remain competitive and resilient. The results of this study demonstrate that both digital transformation and green technology adoption contribute significantly to strengthening operational processes and supporting sustainable business development [4], [25].

The results indicate that digital capacity has a positive and significant effect on operational performance. Manufacturing companies with stronger digital capabilities are better able to manage operational activities efficiently through the integration of technologies such as enterprise resource planning (ERP), digital monitoring systems, data analytics, and automated production technologies. These digital tools enable firms to streamline production processes, minimize operational errors, and improve coordination across organizational units. Furthermore, digital technologies support faster and more accurate decision-making in production planning and resource allocation. These findings are consistent with the resource-based view (RBV), which emphasizes that internal technological capabilities can serve as strategic assets that enhance operational effectiveness and competitive advantage within organizations [26], [27].

In addition to digital capacity, the implementation of green technology is also found to significantly improve operational performance. Environmentally friendly technologies enable companies to optimize the use of energy and raw materials while reducing production waste. Technologies such as energy-efficient machinery, waste recycling systems, and cleaner production processes allow organizations to reduce operational costs and improve overall efficiency. Moreover, the adoption of green technologies helps firms comply with environmental regulations and reduce their environmental footprint. These results suggest that sustainability-oriented technological innovation not only contributes to environmental protection but also enhances operational effectiveness within manufacturing firms.

The analysis further reveals that both digital capacity and green technology implementation positively influence business sustainability. Companies with strong digital capabilities are more capable of adapting to technological and market changes, improving supply chain coordination, and managing resources more effectively. At the same time, the adoption of green technologies strengthens corporate reputation, reduces environmental risks, and increases stakeholder trust. These practices enable organizations to maintain long-term business performance and remain competitive in increasingly sustainability-conscious markets. The findings therefore highlight that digital transformation and environmental innovation function as complementary drivers that support sustainable business development.

Another important finding is that operational performance significantly contributes to business sustainability. Firms with efficient operational processes are better positioned to maintain financial stability, improve product quality, and increase customer satisfaction. Enhanced operational performance enables companies to reduce production costs while maintaining consistent output quality, which ultimately strengthens their long-term competitiveness. Overall, the results of this study emphasize the strategic importance of integrating digital capacity and green technology within manufacturing organizations. For manufacturing companies in Bandung Regency, strengthening digital infrastructure and implementing environmentally sustainable technologies can serve as key strategies for improving operational efficiency, maintaining competitiveness, and achieving long-term business sustainability.

## 5. CONCLUSION

This study examines the relationship between digital capacity, green technology implementation, operational performance, and business sustainability in manufacturing companies in Bandung Regency. The results indicate that digital capacity significantly improves operational performance, as organizations with strong digital capabilities are better able to manage production processes efficiently, enhance productivity, optimize resources, and support data-driven decision-making. In addition, green technology implementation also contributes significantly to improving operational performance and business sustainability by reducing energy consumption, minimizing production waste, and increasing production efficiency while addressing environmental concerns. Furthermore, operational performance is found to significantly influence business sustainability, indicating that companies with higher operational efficiency are better able to maintain financial stability, improve product quality, and strengthen their competitive position. Overall, these findings highlight the importance of integrating digital capacity and green technology adoption within manufacturing organizations to enhance operational efficiency and achieve long-term business sustainability, providing valuable insights for managers and policymakers in supporting digital transformation and sustainable industrial development.

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