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The Effect Of A Human-Centric Approach On Sustainable Business Performance: The Mediating Roles Of Dynamic Capabilities, Digital Transformation, And The Circular Economy In Large And Medium-Sized Manufacturing Enterprises In Banyuwangi And Jember Regencies

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Abstract

Achieving sustainable business performance requires manufacturing firms to integrate human development, organizational adaptability, digital innovation, and resource efficiency into their business operations. However, the mechanisms through which a human-centric approach contributes to sustainable business performance through dynamic capabilities, digital transformation, and circular economy require further empirical investigation. This study examines the influence of a human-centric approach on sustainable business performance and investigates the mediating roles of dynamic capabilities, digital transformation, and circular economy. A quantitative research design was employed using purposive sampling, with data collected through questionnaires from 40 medium- and large-scale manufacturing companies in Banyuwangi and Jember Regencies, Indonesia. The data were analyzed using partial least squares structural equation modeling (PLS-SEM) with SmartPLS 4. The findings indicate that the human-centric approach has a positive and significant effect on digital transformation but does not have a significant direct effect on circular economy. Dynamic capabilities positively and significantly influence digital transformation, circular economy, and sustainable business performance. Digital transformation also has a positive and significant effect on sustainable business performance, whereas the direct effect of circular economy on sustainable business performance is not statistically significant. Furthermore, dynamic capabilities mediate the relationships between the human-centric approach and both digital transformation and circular economy. Digital transformation also mediates the relationship between dynamic capabilities and sustainable business performance, whereas circular economy does not significantly mediate this relationship. These findings highlight the importance of dynamic capabilities and digital transformation as

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organizational mechanisms linking a human-centric approach to sustainable business performance. Practically, manufacturing managers should strengthen employee development and participation, enhance organizational adaptability, and integrate digital technologies into business processes. Circular economy initiatives should also be supported by appropriate implementation strategies and performance indicators to evaluate their contributions to economic, social, and environmental outcomes.

Keywords: human-centric approach, dynamic capabilities, digital transformation, circular economy, sustainable business performance.

INTRODUCTION

The increasingly dynamic business environment and growing sustainability demands require companies to focus not only on financial profitability but also on social and environmental performance. To address these challenges, companies need to develop strategies that integrate human resource management, technology utilization, adaptability, and resource efficiency. A human-centric approach is particularly relevant because it places people at the center of organizational strategies by emphasizing competency development, employee engagement, and the creation of a supportive work environment. This approach aligns with the Industry 5.0 paradigm, which emphasizes the use of technology to empower people rather than merely replace their roles (Nahavandi, 2019; Salzer, 2026).

A human-centric approach needs to be supported by an organization's ability to translate human potential and contributions into sustainable performance. One such capability is dynamic capabilities, defined as a firm's ability to identify changes and opportunities, seize them, and reconfigure its resources in response to evolving business environment requirements (Teece, 2018). Dynamic capabilities enable firms to respond adaptively to change while integrating internal resources to create economic, social, and environmental value (Prayogi et al., 2026). Accordingly, strengthening the role of people through dynamic capabilities has the potential to provide a foundation for achieving sustainable business performance (Rahaman et al., 2024).

In addition to dynamic capabilities, digital transformation plays a crucial role in enhancing corporate competitiveness and sustainability (Junaidi & Adawiyah, 2026; Sari & Napitupulu, 2026; Yanti et al., 2026). A survey conducted by GSMA Intelligence (2025) involving more than 580 companies across the ASEAN region indicates that Indonesian companies are projected to allocate approximately 10% of their revenue to support digital transformation between 2025 and 2030, exceeding the global average of 9.8%. Digital transformation involves not only technology adoption but also changes in operational processes, work practices, and organizational value creation (Vial, 2019; Verhoef et al.,

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2021). Its success continues to depend on human involvement to ensure that technology is utilized in accordance with organizational needs. In this regard, dynamic capabilities help firms adapt their resources and work processes to support effective digital transformation, which may subsequently improve sustainable business performance (Nurhayati & Astono, 2024).

Achieving sustainable business performance is also associated with the adoption of the circular economy as an alternative to the linear economic model, which relies on resource consumption followed by waste disposal. The circular economy encourages companies to preserve the value of products, materials, and resources through reduced consumption of virgin materials, reuse, repair, recovery, and recycling (Kirchherr et al., 2017). These practices have the potential to reduce waste, improve cost efficiency, and create opportunities for process and business model innovation (Heikinheimo et al., 2025). Their implementation requires employee involvement, changes in work practices, and organizational capabilities to adapt resources and production processes. Accordingly, a human-centric approach and dynamic capabilities can support the more effective implementation of the circular economy, thereby strengthening sustainable business performance.

Theoretically, the relationships among these constructs can be explained through the Resource-Based View (RBV), which regards internal resources and capabilities as the foundation for achieving competitive advantage and superior firm performance (J. Barney, 1991; J. B. Barney, 2000). In this study, the human-centric approach is positioned as the foundation for developing human potential, while dynamic capabilities facilitate the adaptation and reconfiguration of organizational resources. Furthermore, digital transformation supports changes in business processes through technology utilization, whereas the circular economy promotes more efficient and sustainable resource use. The integration of these four constructs is expected to provide a more comprehensive explanation of the mechanisms underlying sustainable business performance, encompassing not only direct effects but also mediation pathways among the constructs.

Although research on sustainable business performance has expanded, several research gaps remain to be addressed. Theoretically, the human-centric approach, as one of the pillars of Industry 5.0, has received relatively limited empirical examination in relation to sustainable business performance (European Commission, 2021; Gródek-Szostak et al., 2023; Schröder et al., 2024). Empirically and methodologically, previous studies have tended to examine the relationships of dynamic capabilities, digital transformation, and the circular economy with firm performance separately or through direct effects, leaving integrated relational mechanisms insufficiently explored (Bhadra et al., 2024; Bindeeba et al., 2025; Renfei & Zhongwen, 2026; Shafique et al., 2024). From

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a contextual perspective, research on the human-centric approach has largely focused on companies in developed countries, whereas studies of manufacturing companies in developing regions, particularly Banyuwangi and Jember Regencies, remain limited (Bucci et al., 2025; Lu et al., 2022).

Medium-sized and large manufacturing enterprises in Banyuwangi and Jember Regencies were selected as the research setting because the manufacturing sector makes a substantial contribution to the economies of both regions. According to data from Statistics Indonesia (BPS, 2025), as cited in this study, manufacturing contributed 13.28% of Banyuwangi Regency's gross regional domestic product (GRDP) and approximately 21% of Jember Regency's GRDP. At the same time, manufacturing enterprises face increasing demands to maintain productivity, enhance competitiveness, and manage resources more sustainably. The operational characteristics of manufacturing, which involve labor, technology, raw materials, energy, and production waste management, make this sector particularly relevant for examining the relationships among the human-centric approach, organizational capabilities, digital transformation, the circular economy, and sustainable business performance.

The selection of medium-sized and large enterprises is also based on their operational characteristics, which allow for a more in-depth examination of workforce management, technology utilization, production process adaptation, and material and energy efficiency. In manufacturing operations, employee engagement and competencies can influence a company's readiness to respond to change, while dynamic capabilities facilitate adjustments to resources and work processes. Digital transformation can subsequently improve operational effectiveness, while circular economy practices encourage material reuse and waste reduction. These interrelationships provide a suitable empirical context for examining how various organizational resources and capabilities contribute to sustainable business performance.

Based on the identified phenomena and research gaps, this study offers a novel contribution by developing an integrative model that positions the human-centric approach as the independent variable and sustainable business performance as the dependent variable, with dynamic capabilities, digital transformation, and the circular economy serving as mediating variables. This model is expected to broaden the understanding of the mechanisms linking human-centered management to sustainable business performance through the development of adaptive capabilities, the utilization of digital technologies, and the implementation of circular economy practices. Theoretically, this study integrates constructs that have frequently been examined separately. Practically, it is expected to provide insights for companies in formulating transformation

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strategies that prioritize people, adapt to change, and address economic, social, and environmental sustainability.

Accordingly, this study aims to analyze the effect of a human-centric approach on sustainable business performance through the mediating roles of dynamic capabilities, digital transformation, and the circular economy in medium-sized and large manufacturing enterprises in Banyuwangi and Jember Regencies. The findings are expected to contribute to the advancement of strategic management and sustainability research while providing a basis for managerial decision-making in integrating human resource development, organizational capabilities, digital transformation, and circular economy practices to enhance long-term business performance.

METODOLOGI

This study employed a quantitative approach using an explanatory research design to examine relationships among variables and explain the effect of a human-centric approach on sustainable business performance through the mediating roles of dynamic capabilities, digital transformation, and the circular economy. The study commenced in April 2026 in Banyuwangi and Jember Regencies, East Java, Indonesia. These locations were selected based on the development of economic activities and manufacturing industries in both regions, which are relevant to the investigation of corporate capability development, digital transformation, the circular economy, and sustainable business performance (Creswell & Creswell, 2018).

The study utilized both primary and secondary data. Primary data were collected through questionnaires administered to respondents, while secondary data were obtained from company documents and records provided by the Environmental Agency, the Manpower, Transmigration and Industry Agency, and the Investment and One-Stop Integrated Services Agency in Banyuwangi and Jember Regencies. Based on data integration and field verification, the study identified a population of 40 medium-sized and large manufacturing enterprises that met the research criteria. The sample was selected using purposive sampling, with respondents consisting of owners, directors, managers, supervisors, or senior staff members who possessed knowledge of company operations and were involved in strategic decision-making. The sample of 40 respondents was considered sufficient to meet the minimum requirement of 38 respondents, based on a statistical power approach with a target power of 0.80.

The research instrument consisted of a questionnaire using a 10-point Likert scale to measure five variables: the human-centric approach, dynamic capabilities, digital transformation, the circular economy, and sustainable business performance. Data were collected through field surveys and online questionnaire distribution using Google Forms. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-

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SEM) to evaluate the measurement model, validity, reliability, and direct and indirect relationships among the variables. This method was selected because it can analyze complex research models and simultaneously assess their predictive capabilities (Hair, 2021).

RESULTS AND DISCUSSION

The characteristics of the companies included in this study are presented in Table 1.

Table 1. Company Characteristics

Category	Frequency	Percent
Industrial Sector		
Chemical Processing	2	5,0
Concrete Processing	6	15,0
Wood Processing	6	15,0
Food and Beverage Processing	25	62,5
Fiber-to-Clothing Processing	1	2,5
Years of Operation		
> 3 years	40	100,0
Number of Employees		
> 99 employees	7	17,5
20 - 99 employees	33	82,5
Annual Revenue		
< Rp 500 million	12	30,0
> 10 Miliar	2	5,0
Rp 500 Million - 10 billion	26	65,0

Based on Table 1, most of the companies included in the study operated in the food and beverage processing sector, accounting for 25 companies (62.50%). This was followed by concrete processing and wood processing, with 6 companies each (15.00%), chemical processing with 2 companies (5.00%), and textile or clothing manufacturing with 1 company (2.50%). Regarding years of operation, all companies (100.00%) had been operating for more than three years. In terms of workforce size, 33 companies (82.50%) employed 20–99 employees, while 7 companies (17.50%) employed more than 99 employees. Regarding annual revenue, 26 companies (65.00%) generated between IDR 500 million and IDR 10 billion, 12 companies (30.00%) generated less than IDR 500 million, and 2 companies (5.00%) generated more than IDR 10 billion. These

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characteristics demonstrate variations in industrial sectors, workforce size, and company revenue, providing important contextual factors for this study.

These company characteristics are relevant to analyzing the effect of a human-centric approach on sustainable business performance through the mediating roles of dynamic capabilities, digital transformation, and the circular economy. The companies' operational experience provides insight into their ability to respond to changes in the business environment, while variations in workforce size and revenue may reflect differences in resource management capacity and the adoption of technology and sustainability practices. Accordingly, the characteristics of the respondents and companies provide a relevant empirical context for examining the relationships among the variables in the research model.

Outer Model Analysis

Table 2. Outer Loading Analysis

Variable	Indicator	Outer Loading	Cronbach's alpha	Composite Reliability	AVE	Decision
Human-Centric Approach	X1.1	0.828	0,939	0,949	0,616	Valid
	X1.2	0.835				Valid
	X1.3	0.812				Valid
	X1.4	0.850				Valid
	X1.5	0.815				Valid
	X1.6	0.739				Valid
	X1.7	0.583				Valid
Sustainable Business Performance	Y1.1	0.804	0,908	0,927	0,676	Valid
	Y1.2	0.897				Valid
	Y1.3	0.697				Valid
	Y1.4	0.816				Valid
	Y1.5	0.865				Valid
	Y1.6	0.813				Valid
	Y1.7	0.817				Valid
	Y1.8	0.881				Valid
	Y1.9	0.794				Valid
Dynamic Capabilities	Z1.1	0.732	0,900	0,921	0,624	Valid

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Variable	Indicator	Outer Loading	Cronbach's alpha	Composite Reliability	AVE	Decision
	Z1.2	0.742				Valid
	Z1.3	0.788				Valid
	Z1.4	0.818				Valid
	Z1.5	0.819				Valid
	Z1.6	0.831				Valid
	Z1.7	0.793				Valid
Digital Transformation	Z2.1	0.803	0,895	0,917	0,646	Valid
	Z2.2	0.871				Valid
	Z2.3	0.823				Valid
	Z2.4	0.797				Valid
	Z2.5	0.798				Valid
	Z2.6	0.803				Valid
	Z2.7	0.724				Valid
Circular Economy	Z3.1	0.751	0,823	0,868	0,528	Valid
	Z3.2	0.741				Valid
	Z3.3	0.796				Valid
	Z3.4	0.798				Valid
	Z3.5	0.515				Valid
	Z3.6	0.720				Valid

Based on Table 2, the outer loading analysis indicates that most indicators have values above 0.70, thereby meeting the criteria for convergent validity. Although several indicators have values below 0.70, namely X1.7 (0.583), Y1.3 (0.697), and Z3.5 (0.515), they may be retained after considering the composite reliability and AVE values of their respective constructs. Cronbach's alpha values range from 0.823 to 0.939, while composite reliability values range from 0.868 to 0.949, indicating that all constructs meet the reliability criteria. Furthermore, the Average Variance Extracted (AVE) values range from 0.528 to 0.676, exceeding the minimum threshold of 0.50 and indicating that all constructs satisfy the criteria for convergent validity. Accordingly, the indicators measuring the human-centric approach, sustainable business performance, dynamic capabilities, digital transformation, and the circular economy generally meet the

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measurement criteria and can be considered for further analysis, subject to additional evaluation of indicators with low outer loading values.

Table 3. Cross-Loading Values

	Sustainable Business Performance (Y)	Human-Centric Approach (X1)	Dynamic Capabilities (Z1)	Digital Transformation (Z2)	Circular Economy (Z3)	Decision
Y1.1	0.804	0.517	0.572	0.573	0.514	Valid
Y1.2	0.897	0.533	0.571	0.675	0.486	Valid
Y1.3	0.697	0.397	0.331	0.456	0.478	Valid
Y1.4	0.816	0.492	0.572	0.522	0.315	Valid
Y1.5	0.865	0.600	0.535	0.575	0.385	Valid
Y1.6	0.813	0.384	0.571	0.483	0.489	Valid
Y1.7	0.817	0.422	0.452	0.568	0.472	Valid
Y1.8	0.881	0.423	0.614	0.592	0.575	Valid
Y1.9	0.794	0.428	0.544	0.512	0.504	Valid
X1.1	0.468	0.828	0.409	0.487	0.387	Valid
X1.2	0.495	0.835	0.468	0.439	0.419	Valid
X1.3	0.614	0.812	0.373	0.433	0.262	Valid
X1.4	0.472	0.850	0.364	0.406	0.411	Valid
X1.5	0.426	0.815	0.336	0.449	0.323	Valid
X1.6	0.330	0.739	0.390	0.345	0.249	Valid
X1.7	0.243	0.583	0.293	0.218	0.003	Valid
Y1.1	0.804	0.517	0.572	0.573	0.514	Valid
Y1.2	0.897	0.533	0.571	0.675	0.486	Valid
Y1.3	0.697	0.397	0.331	0.456	0.478	Valid
Y1.4	0.816	0.492	0.572	0.522	0.315	Valid
Y1.5	0.865	0.600	0.535	0.575	0.385	Valid
Y1.6	0.813	0.384	0.571	0.483	0.489	Valid
Y1.7	0.817	0.422	0.452	0.568	0.472	Valid
Y1.8	0.881	0.423	0.614	0.592	0.575	Valid
Y1.9	0.794	0.428	0.544	0.512	0.504	Valid
Z1.1	0.346	0.377	0.732	0.285	0.156	Valid
Z1.2	0.478	0.332	0.742	0.375	0.356	Valid
Z1.3	0.506	0.381	0.788	0.533	0.537	Valid
Z1.4	0.401	0.289	0.818	0.414	0.481	Valid

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	Sustainable Business Performance (Y)	Human-Centric Approach (X1)	Dynamic Capabilities (Z1)	Digital Transformation (Z2)	Circular Economy (Z3)	Decision
Z1.5	0.602	0.350	0.819	0.586	0.332	Valid
Z1.6	0.663	0.507	0.831	0.491	0.500	Valid
Z1.7	0.500	0.404	0.793	0.458	0.343	Valid
Z2.1	0.595	0.298	0.490	0.803	0.474	Valid
Z2.2	0.615	0.570	0.454	0.871	0.508	Valid
Z2.3	0.504	0.422	0.541	0.823	0.452	Valid
Z2.4	0.504	0.336	0.582	0.797	0.564	Valid
Z2.5	0.538	0.414	0.463	0.798	0.376	Valid
Z2.6	0.606	0.424	0.372	0.803	0.472	Valid
Z2.7	0.402	0.447	0.372	0.724	0.238	Valid
Z3.1	0.353	0.459	0.402	0.418	0.751	Valid
Z3.2	0.421	0.270	0.205	0.503	0.741	Valid
Z3.3	0.428	0.378	0.352	0.320	0.796	Valid
Z3.4	0.619	0.287	0.516	0.425	0.798	Valid
Z3.5	0.090	0.193	0.280	0.405	0.515	Valid
Z3.6	0.385	0.141	0.381	0.420	0.720	Valid

Based on the cross-loading test results, all indicators associated with their respective constructs meet the criteria for discriminant validity. This is demonstrated by the fact that each indicator's loading value on its assigned construct is higher than its loading values on the other constructs. The indicators measuring the human-centric approach, sustainable business performance, dynamic capabilities, digital transformation, and the circular economy exhibit stronger associations with their respective constructs than with the other constructs, indicating that the constructs demonstrate adequate discriminant validity.

Table 4. Heterotrait–Monotrait Ratio (HTMT) Values

	Circular Economy (Z3)	Digital Transformation (Z2)	Dynamic Capabilities (Z1)	Human-Centric Approach (X1)
Digital Transformation (Z2)	0.655			

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	Circular Economy (Z3)	Digital Transformation (Z2)	Dynamic Capabilities (Z1)	Human-Centric Approach (X1)
Dynamic Capabilities (Z1)	0.549	0.628		
Human-Centric Approach (X1)	0.450	0.562	0.530	
Sustainable Business Performance (Y1)	0.601	0.722	0.682	0.606

The HTMT test results indicate that all inter-construct correlation values are below the established threshold, demonstrating that the research model satisfies the criteria for discriminant validity. The highest HTMT value is observed between digital transformation and sustainable business performance, at 0.722, while the relationship between dynamic capabilities and sustainable business performance yields a value of 0.682. The remaining construct relationships exhibit lower HTMT values. These findings indicate that the constructs demonstrate adequate empirical distinctiveness and represent different underlying concepts. Therefore, the research model can be considered to satisfy discriminant validity based on the HTMT assessment.

Inner Model Analysis

The following are the results of the inner model evaluation in this study:

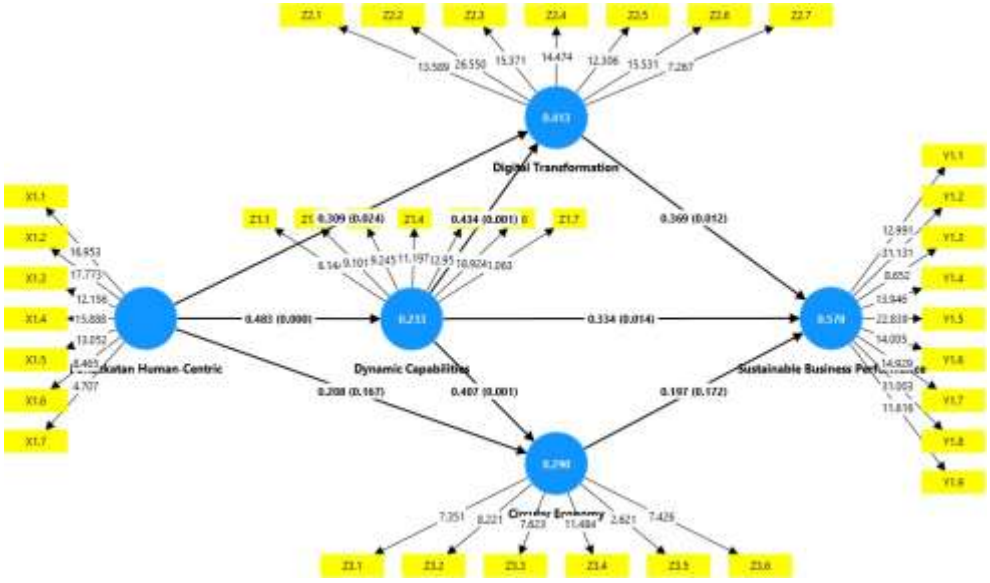


Figure 1. Inner Model

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Table 5. Multicollinearity Test Results

Variables	VIF	Decision
Human-Centric Approach -> Dynamic Capabilities	1.000	No multicollinearity
Human-Centric Approach -> Digital Transformation	1.304	No multicollinearity
Human-Centric Approach -> Circular Economy	1.304	No multicollinearity
Dynamic Capabilities -> Sustainable Business Performance	1.636	No multicollinearity
Dynamic Capabilities -> Digital Transformation	1.304	No multicollinearity
Dynamic Capabilities -> Circular Economy	1.304	No multicollinearity
Digital Transformation -> Sustainable Business Performance	1.756	No multicollinearity
Circular Economy -> Sustainable Business Performance	1.560	No multicollinearity

Based on the results of the Variance Inflation Factor (VIF) test, all indicators associated with the respective constructs have VIF values within the acceptable range. The VIF values for the research indicators range from 1.000 to 1.756. These findings indicate that there are no multicollinearity issues among the indicators in the research model.

Table 6. R-Square Values

	R-square	R-square adjusted	Description
Sustainable Business Performance (Y)	0.578	0.543	Strong
Dynamic Capabilities (Z1)	0.233	0.213	Weak
Digital Transformation (Z2)	0.413	0.382	Moderate
Circular Economy (Z3)	0.290	0.252	Moderate

Based on the coefficient of determination (R-square) results, the endogenous variables in the research model demonstrate varying levels of explanatory power regarding the variables they represent. The R-square value for circular economy is 0.290, while that for digital transformation is 0.413, indicating moderate explanatory power for both variables. Dynamic capabilities has an R-square value of 0.233, indicating weak explanatory power, whereas sustainable business performance has an R-square value of 0.578, which falls into the strong category.

Overall, the results indicate that the model has different levels of explanatory power across the endogenous variables. The highest explanatory power is observed for

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sustainable business performance, with an R-square value of 0.578. This indicates that the variables included in the model explain 57.8% of the variance in sustainable business performance, while the remaining 42.2% is attributable to factors outside the research model. In contrast, the lowest explanatory power is observed for dynamic capabilities, with an R-square value of 0.233. This indicates that the variables included in the model explain 23.3% of the variance in dynamic capabilities, while the remaining 76.7% is explained by other factors outside the research model.

Table 7. F-Square Values

Variable Relationship	F-Square Value	Category
Human-Centric Approach → Circular Economy	0,047	Small
Human-Centric Approach → Dynamic Capabilities	0,125	Small
Human-Centric Approach → Digital Transformation	0,304	Medium
Dynamic Capabilities → Sustainable Business Performance	0,179	Medium
Dynamic Capabilities → Digital Transformation	0,246	Medium
Dynamic Capabilities → Circular Economy	0,162	Medium
Digital Transformation → Sustainable Business Performance	0,184	Medium
Circular Economy → Sustainable Business Performance	0,059	Small

Based on the effect size or F-square test results, the effect of the human-centric approach on the circular economy (0.047) and dynamic capabilities (0.125) falls into the small effect category, whereas its effect on digital transformation (0.304) falls into the medium effect category. The effects of dynamic capabilities on sustainable business performance (0.179), digital transformation (0.246), and the circular economy (0.162), as well as the effect of digital transformation on sustainable business performance (0.184), are all classified as medium effects. Meanwhile, the effect of the circular economy on sustainable business performance (0.059) is categorized as small. Thus, the largest effect in the research model is observed in the relationship between the human-centric approach and digital transformation, with an F-square value of 0.304, whereas the smallest effect is found in the relationship between the human-centric approach and the circular economy, with a value of 0.047. These findings indicate that most relationships among the variables exhibit medium effect sizes, while several others fall into the small effect category.

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Table 8. Q-Square Values

Endogenous Variable	Q²predict	RMSE	MAE	Interpretation
Dynamic Capabilities (Z1)	0.109	1.008	0.818	Has predictive relevance
Digital Transformation (Z2)	0.195	0.946	0.771	Has predictive relevance
Circular Economy (Z3)	0.165	0.969	0.776	Has predictive relevance
Sustainable Business Performance (Y1)	0.233	0.929	0.720	Has predictive relevance

Based on the Q-square test results, the research model demonstrates predictive capability for the endogenous variables. As shown in the table above, all constructs exhibit predictive relevance for their respective endogenous variables. Furthermore, the RMSE and MAE values indicate the levels of prediction error produced by the model. These results suggest that the model has adequate predictive capability and can be used to explain the relationships among the research variables.

Table 9. Hypothesis Testing

Variables	Hypothesis	Original Sample (O)	T-Statistics	P-Value	Decision
Human-Centric Approach -> Dynamic Capabilities	H1	0.483	4.577	0	Accepted
Human-Centric Approach -> Digital Transformation	H2	0.309	2.253	0.024	Accepted
Human-Centric Approach -> Circular Economy	H3	0.208	1.381	0.167	Rejected
Dynamic Capabilities -> Sustainable Business Performance	H4	0.334	2.471	0.014	Accepted
Dynamic Capabilities -> Digital Transformation	H5	0.434	3.348	0.001	Accepted
Dynamic Capabilities -> Circular Economy	H6	0.407	3.313	0.001	Accepted
Digital Transformation -> Sustainable Business Performance	H7	0.369	2.524	0.012	Accepted
Circular Economy -> Sustainable Business Performance	H8	0.197	1.366	0.172	Rejected

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Variables	Hypothesis	Original Sample (O)	T-Statistics	P-Value	Decision
Human-Centric Approach -> Dynamic Capabilities -> Digital Transformation	H9	0.21	2.605	0.009	Accepted
Human-Centric Approach -> Dynamic Capabilities -> Circular Economy	H10	0.196	2.401	0.016	Accepted
Dynamic Capabilities -> Digital Transformation -> Sustainable Business Performance	H11	0.16	2.096	0.036	Accepted
Dynamic Capabilities -> Circular Economy -> Sustainable Business Performance	H12	0.08	1.167	0.243	Rejected

Based on Table 9, the direct effect test results indicate that six of the eight hypotheses tested were accepted, while two were rejected. The human-centric approach had a positive and significant effect on dynamic capabilities (H1), with a coefficient of 0.483 and a p-value of 0.000, as well as on digital transformation (H2), with a coefficient of 0.309 and a p-value of 0.024. However, the effect of the human-centric approach on the circular economy (H3) was not significant, with a coefficient of 0.208 and a p-value of 0.167. Furthermore, dynamic capabilities had positive and significant effects on sustainable business performance (H4), digital transformation (H5), and the circular economy (H6), with coefficients of 0.334, 0.434, and 0.407, respectively. Digital transformation also had a positive and significant effect on sustainable business performance (H7), with a coefficient of 0.369 and a p-value of 0.012. Meanwhile, the effect of the circular economy on sustainable business performance (H8) was not significant, with a coefficient of 0.197 and a p-value of 0.172. These findings indicate that dynamic capabilities and digital transformation play important roles in supporting sustainable business performance, whereas the direct effects of the human-centric approach on the circular economy and the circular economy on sustainable business performance were not statistically significant.

Based on Table 9, the indirect effect test results indicate that three of the four hypotheses tested were accepted, while one was rejected. The human-centric approach had a positive and significant indirect effect on digital transformation through dynamic

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capabilities (H9), with a coefficient of 0.210, a t-statistic of 2.605, and a p-value of 0.009. This finding indicates that dynamic capabilities provide a pathway through which the human-centric approach influences digital transformation. Furthermore, the human-centric approach had a positive and significant indirect effect on the circular economy through dynamic capabilities (H10), with a coefficient of 0.196 and a p-value of 0.016. This finding suggests that an organization's dynamic capabilities can help translate a human-oriented approach into the implementation of circular economy practices. In addition, dynamic capabilities had a positive and significant indirect effect on sustainable business performance through digital transformation (H11), with a coefficient of 0.160 and a p-value of 0.036. Conversely, the indirect effect of dynamic capabilities on sustainable business performance through the circular economy (H12) was not significant, with a coefficient of 0.080 and a p-value of 0.243. Thus, dynamic capabilities and digital transformation were found to be significant mechanisms in several relationships among the variables, whereas the circular economy was not established as a significant mediating pathway between dynamic capabilities and sustainable business performance.

Table 10. Mediation Analysis

Variables	Indirect Effect	t-statistic	p-value Indirect	Direct Effect	p-value Direct	Type of Mediation	Interpretation
Human-Centric Approach -> Dynamic Capabilities -> Digital Transformation	0,210	2,605	0,009	0,309	0,024	*Complementary mediation*	Dynamic capabilities mediate the relationship between the human-centric approach and digital transformation.
Human-Centric Approach -> Dynamic Capabilities	0,196	2,401	0,016	0,208	0,167	*Indirect-only mediation*	Dynamic capabilities mediate the relationship between the

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Variables	Indirect Effect	t-statistic	p-value Indirect	Direct Effect	p-value Direct	Type of Mediation	Interpretation
-> Circular Economy							human-centric approach and the circular economy.
Dynamic Capabilities -> Digital Transformation -> Sustainable Business Performance	0,160	2,096	0,036	0,334	0,014	*Complementary mediation*	Digital transformation mediates the relationship between dynamic capabilities and sustainable business performance.
Dynamic Capabilities -> Circular Economy -> Sustainable Business Performance	0,080	1,167	0,243	0,334	0,014	*Direct-Only*	The circular economy does not mediate the relationship between dynamic capabilities and sustainable business performance.

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Based on Table 10, the mediation analysis identified two relationships characterized by complementary mediation, one by indirect-only mediation, and one by direct-only mediation. For the relationship between the human-centric approach and digital transformation through dynamic capabilities, the indirect effect was significant (p = 0.009), and the direct effect was also significant (p = 0.024). Because both effects were positive and statistically significant, this relationship represents complementary mediation, indicating that dynamic capabilities partially mediate the relationship between the human-centric approach and digital transformation. Furthermore, for the relationship between the human-centric approach and the circular economy through dynamic capabilities, the indirect effect was significant (p = 0.016), whereas the direct effect was not significant (p = 0.167). This pattern represents indirect-only mediation, indicating that dynamic capabilities serve as a significant mediating pathway in this relationship. For the relationship between dynamic capabilities and sustainable business performance through digital transformation, the indirect effect was significant (p = 0.036), and the direct effect was also significant (p = 0.014). Since both effects were positive and significant, this relationship represents complementary mediation, indicating that digital transformation partially mediates the effect of dynamic capabilities on sustainable business performance. Meanwhile, for the relationship between dynamic capabilities and sustainable business performance through the circular economy, the indirect effect was not significant (p = 0.243), whereas the direct effect was significant (p = 0.014). This result represents direct-only mediation, indicating that the circular economy was not established as a significant mediator of this relationship. Overall, the mediation results confirm that dynamic capabilities and digital transformation play significant mediating roles in the research model, whereas the circular economy was not found to be a significant mediator between dynamic capabilities and sustainable business performance.

1. The Effect of the Human-Centric Approach on Dynamic Capabilities

The results indicate that the human-centric approach has a positive and significant effect on dynamic capabilities in manufacturing companies in Banyuwangi and Jember Regencies. Implementing this approach through competency development, training, employee involvement, and an inclusive work environment helps companies identify changes and opportunities (*sensing*), make decisions to capitalize on those opportunities (*seizing*), and reconfigure resources and operational processes (*transforming*). In manufacturing companies employing 20–99 workers, employee involvement is particularly important because employees can provide information about operational conditions and changes in consumer needs. For example, employee feedback regarding consumer preferences for low-sugar beverages can serve as a basis for developing new product variants and adjusting production processes. These findings are consistent with the Resource-Based View (RBV), which regards internal resources as a foundation for

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competitive advantage (Barney, 2000), and the dynamic capabilities concept, which encompasses *sensing*, *seizing*, and *transforming* (Teece, 2018). The findings of Bieńkowska et al. (2025) also support this result by demonstrating that a human-centric approach involving skills development, training, and an inclusive work environment can facilitate organizational adaptation and innovation.

2. The Effect of the Human-Centric Approach on Digital Transformation

The results indicate that the human-centric approach has a positive and significant effect on digital transformation in manufacturing companies in Banyuwangi and Jember Regencies. Attention to employee readiness, competence, and involvement through training and support for technology use helps companies implement digital systems and adapt their work processes more effectively. For example, a concrete-processing company that uses a digital system to record raw materials and production output provides regular training to ensure that employees can operate the system effectively. Digital recordkeeping accelerates access to information, reduces recording errors, and improves operational efficiency. These findings are consistent with the principles of Industry 5.0, which positions technology as a means of supporting human capabilities (Hein-Pensel, 2026), and the Resource-Based View (RBV), which regards employee competencies and knowledge as internal resources that support organizational transformation. Successful digital transformation depends not only on technology adoption but also on employee readiness, skills, and organizational support for technology adoption (Fenwick et al., 2024).

3. The Effect of the Human-Centric Approach on the Circular Economy

The results indicate that the human-centric approach has a positive but insignificant effect on the circular economy in manufacturing companies in Banyuwangi and Jember Regencies. This finding suggests that attention to employee well-being, competence, and involvement is insufficient to directly encourage the implementation of circular economy practices. The descriptive results show that the use of environmentally friendly packaging and waste sorting are relatively prevalent, whereas the conversion of waste into useful outputs remains limited. This condition suggests that companies have adopted basic circular economy practices but have not yet optimized material value recovery. For example, a plywood manufacturer generates wood offcuts and sawdust that could potentially be processed into wood pellets. However, limited investment in machinery and processing facilities means that these production residues are transferred to other parties. This illustrates that employee knowledge and environmental awareness need to be supported by investment, technology, facilities, and operational procedures to translate them into *reduce, reuse, recycle,* and *recovery* practices. This finding can be explained through the Resource-Based View (RBV), which considers human resources valuable internal assets when they are integrated into organizational processes to create

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value (Barney, 1991). The results are also consistent with Arthur et al. (2023), Dräger and Letmathe (2023), and Wasim et al. (2026), who indicate that the contribution of human factors to the circular economy should be understood in conjunction with operational mechanisms, innovation, and organizational support.

4. The Effect of Dynamic Capabilities on Sustainable Business Performance

The results indicate that dynamic capabilities have a positive and significant effect on sustainable business performance in manufacturing companies in Banyuwangi and Jember Regencies. A company's ability to identify changes (*sensing*), capitalize on opportunities (*seizing*), and reconfigure resources and operational processes (*transforming*) helps sustain value creation across the economic, social, and environmental dimensions. This finding is reflected in companies' ability to implement continuous changes and manage resources to improve performance. For example, a sardine-processing company adjusts its production volume according to raw material availability when fish prices increase, improves cutting processes to reduce material waste, and uses fish residues as raw materials for fishmeal intended for animal feed. These measures help control costs while reducing production waste. Theoretically, this finding is consistent with the Resource-Based View (RBV), which emphasizes the importance of resource management in value creation (Barney, 2000), and the dynamic capabilities concept, which explains how companies adapt and reconfigure resources in response to environmental changes (Teece, 2018). The findings are also supported by Chatterjee et al. (2022), who demonstrate that adaptive capabilities, process renewal, and stakeholder integration can support sustained corporate performance.

5. The Effect of Dynamic Capabilities on Digital Transformation

The results indicate that dynamic capabilities have a positive and significant effect on digital transformation in manufacturing companies in Banyuwangi and Jember Regencies. A company's ability to identify changes (*sensing*), capitalize on opportunities (*seizing*), and reconfigure resources and work processes (*transforming*) helps determine appropriate technologies and integrate them into business activities. This finding is reflected in companies' ability to implement continuous changes, learn from other companies, and manage resources. For example, a concrete-processing company facing price competition in government projects needs to adjust its use of raw materials, labor, and production capacity. These adjustments can be supported by digital technologies, such as an Enterprise Resource Planning (ERP) system, to integrate raw material records, production monitoring, and delivery scheduling. Thus, dynamic capabilities help companies determine the changes required, while digital transformation enables these changes to be implemented in a more integrated and efficient manner. Theoretically, this finding is consistent with the Resource-Based View (RBV), which emphasizes the importance of managing and developing organizational resources (Barney, 2000), and

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the dynamic capabilities concept proposed by Teece (2018). The results are also supported by Soluk et al. (2021) and Warner and Wäger (2019), who demonstrate that adaptive capabilities and resource allocation play important roles in strategic renewal and digital business model innovation.

6. The Effect of Dynamic Capabilities on the Circular Economy

The results indicate that dynamic capabilities have a positive and significant effect on the circular economy in manufacturing companies in Banyuwangi and Jember Regencies. A company's ability to identify improvement opportunities (*sensing*), determine appropriate actions and allocate resources (*seizing*), and adjust operational processes (*transforming*) helps translate circular economy principles into practice. This is reflected in the dynamic capabilities indicators, particularly the ability to implement changes consistently, learn from other companies, and manage resources. For example, a dairy-processing company can convert cattle manure into organic fertilizer or biogas by adjusting waste management procedures and allocating the necessary resources. Such practices demonstrate how dynamic capabilities enable companies to identify the potential of production residues and transform them into useful resources. Theoretically, this finding is consistent with the Resource-Based View (RBV), which emphasizes the importance of internal organizational capabilities in creating value, and the dynamic capabilities concept, which concerns the ability to identify changes, capitalize on opportunities, and reconfigure resources. Bocken et al. (2017) emphasize the importance of changing how companies use resources and preserve their value in implementing a circular economy. This finding is further supported by Khan et al. (2020), who demonstrate that dynamic capabilities facilitate circular economy implementation, and Bocken et al. (2017), who highlight the need to adapt business models and activities to preserve resource value.

7. The Effect of Digital Transformation on Sustainable Business Performance

The results indicate that digital transformation has a positive and significant effect on sustainable business performance in manufacturing companies in Banyuwangi and Jember Regencies. Integrating digital technologies into business processes helps companies accelerate information flows, improve operational efficiency, reduce errors, and control costs. This finding is reflected in the high ratings for the use of technology to support organizational needs and employees' ability to operate it, as well as the indicator of operational cost efficiency. For example, a fishmeal-processing company uses digital technology to record raw material inventories, monitor production volumes, and improve coordination between warehouse and production departments. The available information helps the company adjust production volumes or identify alternative suppliers when fish supplies decline, thereby reducing the risk of production stoppages and resource waste. Theoretically, this finding is consistent with the Triple Bottom Line (TBL), which

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encompasses the economic (*profit*), social (*people*), and environmental (*planet*) dimensions (Elkington, 1998). Digital transformation can support all three dimensions through cost control, improved work coordination, and resource-use monitoring. This is consistent with Verhoef et al. (2021) and Vial (2019), who explain that digital transformation involves integrating technology into business processes and decision-making. Asbeetah et al. (2025) further support the finding that digital technology can improve efficiency, innovation, and sustainable performance.

8. The Effect of the Circular Economy on Sustainable Business Performance

The results indicate that the circular economy has a positive but insignificant effect on sustainable business performance in manufacturing companies in Banyuwangi and Jember Regencies. This finding suggests that existing circular economy practices have not yet generated substantial improvements across economic, environmental, and social performance simultaneously. Although companies have implemented energy-efficiency measures and reused production residues, the benefits remain limited because these practices have not fully generated additional economic value. This condition is evident in a poultry-processing company that has not processed chicken bones into animal feed ingredients because of limited financial resources and the investment required for processing facilities. Meanwhile, offal is used as catfish feed, while other waste is sorted and transferred to third parties without generating direct additional value for the company. This indicates that waste management has not yet fully generated cost efficiencies or additional revenue. The finding can be explained through the Triple Bottom Line framework (Elkington, 1998), which emphasizes the balance among the economic (*profit*), environmental (*planet*), and social (*people*) dimensions. Consistent with Amaleshwari and Jeevitha (2025), circular business practices have the potential to support sustainable business performance when they are integrated into business processes and generate measurable benefits.

9. The Mediating Role of Dynamic Capabilities in the Relationship Between the Human-Centric Approach and Digital Transformation

The results indicate that dynamic capabilities positively and significantly mediate the relationship between the human-centric approach and digital transformation, while the direct effect of the human-centric approach on digital transformation is also significant. This relationship therefore constitutes *complementary mediation*, meaning that the human-centric approach promotes digital transformation directly through employee involvement and development and indirectly through the company's ability to identify changes (*sensing*), determine appropriate actions (*seizing*), and reconfigure resources and work processes (*transforming*). In manufacturing companies in Banyuwangi and Jember Regencies, this mechanism is illustrated by a rice-processing company that shifted from manually sun-drying paddy to using a mechanical dryer based

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on employee feedback. The company first identified the limitations of weather-dependent drying, decided to adopt more appropriate technology, and then adjusted work procedures and employees' ability to operate the machinery. This example demonstrates that digital transformation depends not only on technology acquisition but also on the company's ability to translate employees' knowledge and experience into concrete actions. Theoretically, this finding is consistent with the Resource-Based View (Barney, 2000), which regards employees' knowledge, skills, and experience as strategic resources. The human-centric approach is also aligned with the concept of Industry 5.0 (European Commission, 2021), while dynamic capabilities explain how organizations manage change (Teece, 2018). The finding is further supported by Bieńkowska et al. (2025), who emphasize the role of dynamic capabilities in linking human-related factors with innovation outcomes and digital transformation.

10. The Mediating Role of Dynamic Capabilities in the Relationship Between the Human-Centric Approach and the Circular Economy

The results indicate that dynamic capabilities positively and significantly mediate the relationship between the human-centric approach and the circular economy, whereas the direct effect of the human-centric approach on the circular economy is insignificant. This finding indicates *indirect-only mediation*, meaning that employee involvement and development are insufficient to directly promote circular economy practices but can influence their implementation through the company's ability to identify opportunities (*sensing*), determine appropriate actions (*seizing*), and reconfigure resources and work processes (*transforming*). In plywood-manufacturing companies in Banyuwangi and Jember Regencies, this mechanism is illustrated by the utilization of production residues, including veneer offcuts, wood shavings, and damaged wood. Employee suggestions regarding reusable wood offcuts need to be followed by identifying suitable materials, determining alternative uses, and adjusting production processes to reduce waste. Theoretically, this finding is consistent with the Resource-Based View (Barney, 1998), which regards human knowledge and skills as strategic resources, and the human-centric concept of Industry 5.0 (European Commission, 2021). However, these resources must be mobilized through dynamic capabilities to generate tangible changes. This is consistent with Teece (2018), who emphasizes the ability to identify changes, seize opportunities, and reconfigure resources. The finding is also consistent with Vayona et al. (2024), who highlight the importance of human involvement, organizational capabilities, and business process changes in supporting circular economy implementation.

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11. The Mediating Role of Digital Transformation in the Relationship Between Dynamic Capabilities and Sustainable Business Performance

The results indicate that digital transformation positively and significantly mediates the relationship between dynamic capabilities and sustainable business performance, while the direct effect of dynamic capabilities on sustainable business performance is also significant. This relationship therefore constitutes *complementary mediation*, meaning that a company's ability to identify changes, seize opportunities, and reconfigure resources can improve performance directly and through digital technology adoption. In manufacturing companies in Banyuwangi and Jember Regencies, this mechanism is illustrated by a can-manufacturing company experiencing product leakage problems. The company's ability to identify the causes of these problems and improve production processes reflects its dynamic capabilities, while the use of a leak-testing machine helps detect non-hermetic cans before they are delivered to customers. This technology can reduce defective products, optimize raw material use, and minimize production waste. Theoretically, this finding is consistent with the Resource-Based View (Barney, 1998), which regards resource management capabilities as a source of competitive advantage, and the Triple Bottom Line (Elkington, 1998), which emphasizes the balance among economic, environmental, and social performance. The results are also supported by Supriyadi and Firmansyah (2026), who demonstrate that dynamic capabilities can promote digital transformation and contribute to improved sustainable performance and competitive advantage.

12. The Mediating Role of the Circular Economy in the Relationship Between Dynamic Capabilities and Sustainable Business Performance

The results indicate that the circular economy does not mediate the relationship between dynamic capabilities and sustainable business performance. Although dynamic capabilities have a significant effect on the circular economy, the effect of the circular economy on sustainable business performance is insignificant. This finding suggests that a company's ability to identify opportunities, manage resources, and adjust work processes can promote circular economy practices, but their implementation has not yet been sufficiently effective to improve overall economic, environmental, and social performance. In manufacturing companies in Banyuwangi and Jember Regencies, this condition is illustrated by a fish-processing and freezing company that improved product placement in cold storage to optimize storage capacity and energy use. However, this improvement was not accompanied by a reduction in waste caused by fish products deteriorating in quality or becoming damaged during storage. Consequently, operational improvements have not yet translated into circular practices that generate sufficient additional value. Theoretically, this finding can be explained through the Resource-Based View (Barney, 2000), which emphasizes the importance of resource management

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capabilities, and the Triple Bottom Line (Elkington, 1998), which views sustainable performance in terms of economic, environmental, and social dimensions. This result differs from Iqbal et al. (2025), who identified a mediating role for the circular economy, but is consistent with Gurupandi et al. (2026), who found that adopting circular practices does not necessarily lead to significant improvements in sustainable performance. This difference suggests that the extent to which circular economy practices are integrated into business processes may influence their contribution to company performance.

CONCLUSION

This study demonstrates that the human-centric approach has positive and significant effects on dynamic capabilities and digital transformation, but does not have a significant effect on the circular economy. Furthermore, dynamic capabilities have positive and significant effects on digital transformation, the circular economy, and sustainable business performance, while digital transformation has a positive and significant effect on sustainable business performance. The mediation analysis confirms that dynamic capabilities mediate the relationships between the human-centric approach and both digital transformation and the circular economy. In addition, digital transformation mediates the relationship between dynamic capabilities and sustainable business performance. Conversely, the circular economy does not have a significant effect on sustainable business performance and does not mediate the relationship between dynamic capabilities and sustainable business performance. These findings underscore that organizational capabilities in managing change and leveraging digital technologies are essential factors in supporting sustainable business performance among large and medium-sized manufacturing enterprises in Banyuwangi and Jember Regencies, Indonesia.

From a practical perspective, companies need to integrate competency development and employee engagement, the strengthening of adaptive capabilities, and digital transformation into measurable operational strategies. The implementation of the circular economy should also be strengthened through waste reduction, material reuse, raw material efficiency, and supply chain collaboration to ensure that its contribution to business performance can be evaluated effectively. Future research is encouraged to expand the geographical coverage and industrial sectors, involve respondents from various organizational functions, and combine perceptual data with objective indicators and longitudinal observations. These efforts are expected to provide a more comprehensive understanding of the mechanisms linking the human-centric approach, organizational capabilities, digital transformation, and the circular economy to the achievement of sustainable business performance.

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