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Transforming SMEs through AI-Driven Digital Ecosystems to Improve Sustainable Performance: The Roles of Organizational Resilience, Sustainable Value Co-Creation, and Digital Maturity

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ABSTRACT

This research investigates the relationship between artificial intelligence-integrated digital ecosystem, digital maturity, organisational resilience, and the mechanism of sustainable value co-creation and performance results in small and medium-sized firms in East Java, Indonesia. It aims to elucidate how these five factors collectively foster long-term resilience and sustainability in increasingly information-dense business environments.

The Quantitative Method was applied with the SEM-PLS approach in the SmartPLS 3.2 program. The survey included 151 SMEs with different demographic characteristics. The model was evaluated for predictive relevance (Q2), common method bias, bootstrapped path coefficients, confirmatory factor analysis, correlation analysis, multicollinearity, and construct reliability. Data were obtained between December 2025 and April 2026.

The results reveal that AI-enabled digital ecosystems have a remarkable and favourable effect on organisational resilience and sustainable value co-creation, hence improving sustainable performance. Digital maturity serves as an important enabler and mediator, further enhancing the benefits of these AI-enabled solutions. Moreover, sustainable value co-creation is found as the main predictor of sustainable performance, and the link between resilience and co-creation is reciprocal, showing a reinforcing dynamic.

This study contributes to the current literature by extending the conceptualisation of SME success to include economic, social and environmental factors. Moreover, it provides a solid basis for understanding the role of AI ecosystems and digital maturity in supporting resilience and sustainability, allowing resource-constrained SMEs to retain their competitive advantage, while also supporting international sustainability agendas such as the Sustainable Development Goals and Environmental, Social, and Governance standards.

1.Introduction

In the continuously changing business environment, SMEs today have placed digital transformation high on their strategy agenda (Kargas, 2026);(Sidharta et al., 2026). These organisations constitute a substantial part of the world economy and are experiencing increasing pressure to implement advanced digital technology to maintain competitivenes (Mumcu & Brieger, 2026);(Indrawati & Prasetyo, 2026). Digital transformation is not simply about using new tools, but a fundamental change in how organizations function, create value and co-create sustainable economic, social and environmental benefit for stakeholders (Tetteh & Owusu Kwateng, 2026);(Prasetyo et al., 2025). This methodology has been facilitated by AI-driven ecosystems, including machine learning, predictive analytics, and natural language processing (Østerlie & Killian, 2026);(Utari et al., 2025). Directly, these technologies contribute to SMEs' optimisation of decision-making, automation of processes, and enhancement of operational efficiency, fostering sustainable performance (Bhavikatta, 2026);(Laily et al., 2025). The research prioritizes functional AI – predictive, analytical and decision-support capabilities embedded within digital platforms – over larger conceptualizations of AI as an organizational competency. (Aiudi et al., 2026);(Sudaryanto et al., 2025).

This study is specifically aimed at the manufacturing industry in Gresik, East Java, Indonesia, SMEs in this region encounter distinct obstacles in implementing digital technology, including budgetary constraints, insufficient digital infrastructure, and organisational reluctance to change. (Yesuf & Fields, 2026);(Sidharta et al., 2025). The present study was conducted on product-oriented manufacturing SMEs, namely in the consumer products sector as they are vital to national competitiveness and are forerunners in digital transformation (Garzoni et al., 2020);(Sudaryanto et al., 2024). The research amalgamates four categories of attributes – AI ecosystem, digital maturity, organizational resilience, and sustainable value co-creation to establish a cohesive empirical framework. Although these constructs have been thoroughly examined as distinct areas of research, their amalgamation within the context of SMEs in developing countries, particularly in the manufacturing industry, remains little investigated (da Silva et al., 2025);(Indrawati et al., 2024). By framing digital maturity as a mediating variable between the AI ecosystem and organisational resilience, this model enables the study of direct relationships and dimensional interactions, therefore offering insights into the future performance and sustainability of SMEs.

The context of manufacturing SMEs in Gresik, East Java, contributes to the uniqueness of this study because emerging markets are still under-represented in the literature on AI-based digital ecosystems (Innayah et al., 2026);(Utari et al., 2024). SMEs in this region confront unique obstacles such as resource limitations, technological hurdles, and poor infrastructure, providing an interesting environment to investigate the impact of digital ecosystems to strengthen resilience and sustainability in resource-scarce conditions (Fülöp & Topor, 2026);(Martha Hendrati et al., 2024). Artificial intelligence has great potential, but small and medium-sized firms in developing nations confront major financial, technological and cultural impediments to successful digital integration (Yusuf et al., 2024);(Prasetio et al., 2024). Within this scenario, digital maturity, which is understood as the ability of SMEs to integrate and utilise digital technologies, is a key driver of organisational transformation (Jie et al., 2025);(Kurniawan & Prasetio, 2024). This study contributes to the current

literature by hypothesising that digital maturity enhances the adoption of AI-enabled ecosystems and strengthens the ecosystem-organizational resilience relationship, a moderating role that has not gotten significant academic attention so far.

Organisational resilience is the ability of an entity to anticipate disturbances, respond to crises and recover from shocks and is crucial for maintaining competitiveness in turbulent situations (Dickson, 2025);(Hendrati et al., 2024). Artificial intelligence approaches, notably predictive analytics and machine learning, can be used by small and medium-sized organisations to proactively manage market disruptions and reduce risks, hence increasing their operational stability and resilience (Singh & Singh, 2026);(Sabihaini et al., 2023). This research contributes to the Dynamic Capability Theory by proving that AI-enabled digital maturity enables the constant modification and redeployment of resources, thereby helping organisations achieve a sustained competitive advantage. Meanwhile, the rising expectations from stakeholders to embed sustainability into the core operational strategies of SMEs (Sawang et al., 2024);(Shabbir et al., 2023) drive AI-enabled ecosystems for improved resource efficiency, reduced environmental impacts and enhanced social responsibility enabling sustainable value co-creation (Soori et al., 2026);(Laily et al., 2023). In this study, value creation is viewed as local generation of economic output and sustainable value co-creation is defined as a collaborative process involving many stakeholders that leads to co-generation of economic, social and environmental value.

This research enhances the existing literature by suggesting a comprehensive framework to examine the combined effects of AI-driven digital ecosystems, digital maturity, organizational resilience, and sustainable value co-creation on the sustainability outcomes of SMEs in developing economies. Although AI-enabled ecosystems have great potential, the interrelationships among these aspects have rarely been studied simultaneously, especially when considering manufacturing SMEs in Indonesia. This study examines the influence of AI ecosystems on sustainable value co-creation, the relationship between organisational resilience and value creation and sustainability performance, and the effect of digital maturity on these interactions. On the theoretical front, the study adds to the resource-based view (Abdeen et al., 2026);(Nuswantara et al., 2023), Dynamic Capability Theory (Shahzad & Ferreira, 2026);(Hendrati et al., 2023), and stakeholder theory (Shahzad & Ferreira, 2026);(Prasetyo et al., 2023). The findings of this study suggest that AI ecosystems and digital maturity are strategic competencies that can boost SME resilience, value generation, and sustainability performance. From a Resource-Based View standpoint, AI ecosystems comprise valuable resources including data and analytical capabilities. Based on Dynamic Capabilities Theory, digital maturity helps businesses to recognize opportunities and to capitalize on them by reconfiguration of resources and business processes. The findings reveal that the impacts of AI ecosystems on sustainability are primarily indirect thru organizational resilience and sustainable value co-creation. Digital maturity deepens these interactions. The results have significance for SMEs and policymakers who aim to establish digital-adoption strategies that are appropriate for resource-constrained situations.

This research positions sustainable value co-creation as a multi-stakeholder collaborative process that generates economic, social and environmental value, and sustainable performance as its

conclusion. The integrated approach explores the contributions of AI-based digital ecosystems, digital maturity, and organizational resilience in improving SME performance. The result of the study of the manufacturing SMEs in Gresik, East Java showed that the four constructs are connected drivers for sustainable performance.

2. Literature Review

This article delineates essential constructs to establish the conceptual framework. Digital ecosystems powered by AI include integrated AI-fueled solutions like predictive analytics, automation, and decision support systems that are linked throughout internal processes and partner networks (Secundo et al., 2025);(Asyik et al., 2023). Digital maturity is the degree to which digital technologies, competencies and practices are incorporated in the fundamental activities of the SMEs. Organisational resilience is the ability to predict, adapt to, and recover from crises (Ngari & Kagereki, 2026);(Eko Prasetio et al., 2023). Sustainable value co-creation is a collaborative process that involves the joint development of economic, social and environmental value by stakeholders. Sustainable performance includes the results across the triple bottom line. Within organizations, the use of AI has shifted from isolated, ad hoc efforts to interconnected ecosystems to increase organizational performance (Denicolai & Bartosiak, 2026);(Tjaraka et al., 2022). However, the intersection of AI ecosystems, resilience, and sustainability is yet underexplored, particularly in emerging economies (Koldovskyi et al., 2025);(Asyik et al., 2022).

Recent studies confirm that artificial intelligence plays an important role in building digital ecosystems aligned with sustainability and resilience goals (Tsao et al., 2026);(Sudaryanto et al., 2022). Consistent with this view, (Cornelia Dura et al., 2026);(Prasetyo et al., 2022) show that digital maturity affects SMEs' ability to leverage AI for sustainable performance, and more recent work also indicates that digital readiness is a key prerequisite for AI adoption in SMEs (Luu et al., 2026);(Kalbuana et al., 2022). Nonetheless, the majority of previous studies have concentrated on affluent nations and have regarded digital transformation, resilience, and sustainability as distinct research domains. Consequently, empirical research that concurrently investigates the interaction of these three aspects in influencing SME sustainability performance in Indonesia is scarce. This research, based on the resource-based view and dynamic capabilities framework, defines AI-driven data, competencies, and practices as strategic assets that can be modified to improve organizational resilience (Abdeen et al., 2026);(Utari, Sudaryanto, et al., 2021). Accordingly, digital maturity is not only understood as the level of technology adoption, but also as a capability that enables SMEs to exploit AI ecosystems more effectively in creating sustainable value.

2.1. Digital ecosystems powered by AI and value co-creation for sustainability

Recently, there has been a growing interest among scholars in the integration of artificial intelligence into digital ecosystems, notably its potential to facilitate sustainable value co-creation (Barile et al., 2026);(Prasetyo, Aliyyah, Rusdiyanto, Kalbuana, et al., 2021). Fundamental AI technologies, including machine learning, natural language processing, and data analytics, are transforming conventional business models by allowing organisations to function more efficiently and develop sustainably (Shao et al., 2026);(Indrawati et al., 2021). In addition to facilitating real-time decision-making and

enhancing operational efficiency, AI assists organisations in incorporating sustainability objectives into fundamental operations by promoting improved resource utilisation and minimising waste (Xia et al., 2026);(Indrawati et al., 2021). AI-based digital ecosystems are thus a prerequisite for supporting sustainable value co-creation (Renfei et al., 2026);(Rusdiyanto, 2020).

The growing use of artificial intelligence in digital ecosystems has received significant academic attention in its role in sustainable value co-creation (Hansmeier et al., 2026);(Utari, Iswoyo, et al., 2021). Artificial intelligence technologies, including machine learning, natural language processing, and data analytics, are transforming conventional business paradigms by allowing organisations to function more efficiently and innovate sustainably (Shao et al., 2026);(Prasetio et al., 2021). These technologies enhance real-time (Aliyyah et al., 2021)decision-making and operational efficiency, enabling organisations to integrate sustainability objectives into their fundamental operations (Yandamuri, 2026);(Rusdiyanto et al., 2021). Consequently, AI-driven digital ecosystems are essential for facilitating sustainable value co-creation (Barile et al., 2026);(Prasetyo, Aliyyah, Rusdiyanto, Chamariah, et al., 2021).

Several empirical studies indicate that artificial intelligence can foster sustainable value co-creation in digital ecosystems. Research indicates that firms using AI within digital ecosystem structures tend to achieve better sustainability performance and higher stakeholder engagement (Alkaraan et al., 2026);(Prasetyo, Aliyyah, Rusdiyanto, Chamariah, et al., 2021). Similarly, (B. N. Hwang et al., 2026);(Prasetyo, Aliyyah, Rusdiyanto, Chamariah, et al., 2021) that integrating AI into digital strategies is associated with stronger prospects for long-term sustainable growth (Chandra & Feng, 2026);(Prasetyo, Aliyyah, Rusdiyanto, Chamariah, et al., 2021). But the findings are still patchy. The existing literature has not thoroughly articulated how AI, organisational resilience, digital maturity, and value co-creation interact simultaneously in a single integrated ecosystem, especially in the context of developing country SMEs (Vijayakumar & Harish, 2026);(Aliyyah et al., 2021). Hence, this study investigates these correlations collectively as a continuation of previous studies and, in this context, the first hypothesis is derived from this gap.

H1. Effect of AIE and SVC

2.2. AI-powered digital ecosystems and organizational resilience

The integration of artificial intelligence and organisational resilience has been a significant area of research, particularly in SMEs (Ratanacharoenchai & Jantapoon, 2026);(Kalbuana, Prasetyo, et al., 2021). Organisational resilience is the ability of an organisation to anticipate, plan for, respond to, and adapt to gradual changes and unforeseen disturbances in order to survive and thrive (Idrovo Hurel et al., 2026);(Endarto et al., 2021). Technologies of AI, such as machine learning and data analytics, allow organisations to develop stronger skills by processing massive data sets at a fast pace, thus enhancing predictive ability and decision-making (Guo et al., 2026);(Prasetyo, Aliyyah, Rusdiyanto, Nartasari, et al., 2021). These attributes hold significant relevance for SMEs as they typically possess less resources to manage disruptions, resulting in a potentially greater impact compared to larger enterprises (Sagala & Őri, 2026);(Abadi et al., 2021).

Also, AI allows for real-time information processing, which means companies may adapt their plans in real time according to the market developments (Barile et al., 2026);(Kalbuana, Suryati, et al., 2021). Some academic discourses also support the view that AI-enabled digital ecosystems increase the resilience of small- and medium-sized firms by using predictive analytics to develop more flexible decision-making processes. Artificial intelligence is configured as a strategic asset (including data, specialised skills and operational routines) as a basic pillar of the organisational resilience grounded in the resource-based approach and dynamic capability theory. (Jaturat et al., 2026);(Prasetyo, Aliyyah, Rusdiyanto, Utari, et al., 2021). Despite previous research examining aspects of this relationship, empirical evidence integrating resilience into an AI ecosystem model for SMEs in poor nations is still scarce (Ratanacharoenchai & Jantapoon, 2026);(Prasetyo, Aliyyah, Rusdiyanto, Suprapti, et al., 2021). These findings form the basis of the second hypothesis:

H2. Effect of AIE and OR.

2.3. Collaborative Development of Sustainable Value and SMEs Performance

Value co-creation denotes the joint endeavor by companies to produce enduring economic, social, and environmental benefits that facilitate sustainable development (Ngari & Kagereki, 2026);(Prasetyo, Aliyyah, Rusdiyanto, Suprapti, et al., 2021). The implementation of sustainable practices is often related to better performance in different aspects for small and medium-sized firms (Malesios et al., 2018);(Rusdiyanto et al., 2020). Empirical research also indicates that enterprises producing green products can enhance their environmental performance and at the same time earn competitive benefits in the market (Dangelico, 2016);(Prabowo et al., 2020). These benefits are generally manifested in enhanced consumer loyalty, superior brand reputation, and increased operational efficiency (Tran & Le, 2026);(Shan et al., 2026). Moreover, numerous empirical studies demonstrate that sustainable practices can yield cost savings, hence enhancing economic performance (Wu et al., 2026);(Hidayat et al., 2020).

The theories of community and stakeholder suggest that SMEs that implement socially responsible practices are more likely to gain public trust and improve stakeholder interactions, therefore improving sustainable performance (Heikkurinen, 2010);(Juanamasta et al., 2019). Moreover, AI-powered ecosystems augment the social dimensions of value co-creation by improving operational efficiency, enhancing coordination, and minimizing waste, therefore fostering favorable sustainability results. (Moro-Visconti et al., 2023). More recent studies also indicate that stakeholder involvement is a significant aspect in sustainable value creation among SMEs since it helps overcome resource restrictions and expands collaborative capacity (Ledesma Chaves et al., 2026). These results provide the basis for the third hypothesis.

H3. Effect SVC on SP

2.4. Organisational resilience and performance of SMEs

Organisational resilience is an essential competence for small and medium-sized firms operating in a dynamic and unpredictable market context (Martín-Rojas et al., 2023). This trait enables them to better predict, respond to and recover from operational disturbances. Moreover, resilient SMEs are generally better positioned to integrate sustainability into their basic strategies, hence enhancing

long-term profitability (İbrahimcioğlu & Kitapçı, 2025). Empirical research demonstrates that Moreover, these organisations have a greater ability to carry out sustainable activities, which at the same time increases their corporate reputation, stakeholder loyalty and financial results (López-Pérez et al., 2018). Such adaptive skill enables SMEs to create novel solutions in times of economic turbulence, simultaneously maintaining operational continuity in the short term and ensuring long-term sustainability (Do et al., 2022).

Organisational resilience is critical for sustainable performance, because resilient organisations are better able to embed sustainability into their fundamental business strategy (Keskin et al., 2026). In this study, sustainable performance includes economic, environmental and social aspects, which are becoming increasingly important for the survival of SMEs in stressed and uncertain contexts. Furthermore, resilient organisations are likely to follow sustainable practices, enhancing their reputation, customer loyalty, and financial success (Subekti et al., 2026). The dynamic capability approach sees resilience as an adaptive capacity that allows SMEs to respond successfully to market turmoil and maintain their long-term sustainability. Hence, the hypothesis is expressed as follows:

H4. Organisational resilience has a favourable impact on the sustainable performance.

2.5. Digital sophistication, AI-driven digital environments, and SVC

Organisational resilience is a cornerstone of sustainable performance and reflects the greater potential to include sustainability into core strategic planning in resilient businesses (Keskin et al., 2026). In this study, sustainable performance includes economic, environmental and social aspects, which are becoming increasingly important for the survival of SMEs in stressed and uncertain contexts. Furthermore, resilient organisations are likely to follow sustainable practices, enhancing their reputation, customer loyalty, and financial success (Subekti et al., 2026). Based on the dynamic capability concept, resilience is considered as an adaptive capacity that allows SMEs to effectively respond to market volatility and maintain long-term viability. So the hypothesis is expressed as follows:

H5. The effect of DM on the relationship between AIE and SVC.

2.6. Digital Proficiency, AI-Driven Digital Environments, and Operational Research

Digital maturity, as defined in Section 2.0, encompasses the organisational structures and skills that allow small and medium-sized enterprises to smoothly adopt AI-powered digital ecosystems, maintaining adaptability to reconfigure resources in response to unstable environmental factors. (Sohu et al., 2026). SMEs exhibiting advanced digital maturity in resource-constrained environments are more inclined to transform data and analytics produced by AI ecosystems into prompt sensing, seizing, and conversion actions, hence augmenting organisational resilience (Dwivedi et al., 2026). Moreover, SMEs with higher degrees of digital maturity are more likely to possess the necessary skills, resources, and cultural alignment to effectively embrace AI solutions, which in turn enhances their ability to adjust to environmental uncertainty (Tan et al., 2026). Hence, the hypothesis is expressed as follows:

H6. DM moderates the relationship between AIE and OR.

The development of hypothesis is based on the previous theoretical and empirical review, which shows that the current research is filling the gap in the literature on AI ecosystems, operational readiness, and supply chains of small and medium enterprises in developing countries, especially in Gresik, East Java. The study contributes to contextual and theoretical understanding of AI-enabled digital transformation in SMEs by integrating Resource-Based View, Dynamic Capability Theory, and Stakeholder Theory. Figure 1 illustrates the study framework based on this combination.

3. Methodology

3.1 Research Approach

This sort of inquiry is called a positivist method, because reality is only built from objective, quantifiable occurrences that may be discovered through science, empirical evidence and statistical analysis. The use of a quantitative methodology will enable the researcher to get numerical data which is appropriate for statistical analysis in the testing, exploring or refining of theory (Creswell & Creswell, 2017). This is an exploratory study on the relationship of specific constructs in the setting of SMEs in East Java. The survey approach is suitable for the empirical research of phenomena, especially when utilised in a cross-sectional design (Bell et al., 2022). The data analysis follows the standards of the PLS-SEM literature (Sarstedt et al., 2021) and employs confirmatory factor analysis (CFA) and bootstrapping.

3.2 Scale Development

The constructs of the research framework were operationalised through a structured questionnaire. Content validity was enhanced by developing all questionnaire items based on previous studies. To guarantee consistency in responses, responses were collected on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) against each statement. The AI-driven ecosystem (AIE) was measured with five elements adapted from (Sohu & Shaikh, 2026) to explore the function of AI-based ecosystems in facilitating operational efficiency, reducing cost, mitigating pollution, and increasing environmental efficiency. Digital maturity (DM) was measured by 6 factors taken from (Sohu & Shaikh, 2026) covering digital readiness, technology integration, adaptive capability and strategic alignment. Meanwhile, sustainable value co-creation (SVC) was operationalised with three things based on (Sohu & Shaikh, 2026). Organizational resilience was operationalized with six items borrowed from a prior study. Sustainable performance was measured with four items adapted from the same source (Sohu & Shaikh, 2026).

The conceptual structure of this study is presented in Figure 1. It shows the relationships between the independent and dependent variables and factors influencing the associations (Creswell & Creswell, 2017). This framework is significant because it helps guide the way in which data is processed and the way in which research findings are interpreted as seen below:

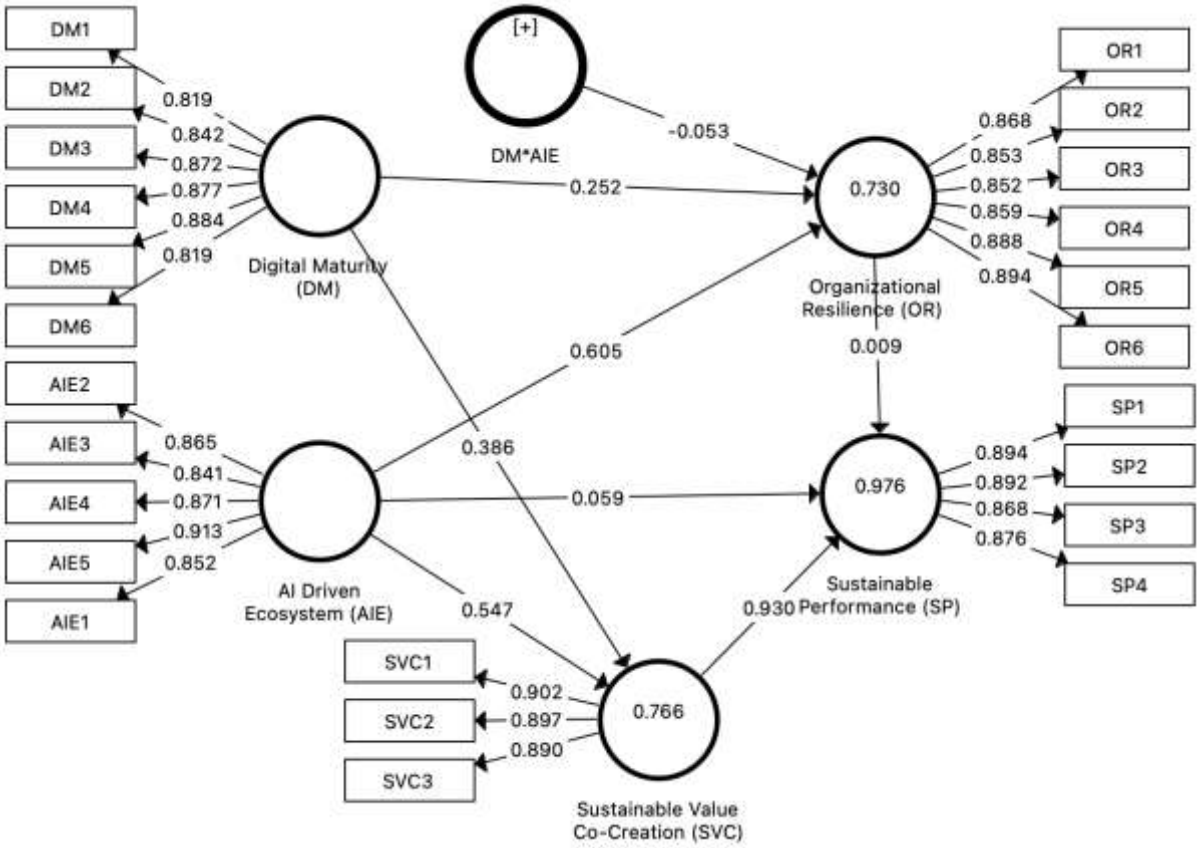

Figure 1: PLS-SEM Algorithm Model Framework

3.3 Sampling Procedure

A survey instrument was utilised in this study to collect primary data and the existing constructs were tailored to the entrepreneurial setting in Gresik Regency, East Java, Indonesia . Data were collected between 31 December 2025 and 30 April 2026. This sampling technique was employed to ensure that the population of SMEs was represented proportionally, as has been done in previous research in the entrepreneurship literature of Indonesia. The respondent data gathered from the Gresik Regency Industrial Service Portal, business associations, and official websites, then complemented by e-mail and telephone follow-up.

The study received endorsement from the Research Ethics Committee of the Institute for Research and Community Service, Indonesian College of Economics (STIESIA), located in Surabaya, East Java, Indonesia. Reference identifier: A.056/06/LP2MN/2026. SME proprietors and managers were informed both in writing and verbally to guaranty that the research adhered to ethical standards, highlighting voluntary participation, data confidentiality, and the right to withdraw at any moment, in compliance with Indonesia's research ethics regulations. A total of 151 surveys were completed and returned from 537 sent, a response rate of 28.12%. This is over the minimum needed sample size of 151 (Wolf & Baum, 2021). This sample size is regarded 'excellent', in the 100-300 range (Comrey & Lee, 2013). The non-response bias test was performed by comparing the first 50 and last 50 responses and no significant difference was seen (Sarstedt et al., 2021).

3.4 Respondent Demographics

We characterised the respondents by include respondent characteristics by division, such as gender, age, education level, and location/industry. All these qualities are introduced in this Table 1 below. This presentation was designed based on demographic segmentation approach, in accordance with the latest trend in Indonesian entrepreneurship research. The details therefore give a better picture of the respondents' demographic features and allow further assessment of parts of the sample.

Table 1: Demographic characteristics of the responders

Information	Demographics	Number (n=151)	Persentase (%)
Gender	Male	67	53
	Female	59	47
Age [in years]	< 25	32	11
	25–40	60	47
	40–55	51	40
	> 55	9	2
Educational qualification	Elementary School	1	1
	Middle School	5	4
	High School/Vocational School	79	63
	Diploma	9	7
	Bachelor's Degree	51	25
	Postgraduate Degree	5	4
Length of Business Establishment [in years]	< 3	30	24
	3–5	44	35
	5–10	34	27
	> 10	42	33
Type of business	Trade	89	71
	Services	18	14
	Production	14	11
	Other	5	4
Source of the author's work			

The study involved 151 respondents, consisting of 53% males and 47% females. Most respondents were aged 25–40 years (47%) and 40–55 years (40%). In terms of education, 63% held secondary or vocational diplomas, while 25% held bachelor's degrees. Respondents' business experience was dominated by the 3–5-year group (35%) and those with more than 10 years of experience (30%). The trade sector was the most dominant, accounting for 71% of firms. This composition indicates that the sample reasonably reflects the general characteristics of Indonesian SMEs.

3.6 Method of Data Analysis

Consequently, all analytical methodologies were devised to guaranty the validity, dependability, and resilience of the research model. The mediating effect was evaluated using SEM-PLS analysis using SmartPLS software (Sarstedt et al., 2021);(Ringle et al., 2020). Confirmatory factor analysis (CFA), assessment of inter-construct correlations, evaluation of multicollinearity (VIF < 5), reliability assessment (Cronbach's $\alpha > 0.7$; CR > 0.7; AVE > 0.5), validation of predictive relevance (Q2 > 0), examination of common method bias via HTMT (< 0.85), and structural model analysis to ascertain the significance of path coefficients utilizing 5,000-subsample bootstrapping (Kock & Hadaya, 2018). Consequently, all analytical methods have been formulated to ensure the validity, reliability, and resilience of the research model.

3.7 Bias Control

The present research employs procedural and statistical safeguards to mitigate the possible common method bias (CMB) inherent in organizational behavior studies. Throughout the data gathering process, participants were guarantyd that their information would remain confidential and would not be disclosed to external entities without their consent. The singular factor analysis for CMB indicated that one factor represented 45.07% of the overall variance, which is below the 50% threshold. Moreover, the VIF values of the constructions were below 3.3, indicating the absence of significant common method bias (CMB). (Kock, 2015);(Sarstedt et al., 2021). The assessment of endogeneity utilizing the Gaussian copula method produced statistically insignificant results, suggesting the model experiences little endogeneity issues (Kock, 2017).

4. Research results and Findings

4.1. Measurement Model and Confirmatory Factor Analysis Results

The statistical analysis was performed in several steps using the two-stage technique suggested by (Gerbing, 1988) to guarantee a thorough assessment of the model's quality. The initial phase involved a confirmatory factor analysis (CFA) utilising SmartPLS-SEM to assess the measurement model and determine the validity and reliability of the indicators. The next phase analysed the structural relationships among the latent constructs for deeper causal insights. This process was finalised prior to the assessment of the structural model and aligns with contemporary criteria for PLS-SEM (Sarstedt et al., 2021). The CFA results and measurement properties are summarized in Table 2.

Table 2: Measurement Model and Confirmatory Factor Analysis Results.

Constructs and the sources of the measures	VIF Value	Standardized Loadings	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
AI Driven Ecosystem			0.919	0.920	0.939	0.755
AIE1	2.739	0.852				
AIE2	2.840	0.865				
AIE3	2.383	0.841				
AIE4	3.092	0.871				
AIE5	2.900	0.913				
Digital Maturity			0.925	0.927	0.941	0.727
DM1	2.277	0.819				
DM2	2.660	0.842				
DM3	2.871	0.872				
DM4	3.200	0.877				
DM5	3.372	0.884				
DM6	2.478	0.819				
Organizational Resilience			0.935	0.936	0.949	0.756
OR1	3.130	0.868				
OR2	2.898	0.853				
OR3	2.819	0.852				
OR4	2.696	0.859				
OR5	2.816	0.888				
OR6	2.714	0.894				
Sustainable Performance			0.906	0.908	0.934	0.779
SP1	2.807	0.894				
SP2	2.806	0.892				
SP3	2.380	0.868				
SP4	2.709	0.876				
Sustainable Value Co-Creation			0.878	0.878	0.925	0.803
SVC1	2.484	0.902				
SVC2	2.406	0.897				
SVC3	2.319	0.890				
Source of the author's work						

The assessment model is presented in Table 2 and shows good psychometric qualities. All constructs meet the recommended criteria for reliability and convergent validity . Cronbach's alpha (0.878–0.935), rho_A (0.878–0.936), composite reliability (0.925–0.949), and the average variance extracted (AVE; 0.727–0.803) are all above the required criteria, indicating good internal consistency and convergent validity (Cheah et al., 2026);(Buberwa, 2026) . In addition, the high standardized loadings,

ranging from 0.819 to 0.913, indicate that each indicator strongly reflects its construct, while the indicator VIF values of 2.277–3.372 suggest no serious multicollinearity issues (Cheah et al., 2026);(Buberwa, 2026). Accordingly, the AIE, DM, OR, SP, and SVC instruments are valid and reliable for subsequent structural analysis.

4.2 Correlation, Multicollinearity, Reliability

Descriptive statistics, standard deviation, zero-order correlations, multicollinearity tests and concept reliability tests were calculated. The Fornell-Larcker criterion and the heterotrait-monotrait ratio satisfy the discriminant validity of the PLS-SEM model. The commonly acknowledged standards were met which shows that the constructs are distinct and that the bias is not confounding.

Table 3: Descriptive statistics: means, standard deviations, zero-order correlations

Variable	Mean	Standard Dev	[AIE]	[DM]	[OR]	[SP]	[SVC]
Fornell-Larcker Criterion							
“AI Driven Ecosystem”	3.841	0.900	0.769				
Digital Maturity	3.894	0.893	0.751	0.853			
Organizational Resilience	3.801	0.949	0.832	0.746	0.769		
Sustainable Performance	3.861	0.963	0.845	0.800	0.850	0.783	
Sustainable Value Co-Creation	3.861	0.963	0.837	0.797	0.851	0.787	0.796
Heterotrait-Monotrait Ratio							
AI Driven Ecosystem	3.841	0.900					
Digital Maturity	3.894	0.893	0.811				
Organizational Resilience	3.801	0.949	0.796	0.798			
Sustainable Performance	3.861	0.963	0.824	0.772	0.819		
Sustainable Value Co-Creation	3.861	0.963	0.830	0.782	0.837	1.805	
Source of the author's work							

The table 3 indicates high mean values, namely AIE 3.841 (SD = 0.900), DM 3.894 (0.893), OR 3.801 (0.949), SP 3.861 (0.963), and SVC 3.861 (0.963). Fornell-Larcker criterion supports discriminant validity as the diagonal values are higher than the inter-construct correlations. The Heterotrait-Monotrait ratios are all below the cut-off point of 0.90, indicating the distinctiveness of the constructs (Osei et al., 2026);(Cheah et al., 2026).

4.3. Model Predictive Precision

The predictive accuracy of the model was assessed using R2 (Coefficient of Determination), Q2 (Predictive Relevance) and f2 (Effect Size). These are designed to test the capacity of the model to explain endogenous variance and to predict out-of-sample as specified in the accompanying table.

This is consistent with standard PLS-SEM techniques for assessing explanatory power and prediction utility (Sarstedt et al., 2021).

Table 4: R^2 and adjusted R^2; Q^2 Predict

Variable	R^2	Adjusted R^2	Q^2 predict	RMSE	MAE	Effect Size
Organizational Resilience	0.730	0.724	0.724	0.533	0.403	Large
Sustainable Performance	0.976	0.976	0.771	0.485	0.386	Large
"Sustainable Value Co-Creation"	0.766	0.762	0.757	0.498	0.394	Large
Source of the author's work						

The table 4 shows that the model has very strong explanatory power. Organizational Resilience has an R^2 of 0.730 and adjusted R^2 of 0.724, with Q^2 predict of 0.724, RMSE of 0.533, MAE of 0.403, and a large effect size. Sustainable Performance has an R^2 of 0.976 and adjusted R^2 of 0.976, with Q^2 predict of 0.771, RMSE of 0.485, MAE of 0.386, and a large effect size. Sustainable Value Co-Creation is also high, with R^2 of 0.766, adjusted R^2 of 0.762, Q^2 predict of 0.757, RMSE of 0.498, MAE of 0.394, and a large effect size. These results indicate excellent explanatory and predictive power of the model (Cheah et al., 2026).

Table 5: $f^{2.}$ Evalaution

Variable	OR	SP	SVC
"AI Driven Ecosystem"	0.569	0.035	0.556
"Digital Maturity"	0.394		0.377
"Organizational Resilience"		0.301	
"Sustainable Value Co-Creation"		0.340	
Source of the author's work			

The table 5 indicates that AI Driven Ecosystem (AIE) has a large effect on Organizational Resilience (f^2 = 0.569) and Sustainable Value Co-Creation (f^2 = 0.556), but only a small effect on Sustainable Performance (f^2 = 0.035). Digital Maturity (DM) also shows large effects on OR (f^2 = 0.394) and SVC (f^2 = 0.377). Organizational Resilience has a moderate effect on SP (f^2 = 0.301), while SP has a moderate effect on SVC (f^2 = 0.340). These f^2 values indicate the relative strength of the relationships according to PLS-SEM criteria (Lenz et al., 2026);(Cheah et al., 2026).

4.4 Common Method Bias Assessment

Nevertheless, since the survey data were self-reported, analytical integrity must be maintained by comprehensive common method bias (CMB) tests (Podsakoff et al., 2012). CMB screening using Harman's single-factor test accounting for 24.67% of variance (less than 50%) showed CMB was not a threat. In a further validity test the latent variable approach inner VIF <3 have been produced (Harman, (Hair Jr et al., 2020) which indicates the absence of validity concerns. The threshold of 3 indicates absence of common method bias (Kock, 2015).

4.5 Outcome Evaluation of Bootstrapping Structural Models

The structural model was evaluated by route analysis, confirmatory factor analysis, and assessment of the measurement properties using bootstrapping methods (5,000 iterations) as shown in the following table (Ma et al., 2026). Bootstrapping is a nonparametric procedure that is employed to determine the statistical significance of path coefficients and other estimations in PLS-SEM according to recent criteria for inference in variance-based SEM (Pham & Vu, 2024), They then follow existing reporting criteria of PLS-SEM and the typical approach of formulating hypothesized relationships, first testing measurement invariance and fitting the model (Ostic et al., 2021).

Table 6: Results of direct, indirect and moderating hypothesis testing [bootstrapping]

Relationships	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values	Result
Direct Effect						
H1_AIE -> OR	0.605	0.605	0.069	8.805	0.000***	Support
H2_AIE -> SP	0.059	0.057	0.026	2.290	0.022**	Support
H3_AIE -> SVC	0.547	0.548	0.071	7.710	0.000***	Support
H4_DM -> OR	0.252	0.256	0.076	3.300	0.001***	Support
H5_DM -> SVC	0.386	0.386	0.071	5.422	0.000***	Support
H6_OR -> SP	0.309	0.310	0.026	4.367	0.071*	Support
H7_SVC -> SP	0.930	0.931	0.024	39.367	0.000***	Support
Moderation						
H7_DM*AIE -> OR	0.553	0.548	0.032	3.651	0.009*	Support
Mediating						
H8_AIE -> OR -> SP	0.506	0.506	0.016	6.362	0.008**	Support
H9_DM -> OR ->SP	0.352	0.350	0.067	5.351	0.006**	Support
H10_AIE -> SVC -> SP	0.509	0.510	0.066	7.765	0.000***	Support
H11_DM -> SVC -> SP	0.359	0.360	0.068	5.289	0.000***	Support

*Note: ***sig<0,01 (1%), **sig<0,05 (5%) *sig<0,1(10%); Source of the author's using SmartPLS*

The table 6 bootstrapping results show that all tested direct, mediating, and moderating relationships are supported. AI Driven Ecosystem (AIE) significantly affects Organizational Resilience (OR) with a coefficient of 0.605, t=8.805, and p=0.000***, and Sustainable Performance (SP) with a coefficient of 0.059, t=2.290, and p=0.022**. AIE also has a strong effect on Sustainable Value Co-Creation (SVC) with a coefficient of 0.547, t=7.710, and p=0.000***. Digital Maturity (DM) positively affects OR

(0.252; t=3.300; p=0.001***) and SVC (0.386; t=5.422; p=0.000***). OR also affects SP (0.309; t=4.367; p=0.071), while SVC exerts the strongest effect on SP (0.930; t=39.367; p=0.000***).

For the moderation effect, the DM*AIE interaction on OR is 0.553 with t=3.651 and p=0.009*, indicating that DM strengthens the influence of AIE on organizational resilience. For indirect effects, AIE influences SP through OR by 0.506 (t=6.362; p=0.008) and through SVC by 0.509 (t=7.765; p=0.000). DM also shows indirect effects through OR (0.352; t=5.351; p=0.006**) and through SVC (0.359; t=5.289; p=0.000***). These findings confirm that bootstrapping in PLS-SEM is effective for testing path, mediation, and moderation significance in a nonparametric way (Cheah et al., 2026).

In contrast to the contour lines shown in the structural model in Figure 2, this visualization offers a more direct picture of the distributions and patterns produced by the bootstrapping procedure. The presentation helps to grasp the predicted analytical results. Moreover, the visualization matches the tabulated data, and it increases the trustworthiness and robustness of the research conclusions according to the requirements of scientific publication.

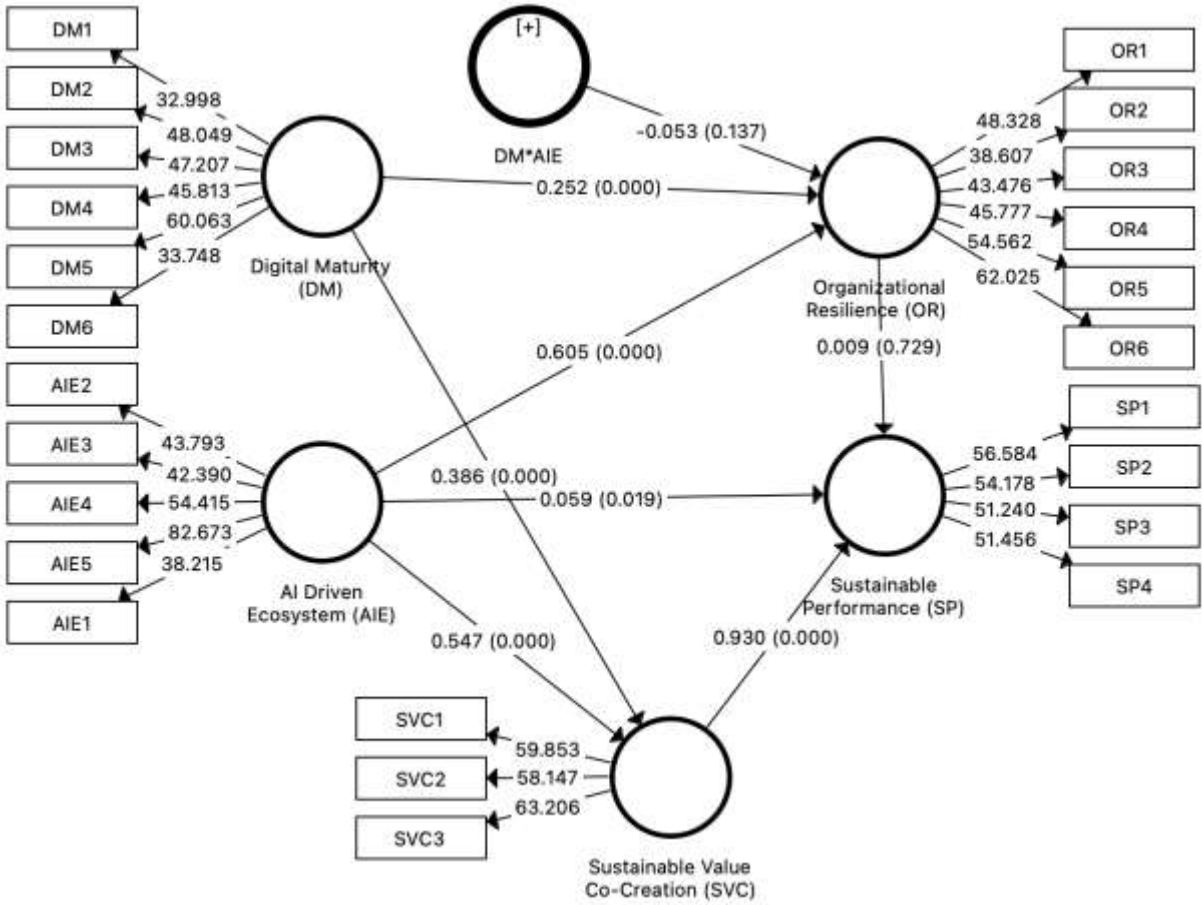

Figure 2: Structural Models [Bootstrapping]

5. Discussion

This study examines the mediating role of organizational resilience and sustainable value co-creation in the relationship between AI-driven ecosystems and sustainable performance, and the moderating effect of digital maturity in the Indonesian SME sector. The findings indicate that digital maturity plays a crucial role in enhancing organizational resilience and fostering sustainable value co-creation.

The two elements significantly enhance the achievement of sustainable performance in manufacturing SMEs (Ying et al., 2026);(Aftab et al., 2026). These findings support the notion that firms exhibiting higher digital maturity are more adept at reallocating resources, participating in ecosystem collaboration, and converting technological investments into sustainability-focused results (Li & Zhang, 2026).

Organisational resilience is widely recognised as a key driver for sustainable performance, especially for SMEs operating in conditions of resource scarcity and market instability (Ooi & Memon, 2025). This study enhances current understanding by finding resilience as a significant mediating variable linking digital maturity to organisational outcomes a link that has hitherto been under-investigated. Furthermore, the effect of AI-based ecosystems on sustainability is mainly indirect, operating mainly through the strengthening of resilience measures and the enhancement of stakeholder-oriented value co-creation (B.-N. Hwang et al., 2025).

The level of digital maturity has an impact on the extent to which SMEs can harness the benefits of AI-driven digital ecosystems. This reflects the larger idea that the value of an ecosystem improves with the effectiveness of organizations in integrating digital resources (Mohsen et al., 2026)). However, the moderating effect is of moderate degree, which means that digital maturity alone is not enough as primary driver; leadership, organisational culture and governance are still needed to optimise its benefits (El Gadrouri et al., 2026).

Unlike previous studies that mostly examine these components in isolation, this study provides an integrated model that sheds light on the intricate interdependencies among AI-powered digital ecosystems, digital maturity, and value co-creation (Sohu et al., 2026). The findings further expand those of (Sharma & Dang, 2026) who exhibited the direct impact of AI on performance. In SMEs within emerging markets, the relationship is more intricate, as it is mediated by organisational resilience and the development of shared value. Thus, the resource-constrained environment of East Java, Indonesia, is vital to understand why the influence of digital ecosystems is not linear but contingent on digital preparedness and internal organisational mechanisms (Gabelaia & Hendieh, 2026).

Although the adoption of AI-enabled digital ecosystems offers promising opportunities for boosting sustainable performance in Indonesian manufacturing SMEs, several hurdles still exist for their implementation. The main challenges are the lack of people resources with the appropriate digital skills, lack of technological infrastructure, and opposition to organizational change. In addition, the formation of an AI ecosystem demands a large number of investments in terms of both money and time, which is a huge challenge for SMEs with limited cash. Another difficulty is the absence of understanding and trust in the ethical and secure use of data, which can cause fears about the integration of AI into business processes. The practical ramifications of the findings highlight the necessity to adopt strategies to enhance technological literacy, support infrastructure and an adaptive organizational culture to use the full capabilities of AI by SMEs. It is also necessary to work together across sectors, such as government and educational institutions, to speed up sustainable digital transformation.

5.1. The Practical implications

This study has important implications for SME operators, especially in East Java, Indonesia, where digital transformation is a strategic imperative rather than a discretionary endeavor. The findings show that digital maturity is the most important enabling factor since it enhances organizational resilience and supports sustained value co-creation. Furthermore, sustainable value co-creation is the most effective method to achieve sustainable performance. Consequently, SMEs should not anticipate sustainability advantages solely from AI implementation. Instead, businesses should progressively integrate AI ecosystems by first developing digital routines, then developing resilience and subsequently co-developing value with stakeholders.

Digital maturity is the basic prerequisite for the resilience and long-term sustainability of resource-constrained SMEs. Therefore, these organisations should leverage cost effective, high impact technologies that can expand with their developing capabilities such as cloud services, core analytics and mobile platforms. This structured approach includes a full review of processes, data and existing capabilities; appointing a dedicated digital lead; identifying a pilot high-impact AI application; establishing resilience protocols; and scaling up stakeholder-centric co-creation projects that are aligned with recognised sustainability metrics.

The increasing uptake of digital technologies requires an extensive regulatory framework, including targeted digital vouchers, subsidized training programs, cluster-based collaboration platforms and financial incentives to encourage sustainable and circular economic models. In addition, partnering with AI solution providers can assist SMEs leverage predictive analytics to boost adaptability, decrease risk and enhance the quality of decision making. In general, a lean, flexible and outcome-oriented managerial strategy is critical to enable SMEs to survive and flourish in a quickly expanding digital economy.

5.2. Theoretical implications

This research contributes to the Resource-Based View by proving that competitive advantage for SMEs in the digital economy goes beyond traditional physical assets. It highlights the crucial significance of ecosystem-enabled information resources such as data access, analysis skills, and partner communication networks. Digitally advanced methods that facilitate SMEs in mobilising resources more efficiently. Consequently, digital maturity is a crucial factor influencing capability development and sustainability results in resource-limited contexts.

The findings, expanding Dynamic Capability Theory (DCT), suggest that digital maturity is a border condition that enhances the link between participation in the AI ecosystem and organisational resilience. In other words, SMEs with high levels of digital maturity are better able to efficiently implement sensing, seizing and reconfiguring processes. It is worth noting that the moderate size of the moderating effect means that digital maturity enhances the relationship, but does not totally replace the requirement for complementing competencies such as leadership, organisational culture, and governance.

Moreover, this research advances the Stakeholder Theory by showing that the best explanation of sustainable performance is through processes of stakeholder participation. This concept defines

sustainable value co-creation as a measurable process in which stakeholder value is derived from the transformation of digital capabilities and resilience into triple bottom line results. The study offers a mechanism-based explanation, via organisational resilience and sustainable value co-creation, and a boundary-condition explanation, through digital maturity, about how AI-based ecosystems enhance sustainable performance in SMEs within emerging economies.

5.3. Limitations and future research

Despite the substantial contributions of this study, there are numerous drawbacks that are worth mentioning. Future study could overcome these constraints by examining more particular types of digital transformation of SMEs actors. There is also a need for longitudinal studies to test causal linkages more robustly. A comparison of regions would also help understand the relationship between resilience and the performance of SMEs influenced by cultural and economic factors. The incorporation of additional factors, including digital ethics and algorithmic openness, could enhance the model and yield a more comprehensive understanding of the transformative effects of AI ecosystems.

6. Conclusions

This research investigates the intermediary functions of organizational resilience and sustainable value co-creation in the connection between AI-driven ecosystems and sustainable performance in Indonesian SMEs, with digital maturity acting as a moderating factor. Findings from partial least squares structural equation modeling indicate that digital maturity is a vital factor influencing organizational resilience and the creation of shared value, which are fundamental processes for achieving sustained success.

The results indicate that the deployment of adaptive and collaborative strategies in addition to technological implementation is necessary for the success of digital transformation in small and medium-sized organisations. The manuscript formulates an elaborate framework for connecting digital transformation initiatives with corporate sustainability goals thru the amalgamation of the Resource-Based View, Dynamic Capability Theory, and Stakeholder Theory.

This research highlights the necessity for gradual digital transformation, cooperative value generation including stakeholders, and effective innovation tactics among resource-limited SMEs. The findings indicate a necessity for specific programs aimed at policymakers to enhance the digital readiness, resilience, and sustainability capacities of SMEs in the future.

This work fills an important gap in the literature and also ties the empirical findings to global sustainability goals. As so, it offers actionable insights for academics, practitioners and policy makers that attempt to steer SMEs digitalisation in a dynamic and unpredictable climate. Future research may encompass a wider range of businesses and international comparisons to substantiate the global applicability of findings about the role of digital ecosystems in bolstering resilience and sustainability.

Author Contributions

EAS, YOL, ETW, NFA, R, M, AW, and MA collaboratively participated in composing the manuscript, analyzing the data, and finalizing the work. They formulated the research hypothesis, established the

theoretical framework, and oversaw the comprehensive monitoring of the study. They monitored the progression of the research and the suitability of its methods. The conclusive manuscript underwent examination and modification by EAS, YOL, ETW, NFA, R, M, AW, and MA prior to its submission to the journal.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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"Authors independently selected methods, collected data, and performed PLS-SEM statistical analysis and interpreted the findings in designing, executing, and analyzing this research. We employed ChatGPT solely for cleaning up language, paraphrasing, and en-hancing wording and coherence, while not allowing it to affect the scientific message. The authors bear full responsi-bility for the use of the data and methods and for the paper itself. Independent English language services edited the manuscript professionally to meet the requirements of international journal publication"

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