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Sustainability Performance In Cooperatives: The Mediating Role Of Sustainable Competitive Advantage Between Entrepreneurial Orientation And Knowledge Management

Raisa Dyanny Salahuddin^{1*}, Yesi Mutia Basri¹, Poppy Nurmayanti M¹, Hariadi Yasni¹, Gusnardi¹

AFFILIATION:

¹Department of Accounting, Faculty of Economics and Business, University of Riau, Pekanbaru, Riau, Indonesia

***CORRESPONDENCE:**

dyannysraisa@gmail.com

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Research aims:

This study aims to analyze the role of entrepreneurial orientation and knowledge management in improving sustainability performance by considering sustainable competitive advantage as a mediating variable.

Design/Methodology/Approach:

This study was conducted on cooperatives in Kampar Regency, Riau Province, involving 175 respondents selected using a purposive sampling technique as primary data sources collected through questionnaires. The data were analyzed using the Partial Least Squares–Structural Equation Modeling (PLS-SEM) method with the help of SmartPLS 4 software.

Research findings:

The results show that entrepreneurial orientation and knowledge management have a direct effect on sustainability performance and also have an indirect effect through the enhancement of sustainable competitive advantage.

Theoretical contribution/ Originality:

These findings support the resource-based perspective by emphasizing the importance of managing internal organizational resources to achieve sustainability performance.

Practitioner/Policy implication:

This study provides empirical evidence from the context of developing countries with complex socio-ecological characteristics and can serve as a basis for strengthening strategies related to entrepreneurial orientation, knowledge management, and sustainable cooperative governance in Riau Province and similar regions.

Research limitation/Implication:

This study is limited to cooperatives in Kampar Regency, which may restrict the generalizability of the findings to other sectors or regions with different characteristics. Future research is recommended to expand the scope of study and include additional variables or contexts.

Keywords: Entrepreneurial Orientation, Knowledge Management, Sustainable Competitive Advantage, and Sustainability Performance.

Introduction

The issue of sustainability has become a major concern due to the negative impacts of globalization on the environment. Every organization, including cooperatives, is required to design sustainable business strategies. Global initiatives such as the Sustainable Development Goals (SDGs), Environmental, Social, and Governance (ESG) standards, and decarbonization policies urge organizations to balance economic objectives with long-term sustainability (United Nations, 2024; OECD, 2024). In Indonesia, this commitment is reinforced through Presidential Regulation No. 111 of 2022 on SDGs implementation.

Sustainability is not only a moral obligation but also a source of competitive advantage. Organizations with strong sustainability performance can attract talented employees and enhance innovation (Sari & Soelton, 2024). Sustainability performance reflects an organization's ability to maintain economic, social, and environmental balance (Marpaung et al., 2024).

In the cooperative context, cooperatives play a vital role in economic growth, community empowerment, and social equity (Ridloah et al., 2024). However, many cooperatives in developing countries still struggle to adopt sustainability practices comprehensively (Fakhri & Selvaratnam, 2025; Hernández-Trasobares & Murillo-Luna, 2025). Existing studies mainly focus on corporations in developed countries, leaving limited empirical evidence on cooperative sustainability (Basri et al., 2023; Lashitew & Rosca, 2025).

According to the recapitulation of cooperative data across regencies/cities for the 2025 fiscal year published by the Department of Industry, Trade, Cooperatives, and SMEs of Riau Province, Kampar Regency represents a relevant research context due to its strong reliance on the plantation sector. The data indicate that out of 639 registered cooperatives, 245 are inactive, reflecting issues related to weak governance and sustainability. These conditions are often associated with internal conflicts, limited managerial capacity, and distribution inefficiencies that ultimately reduce members' income.

This study examines entrepreneurial orientation and knowledge management as key determinants of sustainability performance. Entrepreneurial orientation reflects innovative and proactive decision-making (Rahmat et al., 2023), while knowledge management supports effective information utilization to improve performance (Fakhrunnisa et al., 2023). However, their effects remain inconsistent, especially in cooperative settings.

Research on entrepreneurial orientation has predominantly focused on SMEs and shows mixed results. Several studies report a significant effect on performance (Fakhrunnisa et al., 2023; Ikhwan & Riono, 2021; Mashuri & Moko, 2024; Wati et al., 2022; Yaskun et al., 2023), while others find insignificant effects (Ahmatang & Sari, 2022; Wijaya & Widjaja, 2023), indicating inconsistency in findings. Meanwhile, cooperatives have distinct characteristics due to their membership-based structure and social values, making it important to examine this relationship in the cooperative context. Similarly, studies on knowledge management also report inconsistent results in both SME (Mashuri & Moko, 2024; Santoso, 2021) and BUMDes contexts (Wati et al., 2022), suggesting that its impact is context-dependent. Therefore, it is important to further examine the roles of entrepreneurial orientation and knowledge management in the context of cooperatives.

Various studies have demonstrated that entrepreneurial orientation and knowledge management positively influence organizational performance. However, empirical findings remain inconsistent. In the context of cooperatives, which emphasize economic, social, and governance aspects, sustainability performance is a more comprehensive measure than financial performance alone. This indicates the potential role of an intervening variable that mediates the relationship between entrepreneurial orientation, knowledge management, and sustainability performance. In this regard, sustainable competitive advantage is proposed as a mediating variable. Drawing on the Resource-Based View (RBV), competitive advantage is

derived from valuable, rare, inimitable, and non-substitutable resources (Wernerfelt, 1984). Entrepreneurial orientation and knowledge management are therefore viewed as strategic capabilities that strengthen cooperative competitiveness and contribute to enhanced sustainability performance.

This study contributes theoretically by developing a framework linking entrepreneurial orientation, knowledge management, and sustainability performance. Empirically, it provides evidence from a developing country context, while practically offering insights for strengthening cooperative governance and sustainability strategies in Riau and similar regions.

Literature Review and Hypothesis Development

Resource Based View Theory (RBV)

Theory *Resource Based View* (RBV) was first pioneered by Wernerfelt, (1984) in his work entitled “*A resourced-based view of the firm*”. This theory states that resources and capabilities are very important for the company, because they are the basis of the company's competitiveness and performance based on the resources the company has (Wernerfelt, 1984).

According to Fakhrunnisa et al., (2023) The RBV theory stems from the principle that the main resources for creating a competitive advantage come from their internal environment. In the context of cooperatives, RBV is the basis that explains that entrepreneurial orientation and knowledge management are company resources in managing companies that have a value and potential.

Entrepreneurial Orientation and Sustainability Performance

Entrepreneurial orientation refers to a firm's tendency to innovate, act proactively, and take risks in pursuing new opportunities (Lumpkin & Dess, 1996; Miller, 2011). It is commonly measured through three dimensions: innovativeness, proactiveness, and risk-taking, which reflect a firm's ability to compete and adapt in dynamic environments.

Based on the study by Halik et al., (2025), risk-taking capability was found to be the most dominant factor in driving business sustainability. Entrepreneurs are willing to try new approaches, explore uncertain markets, and develop innovative products despite the possibility of failure. They demonstrate courage in facing challenges, including producing goods that have never been created before.

From the Resource-Based View (RBV), entrepreneurial orientation represents a strategic internal capability that can enhance organizational performance (Wernerfelt, 1984). In the context of cooperatives, it enables leaders to respond to uncertainty, explore new opportunities, and sustain long-term performance.

Empirical studies consistently show that entrepreneurial orientation positively influences sustainability performance (Anisa et al., 2023; Halik et al., 2025; Nuraini & Didit Darmawan, 2024; Putra & Utama, 2022). Therefore, the following hypothesis is proposed:

H₁: Entrepreneurial Orientation has a positive effect on Sustainability Performance.

Knowledge Management and Sustainability Performance

Knowledge management refers to activities related to acquiring, utilizing, and transferring knowledge within an organization (Ardia et al., 2025). It supports sustainable practices across economic, social, and business dimensions, contributing to long-term organizational goals (Shofiyani et al., 2024).

From the Resource-Based View (RBV), knowledge is a valuable and inimitable internal resource that drives competitive advantage and long-term performance. In cooperatives, knowledge is developed through training, mentoring, and collaboration, and its effective application enhances problem-solving and organizational adaptability (Ardia et al., 2025). Empirical studies show that knowledge management positively influences sustainability performance by improving decision-making and strategic capabilities (Ardia et al., 2025; Fakhrunnisa et al., 2023; Rahmat et al., 2023). Therefore, the following hypothesis is proposed:
H₂: Knowledge Management has a positive effect on Sustainability Performance.

Entrepreneurial Orientation and Sustainable Competitive Advantage

Entrepreneurial orientation is considered a key driver of sustainable and competitive organizational growth, as it encourages firms to continuously innovate and develop new products (Feriyansyah & Febriansyah, 2023). From the Resource-Based View (RBV), entrepreneurial orientation represents an intangible capability that can generate sustainable competitive advantage (Wernerfelt, 1984).

Empirical studies confirm that entrepreneurial orientation positively influences sustainable competitive advantage (Dahana et al., 2020; Tirtayasa, 2022; Yaskun et al., 2023; Basri et al., 2024). In the context of cooperatives, it enables organizations to create unique value through innovation, proactiveness, and risk-taking. Therefore, the following hypothesis is proposed:

H₃: Entrepreneurial Orientation has a positive effect on Sustainable Competitive Advantage

Knowledge Management and Sustainable Competitive Advantage

Knowledge management becomes effective when organizations can capture, store, and disseminate knowledge efficiently. Limited knowledge, inadequate human resources, and lack of technological support may hinder performance, particularly in a dynamic and competitive environment (Masbullah, 2023).

From the Resource-Based View (RBV), knowledge is a valuable and inimitable resource that drives sustainable competitive advantage. Effective knowledge management supports organizational learning, innovation, and adaptability (Shofiyani et al., 2024). Empirical studies confirm its positive influence on sustainable competitive advantage (Ardia et al., 2025; Sitiari et al., 2024; Sulastri & Satispi, 2021). Therefore, the following hypothesis is proposed:

H₄: Knowledge Management has a positive effect on Competitive Advantage Sustainable.

Sustainable Competitive Advantage and Sustainability Performance

Competitive advantage refers to an organization's ability to outperform competitors through effective resource utilization (Porter, 1985). Based on RBV, sustainable competitive advantage arises from valuable, rare, inimitable, and non-substitutable resources (Beigi et al.,

2023). In dynamic environments, such advantages enable organizations to remain adaptive and achieve long-term sustainability (Teece et al., 1997).

In cooperatives, sustainable competitive advantage enhances economic, social, and environmental performance. Previous studies confirm its positive effect on sustainability performance (Dahana et al., 2020; Marpaung et al., 2024; Yaskun et al., 2023). Thus, the following hypothesis is proposed:

H₅: Sustainable Competitive Advantage has a positive effect on Sustainability Performance.

The Mediating Role of Sustainable Competitive Advantage between Entrepreneurial Orientation and Sustainability Performance

Entrepreneurial orientation is considered an intangible organizational resource that contributes to the creation of competitive advantage. Based on the Resource-Based View (RBV), sustainable competitive advantage can be achieved through valuable, rare, inimitable, and non-substitutable resources, which ultimately improve organizational performance (Wernerfelt, 1984). Entrepreneurial orientation influences performance when organizations are able to strategically acquire, develop, and utilize their resources to exploit opportunities and strengthen their competitive position (Fakhrunnisa et al., 2023).

In the context of cooperatives, entrepreneurial orientation enables organizations to create unique value through innovation, proactiveness, and risk-taking. This allows cooperatives to develop product differentiation, improve market positioning, and respond more effectively to changing market conditions (Tirtayasa, 2022).

Previous studies have shown that competitive advantage plays a mediating role in the relationship between entrepreneurial orientation and sustainability performance (Dahana et al., 2020; Kiyabo & Isaga, 2020). Based on this explanation and supported by RBV theory, sustainable competitive advantage can be considered a mechanism that strengthens the influence of entrepreneurial orientation on sustainability performance. Therefore, the following hypothesis is proposed:

H₆: Sustainable Competitive Advantage mediates the effect of Entrepreneurial Orientation on Sustainability Performance.

The Mediating Role of Sustainable Competitive Advantage between Knowledge Management and Sustainability Performance

Knowledge management emphasizes the role of knowledge as a foundation for organizational activities and long-term sustainability (Santoso, 2021). From the RBV perspective, knowledge is a valuable and inimitable strategic resource that can enhance competitive advantage and organizational performance (Shofiyani et al., 2024).

In cooperatives, effective knowledge management supports the development of competitive advantage through improved decision-making, innovation, and efficiency. The integration of knowledge with social and environmental values also enables organizations to create sustainable and competitive business practices (Beigi et al., 2023).

Empirical studies indicate that knowledge management significantly influences sustainable competitive advantage and plays a mediating role in improving sustainability performance

(Elistia et al., 2024; Fakhrunnisa et al., 2023). Thus, sustainable competitive advantage acts as a key mechanism linking knowledge management to sustainability performance. Therefore, the following hypothesis is proposed:

H7: Sustainable Competitive Advantage mediates the effect of Knowledge Management on Sustainability Performance.

Research Methods

Population and sampling techniques

The population in this study comprises cooperatives operating within Kampar Regency, Riau Province, Indonesia. According to data from the Riau Provincial Office of Cooperatives and SMEs (2025), there are a total of 639 cooperatives registered in Kampar Regency, encompassing both active and inactive organizations. This region was specifically chosen as the focus of the study because it represents the core economic profile of Riau Province, which is largely dominated by agricultural, plantation, and fisheries activities, making it an ideal context for examining cooperative performance and sustainability practices.

This study employed a purposive sampling technique, defined as a sampling method based on specific criteria (Sugiyono, 2022). The sampling criteria included cooperatives that were active and still operating in 2025, had been established for more than two years, and respondents who were cooperative managers. Based on the Slovin formula with a 10% margin of error, the targeted sample consisted of 86 cooperatives or 258 respondents. However, only 175 questionnaires were returned and considered valid for analysis.

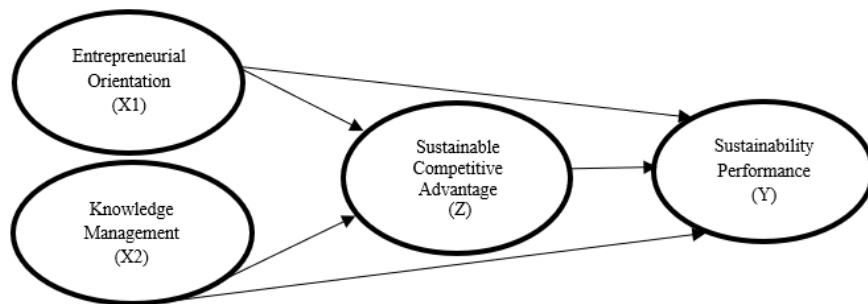


Figure 1. Research model

Data were collected by distributing questionnaires to cooperative managers, including chairpersons, secretaries, treasurers, and business unit managers. Each cooperative received two to three questionnaires, distributed either directly or via Google Forms. The instrument was adapted from previously validated questionnaires and further tested for validity and reliability to ensure its suitability for this study.

Prior to participation, respondents were informed about the research objectives, procedures, and their rights, including the option to withdraw at any time without consequences. Consent was obtained either orally or in writing and properly documented. All research procedures adhered to ethical standards and received approval from the Center for Socio-Economic Research, Universitas Riau (License No. 002/UN19.5.1.3/PSSE/2025).

Variable Measurement

The measurement of variables in this study employed a 5-point Likert scale, using an ordinal scale ranging from 1 (strongly disagree) to 5 (strongly agree). Each construct was measured reflectively and adapted from empirically validated scales in the management and sustainability literature.

Entrepreneurial Orientation (EO) refers to decision-making processes and practices that promote innovation and new idea creation (Lumpkin & Dess, 1996). Knowledge Management (KM) involves the application of knowledge practices to support organizational development and operations (Santoso, 2021). Sustainable Competitive Advantage (SCA) is the ability to maintain competitive advantage through dynamic adaptation to changing environments (Teece et al., 1997), while Sustainability Performance (SP) reflects an organization's ability to balance economic, social, and environmental aspects sustainably (Elkington & Rowlands, 1999).

Common Method Bias (CMB)

Common Method Bias (CMB) testing is conducted to identify potential systematic errors that may arise when data for all variables are collected from the same source or through a uniform instrument, such as a single questionnaire completed by one respondent at a time. This type of bias may distort the relationships between variables, either by inflating or deflating correlations, leading to invalid findings. Therefore, CMB testing is performed to ensure internal validity and to minimize the risk of spurious relationships between constructs.

The Harman single-factor test is a commonly used method to assess common method bias. This technique applies exploratory factor analysis to determine whether a single factor dominates the total variance. If one factor accounts for more than 50% of the total variance, it indicates the presence of significant common method bias (Podsakoff et al., 2003).

Endogeneity Test

Endogeneity occurs when one or more predictor variables are correlated with the error term of the dependent variable, which can lead to biased estimates and misleading conclusions (Wooldridge, 2010). Identifying and addressing endogeneity is critical to ensuring the validity and reliability of research findings.

In this study, the Gaussian copula approach was employed to test for endogeneity in the PLS-SEM model. This method is particularly useful for detecting nonlinear dependencies between independent variables and error terms, providing a robust approach to ensure that the observed relationships are not distorted by endogeneity issues (Hult et al., 2018). By conducting this test, the study strengthens confidence that the model accurately captures the true causal relationships among the variables.

Data Analysis Techniques

Data analysis was conducted using PLS-SEM with SmartPLS 4, consisting of two stages: evaluation of the measurement model (outer model) and the structural model (inner model). The measurement model was assessed for reliability using Cronbach's Alpha and Composite Reliability ($CR \geq 0.70$), and for validity through Average Variance Extracted ($AVE \geq 0.50$)

and outer loadings (≥ 0.60). Discriminant validity was evaluated using cross-loading, where each indicator must have the highest loading on its respective construct (Hair Jr et al., 2021). The structural model was evaluated using path coefficients, R^2 , f^2 , and Q^2 predictive relevance. Mediation analysis was conducted using bias-corrected bootstrapping with 5,000 resamples at a significance level of $p < 0.05$ to assess the role of Sustainable Competitive Advantage. Additionally, PLSpredict was applied to evaluate the model’s predictive performance on out-of-sample data.

Research results

Statistics descriptive

The questionnaire was distributed to 258 cooperative managers, of which 175 were returned and processed, resulting in a response rate of 68%. Based on the collected data, the respondents consisted of various types of cooperatives: producer cooperatives (62%), savings and loan cooperatives (19%), service cooperatives (7%), consumer cooperatives (6%), multi-business cooperatives (5%), and marketing cooperatives (2%). This distribution indicates that the majority of respondents were from producer cooperatives.

In terms of organizational age, most cooperatives have been operating for more than 10 years (79%), followed by those operating for 2–5 years (17%), 6–10 years (4%), and less than 2 years (1%). These findings suggest that the majority of the cooperatives involved in this study are well-established organizations with relatively long operational experience. Descriptive statistics of the data are presented in Table 1, which indicate that all variables are in good condition, as reflected by standard deviation values that are lower than their respective mean values, suggesting a relatively consistent distribution of responses.

Table 1. Descriptive statistics.

	N	Minimum	Maximum	Mean	Hours of deviation
Entrepreneurial Orientation	175	1.833	5.000	4.131	0.790
Knowledge Management	175	2.600	5.000	4.335	0.662
Sustainability Performance	175	2.167	5.000	4.258	0.674
Competitive Advantage Sustainably	175	1.500	5.000	4.209	0.741
Valid (listwise)	175				

The Entrepreneurial Orientation variable (X1) has a minimum value of 1.833 and a maximum value of 5.000, with a mean of 4.131 and a standard deviation of 0.790. The Knowledge Management variable (X2) has a minimum value of 2.600 and a maximum value of 5.000, with a mean of 4.335 and a standard deviation of 0.662. The Sustainability Performance variable (Y) has a minimum value of 2.167 and a maximum value of 5.000, with a mean of 4.258 and a standard deviation of 0.674. Meanwhile, the Sustainable Competitive Advantage variable (Z)

has a minimum value of 1.500 and a maximum value of 5.000, with a mean of 4.209 and a standard deviation of 0.741. Overall, all variables have standard deviation values lower than their respective means, indicating that the distribution of respondents' answers is relatively consistent.

Results of the evaluation of the measurement model

In the PLS-SEM analysis, the first step is to evaluate the outer model through convergent validity testing, which measures the correlation between indicators and their respective latent variables. Convergent validity is assessed based on outer loadings greater than 0.60 (Umar & Norawati, 2022) and the Average Variance Extracted (AVE) exceeding 0.50 (Sholihin & Ratmono, 2021). The results indicate that several indicators did not meet the minimum threshold and were therefore removed, followed by a second stage of testing. After refinement, all remaining indicators satisfied the criteria for convergent validity, with loading values for entrepreneurial orientation ranging from 0.711 to 0.837 (mean = 0.790), knowledge management from 0.675 to 0.792 (mean = 0.740), sustainability performance from 0.642 to 0.855 (mean = 0.742), and sustainable competitive advantage from 0.696 to 0.795 (mean = 0.753).

Table 2. Average variance extracted, cross-loading and reliability test.

Indicator	Entrepreneurial Orientation	Knowledge Management	Sustainability Performance	Sustainable Competitive Advantage	Cronbach's alpha
Entrepreneurial Orientation CR : 0.834 AVE : 0.628					0.710
EO2	0.711	0.283	0.336	0.266	
EO3	0.837	0.500	0.401	0.402	
EO4	0.823	0.496	0.525	0.456	
Knowledge Management CR : 0.859 AVE : 0.550					0.796
KM1	0.409	0.767	0.450	0.327	
KM2	0.564	0.753	0.394	0.382	
KM3	0.415	0.792	0.449	0.444	
KM4	0.364	0.717	0.523	0.372	
KM5	0.328	0.675	0.508	0.578	
Sustainability Performance CR : 0.861 AVE : 0.556					0.797
SP2	0.344	0.359	0.642	0.465	
SP3	0.356	0.398	0.673	0.249	
SP4	0.427	0.533	0.751	0.440	
SP5	0.499	0.487	0.855	0.501	
SP6	0.389	0.567	0.789	0.418	

Sustainable Competitive Advantage					0.753
CR : 0.841					
AVE : 0.570					
SCA1	0.493	0.433	0.560	0.696	
SCA2	0.345	0.463	0.389	0.795	
SCA3	0.184	0.363	0.287	0.751	
SCA4	0.364	0.476	0.389	0.773	

Discriminant validity testing was performed using three approaches: cross-loadings (Table 2), the Fornell–Larcker criterion (Table 3), and the HTMT ratio (Table 4). The cross-loading results indicate that each indicator has a higher loading on its respective construct than on other constructs, thereby meeting the established criteria. Furthermore, the reliability test results show that all constructs have Composite Reliability values ranging from 0.834 to 0.861 and Cronbach’s Alpha values ranging from 0.710 to 0.797, all exceeding the threshold of 0.70 (Sihombing et al., 2024), indicating good internal consistency. Therefore, all constructs in the model are considered valid and reliable, and are suitable for further structural model evaluation.

Table3. Fornell-larcker Criterion

	SCA	SP	KM	EO
Sustainable Competitive Advantage	0.755			
Sustainability Performance	0.564	0.746		
Knowledge Management	0.584	0.637	0.742	
Entrepreneurial Orientation	0.488	0.545	0.555	0.792

The square root of the AVE for each variable is higher than its correlations with other variables. Specifically, Sustainable Competitive Advantage (0.755), Sustainability Performance (0.764), Knowledge Management (0.742), and Entrepreneurial Orientation (0.792) all exhibit values that exceed their respective inter-construct correlations. These results indicate that the discriminant validity criterion has been satisfied (Sihombing et al., 2024).

Table. Heterotrait-monotrait ratio (HTMT)

	Heterotrait-monotrait ratio (HTMT)
Sustainability Performance <-> Competitive Competitiveness	0.685
Knowledge Management <-> Competitive Sustainability	0.716
Sustainability Performance <-> Knowledge Management	0.779
Entrepreneurship Orientation <-> Competitive Sustainability	0.602
Entrepreneurial Orientation <-> Sustainability Performance	0.700

Entrepreneurship Orientation <-> Knowledge Management	0.723
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The HTMT values range from 0.602 to 0.779, all of which are below the recommended threshold. Discriminant validity is considered established when HTMT values are below 0.90, or 0.85 for more stringent criteria. Therefore, these results indicate that each construct in the research model is distinct, with no significant overlap in measurement between constructs (Henseler et al., 2015).

Common Method Bias Test Results

The Common Method Bias (CMB) test, conducted using Harman’s single-factor analysis without rotation, revealed that the first factor accounted for only 38.30% of the total variance. This result indicates that no single factor dominates the data, suggesting that respondents’ answers are not significantly affected by common method bias. In other words, the self-reported data in this study is not substantially influenced by uniform perception bias among respondents. These findings are consistent with the recommended threshold of 50% (Podsakoff et al., 2024). Therefore, it can be concluded that the impact of common method bias in this study is relatively low, allowing the relationships between variables to be interpreted with greater validity and reliability.

Results of endogeneity tests

The Gaussian Copula method was employed to test for endogeneity, which occurs when predictor variables are correlated with the error terms in the PLS-SEM model. This method is recommended by (Hult et al., 2018) as an effective approach to detect potential biases.

Table 5. Gaussian Copula Test Results

Relationship	Original sample (O)	T statistics (O/STDEV)	P values	Decision
GC (Sustainable Competitive Agility -> Sustainability Performance) -> Sustainability Performance	-0.373	2.328	0.020	endogeneity
GC (Knowledge Management -> Sustainable Competitive Edge) -> Competitive Edge	0.006	0.051	0.960	No endogeneity
GC (Knowledge Management -> Sustainability Performance) -> Sustainability Performance	0.053	0.400	0.689	No endogeneity
GC (Entrepreneurship Orientation -> Sustainable Competitive Advantage) -> Sustainable Competitive Advantage	0.243	1.524	0.127	No endogeneity
GC (Entrepreneurial Orientation -> Sustainability Performance) -> Sustainability Performance	-0.095	0.683	0.494	No endogeneity
GC (Knowledge Management -> Sustainable Competitive Advantage) -> Sustainable Competitive Advantage	0.005	0.049	0.961	No endogeneity

Performance) -> Sustainable Competitive Performance>

GC (Entrepreneurship Orientation -> Sustainable Competitive Behavior) -> Sustainable Competitive Behavior -> Sustainability Performance	0.179	1.309	0.191	No endogeneity
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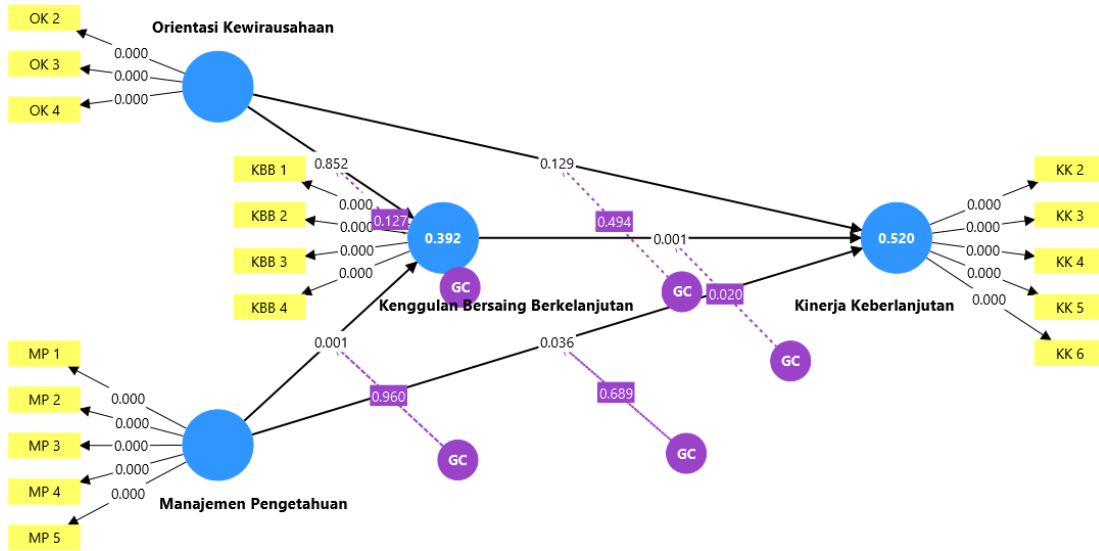


Figure 2. Gaussian Copula testing in the PLS-SEM model.

The analysis revealed that all p-values for the relationships between independent variables and the error terms of the dependent variable were greater than 0.05, indicating no significant correlation. This confirms that the model is free from endogeneity, and the estimated results can be considered unbiased and valid (Wooldridge, 2010). Detailed results are presented in Table 5, while the Gaussian Copula test is illustrated in Figure 2.

Results of Inner Model

To evaluate the adequacy of the PLS-SEM model, a goodness-of-fit assessment was conducted, considering both the overall model fit and predictive capabilities. The evaluation included SRMR and NFI as indicators of model fit, along with the PLSpredict procedure, which reported Q² predict, RMSE, and MAE to assess the predictive accuracy of endogenous constructs (Henseler et al., 2015). The results are summarized in Table 6. The SRMR value was 0.105, slightly above the recommended threshold of 0.10, indicating that the model fit criteria were not fully met; however, this is consistent with Sarma, (2022), who continued analysis using the PLS-SEM approach despite similar SRMR results. The NFI value of 0.621, although modest, is considered acceptable for exploratory research purposes. Predictive validity was further assessed using the PLSpredict procedure.

Table 6. Model conformity results and quality index

	Estimation Model	Sustainable Competitive Advantage	Sustainability Performance
SRMR	0.105		
NFI	0.621		
Q ² predict		0.358	0.438
RMSE		0.814	0.757
MAE		0.637	0.592

SRMR = Standardized Average Square Root Residual; nFi = normalized Match Index; Q2predict = Predictive Relevance (Q-squared predict); RMse = Root Mean square error; Mae = Mean absolute error.

The results indicate that the Q² predict values for all endogenous constructs are 0.358 for Sustainable Competitive Advantage and 0.438 for Sustainability Performance, confirming the predictive relevance of the model. Additionally, the RMSE values (0.814 and 0.757) and MAE values (0.637 and 0.592) demonstrate that the model achieved a satisfactory level of predictive accuracy, in line with the recommended guidelines for predictive assessment in PLS-SEM (Chen et al., 2018).

Hypothesis test results

The test results indicate that all hypotheses in this study are supported. Entrepreneurial Orientation has a significant effect on Sustainability Performance (t = 2.707; p = 0.007) and Sustainable Competitive Advantage (t = 3.011; p = 0.003). Knowledge Management also significantly influences Sustainability Performance (t = 5.084; p = 0.000) and Sustainable Competitive Advantage (t = 6.017; p = 0.000). Furthermore, Sustainable Competitive Advantage significantly affects Sustainability Performance (t = 3.358; p = 0.001). Mediation analysis shows that Sustainable Competitive Advantage partially mediates the effect of Entrepreneurial Orientation (t = 2.198; p = 0.028) and Knowledge Management (t = 2.870; p = 0.004) on Sustainability Performance, as the independent variables still exert a direct influence on the dependent variable.

Table 7. STDEV, T-Values, P-Values

	Original Sample (O)	T Statistics (O/STDEV)	P-values	Ket
H1 Entrepreneurship Orientation -> Sustainability Performance	0.221	2.707	0.007	Accepted
H2 Knowledge Management -> Sustainability Performance	0.376	5.084	0.000	Accepted
H3 Entrepreneurship Orientation -> Competitive Pursuit of Sustainable Competitiveness	0.236	3.011	0.003	Accepted
H4 Knowledge Management -> Competitive Advantage	0.453	6.017	0.000	Accepted
H5 Sustainability Competitiveness -> Sustainability Performance	0.236	3.358	0.001	Accepted

	Entrepreneurial Orientation -> Sustainability Competitive Skills -				
H6	> Sustainability Performance Knowledge Management -> Sustainability Competitiveness	0.056	2.198	0.028	Accepted
H7	-> Sustainability Performance	0.107	0.037	0.004	Accepted

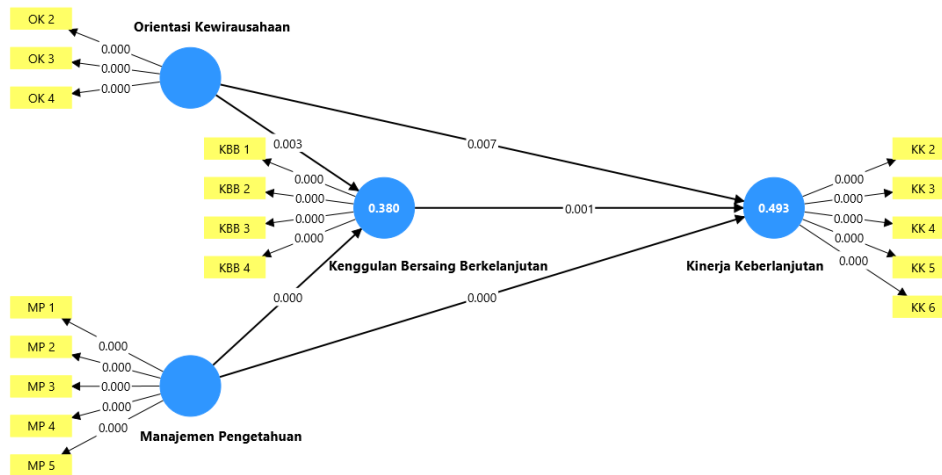


Figure 3. Complete structural equation model

Discussion

The findings from the testing of Hypothesis 1 indicate that entrepreneurial orientation has a significant effect on the sustainability performance of cooperatives. This suggests that the higher the entrepreneurial orientation of cooperative managers, the better the sustainability performance achieved. Both variables are categorized as high, reflecting strong entrepreneurial attitudes and solid sustainability outcomes. One dominant indicator is the ability of cooperative managers to establish partnerships to expand business opportunities. An empirical example can be seen in Koperasi Unit Desa Tanera Mukti Mandiri in Tapung District, Kampar Regency, which operates various business units such as palm oil production, fertilizer, retail, and savings and loans. The cooperative actively collaborates with large companies in replanting programs and improving palm oil quality, thereby enhancing member welfare and creating employment opportunities. This finding supports the Resource-Based View (RBV), which emphasizes that unique internal resources such as innovation, proactiveness, and risk-taking contribute to improved organizational performance (Wernerfelt, 1984). These results are consistent with previous studies by (Halik et al., 2025; Nuraini & Didit Darmawan, 2024; Putra & Utama, 2022), which show that entrepreneurial orientation positively affects sustainability performance.

The findings from the testing of Hypothesis 2 indicate that knowledge management has a significant effect on sustainability performance. This indicates that cooperatives with effective

knowledge management practices tend to achieve better sustainability outcomes. Most cooperatives demonstrate strong knowledge management systems, including knowledge documentation and accessible information. An example is Koperasi Konsumen Syariah KPRI Prima Husada Barokah, which acquires knowledge through sharia financial training, cooperative management certification, and institutional mentoring. This knowledge is shared with members through meetings and educational forums and is documented in standard operating procedures and information systems. From an RBV perspective, knowledge is an intangible resource that enhances decision-making and operational efficiency. These findings are in line with studies by (Ardia et al., 2025; Fakhrunnisa et al., 2023; Rifqi Almahdani Rahmat et al., 2023), which show that knowledge management positively affects organizational performance.

The findings from the testing of Hypothesis 3 indicate that entrepreneurial orientation has a significant effect on sustainable competitive advantage. This indicates that innovative, proactive, and risk-taking attitudes enable cooperatives to create advantages that are difficult for competitors to imitate. An empirical example is Koperasi Produsen Rumbio Jaya Steel, which develops agricultural tools tailored to local farmers' needs. Product innovation, responsiveness to changing farming patterns, and the willingness to develop new tools enable the cooperative to maintain its competitiveness. These findings are consistent with studies by (Dahana et al., 2020; Tirtayasa, 2022; Yaskun et al., 2023), which state that entrepreneurial orientation influences sustainable competitive advantage.

The findings from the testing of Hypothesis 4 indicate that knowledge management has a significant effect on sustainable competitive advantage. This suggests that cooperatives capable of effectively managing knowledge will possess stronger internal capabilities to foster innovation and improve service quality. For example, Koperasi Jaring Mas Sejahtera in Kampar Regency, which operates in catfish production, acquires knowledge through government training programs and disseminates it among members while documenting it in operational procedures. This process results in competitive advantages such as consistent product quality and strategic partnerships. These findings are in line with studies by (Ardia et al., 2025; Sitiari et al., 2024; Sulastri & Satispi, 2021), which highlight the role of knowledge management in building competitive advantage.

The findings from the testing of Hypothesis 5 indicate that sustainable competitive advantage has a significant effect on sustainability performance. This indicates that cooperatives with advantages in product quality, efficiency, and service differentiation are better able to sustain their economic, social, and environmental performance. For instance, Koperasi Jaring Mas Sejahtera maintains product quality and supply continuity through an integrated supply chain, which contributes to increased member income and job creation. These findings are consistent with studies by (Beigi et al., 2023; Haseeb et al., 2019; Marpaung et al., 2024), which show that competitive advantage positively affects sustainability performance.

The findings from the testing of Hypothesis 6 indicate that sustainable competitive advantage mediates the relationship between entrepreneurial orientation and sustainability performance, with a partial mediation pattern. This means that entrepreneurial orientation improves performance both directly and indirectly through the development of competitive advantage. Cooperatives with strong entrepreneurial orientation tend to be more innovative in creating

products, services, and business strategies that differentiate them from competitors. These findings are supported by studies by (Dahana et al., 2020; Kiyabo & Isaga, 2020), which state that competitive advantage mediates the relationship between entrepreneurial orientation and organizational performance.

Finally, the findings from the testing of Hypothesis 7 indicate that sustainable competitive advantage also mediates the relationship between knowledge management and sustainability performance, with a partial mediation pattern. This indicates that effective knowledge management will have a stronger impact on sustainability performance when it is transformed into competitive advantage. In Koperasi Jaring Mas Sejahtera, knowledge management in catfish cultivation and distribution enables the cooperative to become part of the food supply chain for free nutritious meal programs in schools across Riau. This demonstrates that accumulated knowledge can enhance competitiveness while generating economic and social benefits for cooperative members. Thus, sustainable competitive advantage serves as a crucial mechanism linking knowledge management to sustainability performance. These findings are consistent with studies by (Elistia et al., 2024; Fakhrunnisa et al., 2023), which show that competitive advantage mediates the relationship between knowledge management and sustainability performance.

Conclusions, Implications, limitations, and suggestions

This study concludes that entrepreneurial orientation and knowledge management have a positive effect on sustainability performance. Higher levels of innovation, proactiveness, risk-taking, and effective knowledge management contribute to improved cooperative sustainability performance. In addition, both variables significantly influence sustainable competitive advantage, indicating that cooperatives with strong internal capabilities are better able to develop strategies that are difficult to imitate.

Sustainable competitive advantage is also proven to positively affect sustainability performance, suggesting that cooperatives with superior service quality, product value, and member benefits are more likely to sustain long-term performance. Furthermore, sustainable competitive advantage partially mediates the relationship between entrepreneurial orientation, knowledge management, and sustainability performance, indicating both direct and indirect effects.

This study has several limitations, including its focus on cooperatives in Kampar Regency and the inclusion of various types of cooperatives, which may lead to differences in respondent perceptions. The R-square value of 49,3% also indicates that other factors influencing sustainability performance were not examined.

Future research is recommended to expand the research scope, focus on specific types of cooperatives, and include additional variables such as human resource competence, organizational culture, and dynamic capabilities. Further model development is also suggested to improve model fit.

Theoretically, this study supports the Resource-Based View (RBV), emphasizing that internal resources such as entrepreneurial orientation and knowledge management can generate

sustainable competitive advantage and enhance performance. Practically, these findings highlight the importance of strengthening innovation, proactive behavior, and knowledge management among cooperative managers, supported by institutional facilitation such as training, financing, and knowledge-sharing platforms.

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Sustainability Performance In Cooperatives: The Mediating Role Of Sustainable Competitive Advantage
Between Entrepreneurial Orientation And Knowledge Management

AUTHOR CONTRIBUTIONS

Conceptualization, Raisa Dyanny Salahuddin, Yesi Mutia Basri, and Poppy Nurmayanti M.;
Methodology, Raisa Dyanny Salahuddin and Yesi Mutia Basri;
Investigation, Raisa Dyanny Salahuddin;
Data curation and Analysis, Raisa Dyanny Salahuddin;
Original draft preparation, Raisa Dyanny Salahuddin;
Review & Editing, Yesi Mutia Basri, Poppy Nurmayanti M., Gusnardi, and Hariadi Yasni;
Supervision, Yesi Mutia Basri and Poppy Nurmayanti M.;
Visualization, Raisa Dyanny Salahuddin;
Project administration, Yesi Mutia Basri;
Funding acquisition, Poppy Nurmayanti M.;
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CONFLICTS OF INTEREST

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