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Abstract: This study examines the influence of entrepreneurial leadership on entrepreneurial performance and value co-creation in the education sector, focusing on Indonesian junior high schools. Addressing a notable gap in the literature, the research investigates the mediating role of value co-creation in the relationship between entrepreneurial leadership and school performance. Using a quantitative approach, data were collected from principals, teachers, and school committees across 350 schools selected through multistage cluster sampling. Covariance-based structural equation modelling (CB-SEM) with SmartPLS 4.0 was used to evaluate measurement validity, model fit, and structural relationships among variables. The results demonstrate that both entrepreneurial leadership and value co-creation significantly enhance entrepreneurial performance in educational contexts. Theoretically, the study extends the resource-based view, capability theory, and service-dominant logic to school settings. Practically, the findings highlight the importance of promoting entrepreneurial leadership and value co-creation strategies, recommending targeted policies and training programs for policymakers and educational authorities.

Keywords: entrepreneurial leadership; value co-creation; entrepreneurial performance.

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Sasmoko Sasmoko is a Full Professor at BINUS University, Jakarta, renowned for his interdisciplinary research combining education, information technology, and artificial intelligence. He plays a pivotal role in developing a humanistic approach to technology-based education in Indonesia, bridging engineering, pedagogy, and cognitive technology. With a strong academic background in engineering and education, he developed neuroresearch methods that integrate AI with complex statistical analysis. A prolific scholar, he has published numerous articles in national and international journals, including Scopus and Web of Science. He also leads the Educational Technology Research Interest Group and serves as a principal investigator in collaborative projects.

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1 Introduction

The pursuit of national prosperity is fundamentally connected to a nation's capacity to develop high-quality human resources, with schools serving as the principal institutions for nurturing such talent. High-quality education is expected not only to transmit academic knowledge, but also to foster entrepreneurial capabilities among students, thereby supporting job creation, poverty reduction, and economic resilience (Rusu et al., 2022; Acs et al., 2012). In Indonesia, the crucial role of entrepreneurship in national development is evidenced by data indicating that entrepreneurial ventures account for over 60% of national economic activity and absorb nearly the entire workforce (Kementerian Koordinator Bidang Perekonomian, 2022). In response, national regulations such as the Ministry of Education Decree No. 15 of 2018 have mandated the integration of entrepreneurship into both school management and curricula (Kemendikbud, 2018). Despite these policies, empirical findings reveal that implementation and outcomes remain less than optimal. Evaluations by the Ministry of Education and the Global Entrepreneurship Monitor show a continuing decline in school-based entrepreneurial activity, accompanied by a deterioration in the entrepreneurial framework conditions within Indonesia's education sector (GEM Global, 2023; Kemendikbud, 2018).

The challenge of enhancing entrepreneurial performance within educational institutions is inextricably linked to the effectiveness of leadership. The literature consistently underscores that entrepreneurial leadership is foundational in setting strategic direction, fostering a culture of innovation, and motivating both staff and students to engage in creative problem-solving (Pu et al., 2022; Cai et al., 2019; Musara and Nieuwenhuizen, 2020). Entrepreneurial leaders inspire the school community, articulate a compelling vision, and empower others to generate novel solutions, thereby enhancing the institution's overall entrepreneurial performance (Du et al., 2021; Zeb and Ihsan, 2021). Nevertheless, a growing body of research indicates that leadership alone is rarely sufficient to ensure sustained performance improvements. Increasingly, it is recognised that outcomes are also shaped by the extent to which schools can promote value co-creation through collaboration among educators, students, and broader stakeholders (Benevene et al., 2018; Wang et al., 2022). Value co-creation is defined as the active participation of service recipients in jointly generating value with service providers at various stages of the educational process (Rönnerberg Sjödin et al., 2016). In education, this entails teachers, students, and community members collectively identifying opportunities, developing initiatives, and co-creating solutions that yield mutual benefit (Alves, 2013).

While the importance of value co-creation has been widely explored in business and public service contexts, its application and empirical examination within educational settings – especially at the school level – remains limited (Benevene et al., 2018). Emerging evidence suggests that value co-creation may mediate the relationship between leadership and organisational performance by facilitating knowledge exchange, promoting innovation, and engendering a sense of shared ownership (Wang et al., 2022; Chao et al., 2019). In business contexts, value co-creation has been demonstrated to drive service innovation and operational effectiveness, yet research examining schools as the unit of analysis is comparatively scarce (Alves, 2013; Rönnerberg Sjödin et al., 2016). Most extant studies prioritise higher education or business organisations, with only a few

investigating the dynamic interplay between entrepreneurial leadership, value co-creation, and entrepreneurial performance at the junior secondary level.

Moreover, research into the determinants of entrepreneurial performance identifies a range of important factors, including dynamic capability, knowledge management, and digital capability (Shi et al., 2022; Wang et al., 2022; Li et al., 2020). However, systematic literature reviews highlight persistent gaps, particularly in research that simultaneously investigates these constructs within an integrated conceptual framework and specifically examines the mediating role of value co-creation (Costa et al., 2023; Bae and Choi, 2021). Recent bibliometric and historical analyses of global research output confirm that simultaneous studies of entrepreneurial leadership, knowledge management, and value co-creation in school contexts are still at an early stage. Most research on value co-creation remains focused on industry and higher education, with basic and secondary education comparatively overlooked (Benevene et al., 2018; Wang et al., 2022).

This study addresses these critical gaps by advancing a comprehensive conceptual model that positions entrepreneurial leadership as a primary driver of entrepreneurial performance and examines the mediating effect of value co-creation in junior high schools. The novelty of this research is threefold. First, it is among the earliest empirical studies to examine both the direct and indirect effects of entrepreneurial leadership on school-based entrepreneurial performance, adopting a value co-creation perspective and using junior high schools as the unit of analysis (Pu et al., 2022; Wang et al., 2022). Second, the study introduces and validates value co-creation as a pivotal organisational mechanism through which leadership is translated into measurable performance improvements in educational settings. Third, this research offers context-specific insights for Indonesian education, addressing the previous lack of integrated empirical models connecting these variables within the school sector. By addressing these gaps, the study contributes not only to the theoretical understanding of value co-creation in education but also offers practical guidance for policymakers and school leaders seeking to promote sustainable entrepreneurial performance within their institutions.

2 Literature review

2.1 *Resource-based theory*

Resource-based theory (RBT) is recognised as a leading grand theory in strategic management, offering an explanation for differences in organisational performance based on the specific resources they possess (Miles, 2012). The theory is built on two fundamental assumptions. Firstly, organisations possess heterogeneous resources, meaning that each organisation is distinct in its capabilities and assets. Secondly, these resources are not perfectly mobile, thereby enabling such differences to serve as the basis for sustainable competitive advantage (Barney, 1991). A resource is regarded as a source of advantage when it is valuable, rare, inimitable, and non-substitutable – attributes collectively referred to as the VRIN criteria (Barney, 1991; Wernerfelt, 1984).

Within the RBT framework, resources include both tangible and intangible assets that strengthen an organisation, such as brand name, knowledge, skills, social capital, and effective organisational processes (Wernerfelt, 1984; Miles, 2012). This theoretical perspective underscores that organisational success depends not only on external

influences, but also on the ability to identify, manage, and leverage internal resources to fulfil the organisation's vision and strategy (Miles, 2012).

In the context of education, intangible resources such as entrepreneurial leadership are especially critical, acting as catalysts for innovation and collaboration, which in turn facilitate the attainment of entrepreneurial performance (Pu et al., 2022; Musara and Nieuwenhuizen, 2020). Value co-creation is likewise conceptualised as an organisational capability that fosters collaboration among stakeholders – including teachers, students, and the wider community – to generate value collectively through school programs (Alves, 2013; Benevene et al., 2018). Such collaborative mechanisms amplify the impact of leadership and cultivate an environment conducive to continuous improvement and change (Wang et al., 2022; Rönnerberg Sjödin et al., 2016).

Although RBT has been extensively utilised to analyse sources of organisational advantage, it is not without limitations. Notably, it often underemphasises the impact of external factors and environmental dynamics on the strategic value of resources (Priem and Butler, 2001). In educational contexts, assessing the VRIN attributes can prove challenging, as resources such as leadership, infrastructure, or partnership networks may be significantly shaped by public policy and national regulations (Benevene et al., 2018).

In this study, entrepreneurial leadership and value co-creation are positioned as strategic resources with the potential to enhance entrepreneurial performance in schools. By applying the RBT framework, this research investigates how these resources interact to support sustainable entrepreneurial performance in Indonesian junior high schools. This approach is anticipated to broaden the application of RBT within educational research and to offer practical implications for optimising resource management in schools.

2.2 Entrepreneurial performance

Performance is conceptualised as the outcome of an organisational process, manifesting in operational results and providing a benchmark by which the degree of success achieved can be assessed. The measurement of performance can be undertaken from a results-oriented perspective, which quantitatively evaluates outcomes, as well as from a process-oriented perspective, which considers the various stages of program implementation. In light of the absence of universal standards for measuring performance, there is a recognised need for models that can offer clear and reliable benchmarks (Liu et al., 2022). Entrepreneurship itself denotes activities centred on the development and growth of new ventures, marked by innovation, risk-taking, and integrity (Liu et al., 2022).

Within the context of this study, performance is defined as the successful realisation of program implementation processes. Several studies describe entrepreneurial performance using a process-oriented lens. It can be understood as the effective completion of entrepreneurial activities that make a direct contribution to organisational performance (Pu et al., 2022; Chandler and Hanks, 1993). Other scholars contend that entrepreneurial performance represents the extent to which entrepreneurial actions generate opportunities for the organisation to attain its objectives (Baron, 2004; Pu et al., 2022). Entrepreneurial performance may also be viewed as the creation of new activities within the organisation that facilitate the achievement of organisational goals (Kantur, 2016; Li et al., 2020), or as the production of new value, creativity, and other initiatives that elevate overall organisational performance (Li et al., 2020; Miao et al., 2017).

2.3 *Entrepreneurial leadership*

Entrepreneurial leadership denotes a distinctive style of leadership that actively leverages entrepreneurial opportunities, places emphasis on innovation, and inspires organisational members to pursue shared objectives (Renko et al., 2015; Gupta et al., 2004). It encompasses the capacity to articulate a compelling vision, foster commitment, and guide stakeholders within dynamic environments by encouraging initiative, risk-taking, and creativity (Pu et al., 2022; Musara and Nieuwenhuizen, 2020). Leaders who exhibit entrepreneurial leadership motivate members of the organisation to act proactively, innovate, and display resilience in striving for organisational success (Alsharif et al., 2021). Empirical research consistently affirms that entrepreneurial leadership constitutes a principal driver of entrepreneurial performance across a variety of settings. For instance, studies of start-ups in China and organisations in Croatia have identified a significant positive effect of entrepreneurial leadership on both entrepreneurial and economic performance (Pu et al., 2022; Alsharif et al., 2021). Additional studies underscore the significance of entrepreneurial orientation, risk-taking, and leader accountability in predicting entrepreneurial performance and creativity (Zeb and Ihsan, 2021; Du et al., 2021; Sayyam et al., 2022).

Nevertheless, the relationship between entrepreneurial leadership and performance is not invariably direct. A number of studies have demonstrated that this influence may be mediated by factors such as knowledge sharing, job embeddedness, or learning orientation, thereby indicating that the pathway from leadership to performance is often complex (Pu et al., 2022; Hussain and Li, 2022; Wu et al., 2021). In educational institutions, the tenets of entrepreneurial leadership are equally pertinent. School leaders who inspire and empower their members to seize opportunities, commit to collective aims, and engage in innovation are more likely to attain superior entrepreneurial performance, especially in the development and delivery of effective entrepreneurship programs (Pu et al., 2022). Accordingly, this study posits the following hypothesis:

H1 Entrepreneurial leadership positively and significantly affects entrepreneurial performance ($\eta_1 = \gamma_1 \xi_1 + \zeta_1$).

2.4 *Value co-creation*

Value co-creation refers to the collaborative process through which stakeholders jointly generate value, a phenomenon observed not only in business contexts but increasingly within public and educational services (Ranjan and Read, 2014; Prahalad and Ramaswamy, 2000; Wang et al., 2022). In service organisations, value is created through active engagement and interaction between providers and users, resulting in mutual benefits for all parties involved (Rönnerberg Sjödin et al., 2016; Kohler et al., 2011). Such collaboration is underpinned by open communication, knowledge sharing, and collective problem-solving, enabling both sides to co-design and evaluate services together (Ranjan and Read, 2014; Sun et al., 2022).

Leadership plays a pivotal role in facilitating value co-creation by bringing together diverse perspectives, fostering a shared vision, and encouraging active participation among stakeholders (Sharma et al., 2021; Haug and Mergel, 2021). In educational settings, entrepreneurial leaders are well positioned to involve teachers, students, and

parents in the creation of innovative programs, thereby enhancing the quality and relevance of education (Alves, 2013).

Empirical research demonstrates that value co-creation strengthens organisational performance by supporting innovation, building commitment, and aligning institutional objectives with stakeholder needs (Chao et al., 2019; Sari et al., 2024; Otchere et al., 2019). In schools, this translates into more relevant and sustainable entrepreneurship programs, a greater sense of ownership among participants, and improved achievement of institutional goals.

Additionally, value co-creation acts as a mediator, amplifying the impact of entrepreneurial leadership on performance via mechanisms such as knowledge sharing and collaborative learning (Pu et al., 2022; Hussain and Li, 2022). However, empirical findings regarding its mediating role remain mixed, highlighting the need for continued investigation in educational contexts (Wang et al., 2022; Mathibe et al., 2023). Based on these considerations, this study advances the following hypotheses:

H2 Entrepreneurial leadership positively and significantly affects value co-creation ($\eta_2 = \gamma_2\xi_1 + \zeta_2$).

H3 Value co-creation positively and significantly affects entrepreneurial performance ($\eta_1 = \beta_1\eta + \zeta_3$).

H4 Value co-creation positively and significantly mediates the effect of entrepreneurial leadership on entrepreneurial performance ($\eta_2 = \gamma_2\xi_1 + \beta_1\eta_1 + \zeta_2$).

3 Method

3.1 Research design

This study adopts a quantitative research approach, employing a structured survey as the primary instrument for data collection. The survey method was selected due to its effectiveness in capturing data that describe, compare, and explain knowledge, attitudes, and behaviours across a large and diverse sample of educational institutions (Sekaran, 2016). Primary data were collected via questionnaires administered directly to participants from each school, thereby ensuring the information obtained is both timely and contextually grounded. To facilitate a comprehensive and objective evaluation of entrepreneurial performance, the study implements a 360-degree feedback perspective (Kandpal et al., 2018). Data were gathered from three key stakeholder groups within each school: principals, teacher representatives, and members of the school committee. This multi-informant design enhances the objectivity of performance assessment and provides a holistic perspective on each institution's entrepreneurial dynamics. Figure 1 illustrates the structural model design and variable relationships, which form the analytical framework for hypothesis testing in this study.

The survey instrument utilises a seven-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'. This scale was chosen for its high reliability, ease of administration, and greater discriminative capacity relative to shorter scales (Preston and Colman, 2000; Dawes, 2008). The use of seven response categories provides fine granularity for robust psychometric evaluation and is particularly beneficial for confirmatory factor analysis and structural equation modelling. All variables and

hypotheses were operationalised and tested using advanced statistical techniques. Model estimation was conducted using covariance-based structural equation modelling (CB-SEM) in SmartPLS 4.0 (Fahmi et al., 2024a, 2024b; Kunaifi et al., 2022), allowing for the simultaneous evaluation of measurement validity and the hypothesised structural relationships among entrepreneurial leadership, value co-creation, and entrepreneurial performance. The structural model and its path specifications are as follows:

$$\eta_1 = \gamma_2 \xi_1 + \zeta_2 \tag{1}$$

$$\eta_2 = \gamma_1 \xi_1 + \beta_1 \eta_1 + \zeta_1 \tag{2}$$

where

ξ_1 entrepreneurial leadership (exogenous variable)

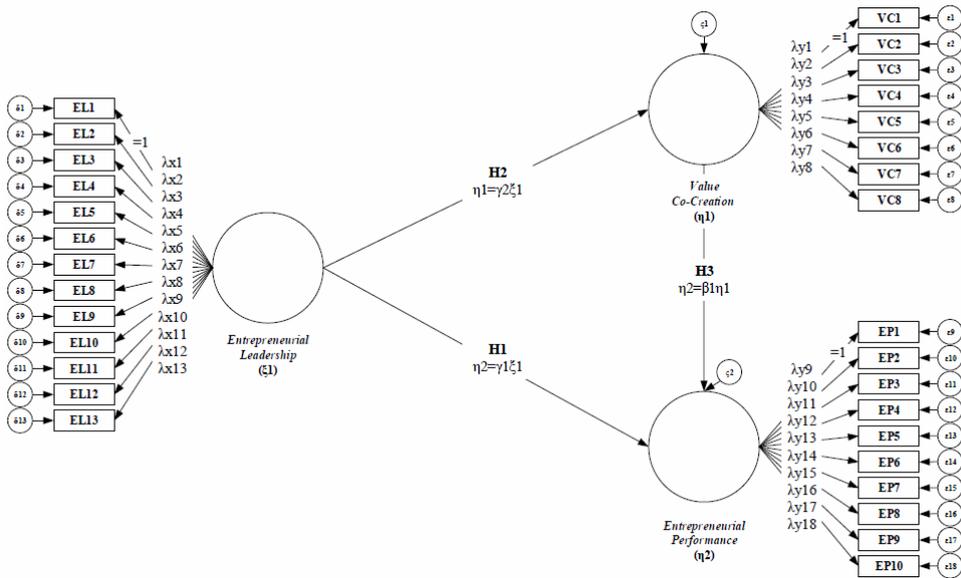
η_1 value co-creation (mediator)

η_2 entrepreneurial performance (endogenous variable)

γ and β path coefficients

ζ residual terms.

Figure 1 Structural model design



Note: ξ represent exogenous variable; η represents endogenous variable; γ and β are path coefficients; ζ represent residual terms.

3.2 Unit of analysis

The unit of analysis in this study is the school institution, specifically junior high schools (SMP), encompassing both public and private schools throughout Indonesia. The population for the study includes 42,260 junior high schools, reflecting the considerable

diversity within Indonesia's educational landscape. Sampling was conducted using a multistage cluster technique (Bandur, 2021), which is designed to ensure representativeness across the country's vast geographical expanse and the heterogeneity of school types. In the first stage, Indonesia was divided into three macro-regions: Western, Central, and Eastern Indonesia. The second stage involved the random selection of several provinces from each macro-region, with consideration given to the relative size of each region. The third stage entailed the random selection of three to four districts or cities within each chosen province, and, finally, several junior high schools were randomly drawn from each district or city.

According to the Krejcie and Morgan (1970) table, a sample of at least 380 schools is required to achieve a 95% confidence level with a 5% margin of error (Sekaran, 2016; Krejcie and Morgan, 1970). The realised sample comprises 350 schools, resulting in a high response rate of 92%, which far exceeds the minimum threshold recommended for survey-based educational research (Budiastuti and Bandur, 2020).

Table 1 Summary of school profiles

<i>Demographics</i>	<i>Category</i>	<i>Total number of schools</i>	<i>Percentage</i>
Schools by provinces in Western Region	East Java	28	9%
	Middle Java	35	10%
	West Java	33	9%
	DKI Jakarta	16	4%
	West Sumatera	20	6%
	Riau Island	29	8%
	DI Yogyakarta	17	5%
Schools by provinces in Central Region	South Borneo	22	6%
	South Sulawesi	28	8%
	North Borneo	25	7%
	Bali	18	5%
	Gorontalo	34	10%
	East Borneo	9	3%
Schools by provinces in the Eastern Region	Papua	22	6%
	East Nusa Tenggara	14	4%
Schools by types (public and private)	Public schools	210	60%
	Private schools	140	40%
Total schools		350	100%

Table 1 summarises the profiles of participating schools by region and type. The Western region accounted for the majority (51% or 178 schools), followed by the Central region (39% or 136 schools), and the Eastern region (10% or 36 schools). With respect to school type, public schools constituted 60% (210 schools), and private schools 40% (140 schools) of the sample. The final dataset includes 971 respondents: 350 principals, 350 teacher representatives, and 271 school committee members. This robust, multi-respondent dataset ensures that the assessment of entrepreneurial performance in this research is both valid and reliable, capturing the collective perspectives of key stakeholders within each school.

3.3 *Measurement item(s)*

Entrepreneurial leadership is conceptualised as the school's capacity to inspire, motivate, and guide its members to seize entrepreneurial opportunities and realise strategic objectives. This definition is informed by the works of Gupta et al. (2004), Renko et al. (2015), Musara and Nieuwenhuizen (2020) and Pu et al. (2022), who collectively emphasise the importance of vision, commitment, innovation, and proactive leadership within dynamic environments. In this context, indicators of entrepreneurial leadership include the school's ability to set performance-oriented targets, foster diligence, promote forward-thinking, boost confidence, cultivate positive relationships with stakeholders, inspire action, encourage collaboration, empower creativity, and nurture optimism among members.

Value co-creation denotes the active collaboration between the school and its stakeholders – including school committees, parents, educational authorities, external partners, and the wider community – to generate value collectively across all stages of service delivery. In line with frameworks articulated by Ranjan and Read (2014), Wang et al. (2022), Hoyer et al. (2010) and Sun et al. (2022), the measurement of value co-creation in this study encompasses openness to stakeholder input, clarity and transparency of information, ease of stakeholder access and engagement, alignment of services with stakeholder expectations, reciprocal interaction, constructive dialogue, and opportunities for involvement in the development of services.

Entrepreneurial performance is operationalised as the extent to which the school achieves success in developing and managing entrepreneurial programs that contribute to organisational objectives. Drawing on Chandler and Hanks (1993), Baron (2004), Li et al. (2020), Miao et al. (2017) and Pu et al. (2022), the indicators include the growth of entrepreneurship-related activities for students, the establishment of school-based business units (such as canteens and cooperatives), stakeholder satisfaction with entrepreneurial outcomes, and comparative performance with other schools. This multi-faceted approach ensures that both the breadth of entrepreneurial activity and its perceived value are accurately captured. All measurement items were subjected to confirmatory factor analysis using CB-SEM with SmartPLS 4.0 to ascertain construct validity and reliability. Each item demonstrated acceptable outer loadings and contributed to the overall model fit, thereby supporting the robustness of the measurement instrument within the educational context of this research.

4 **Results**

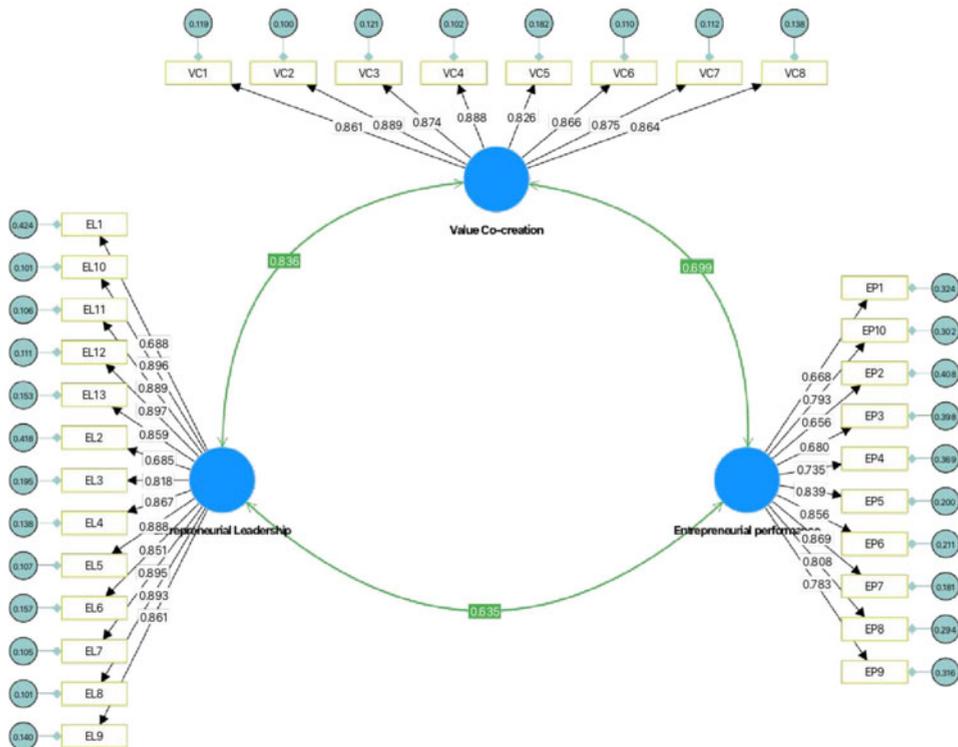
4.1 *Measurement model evaluation*

The measurement model was rigorously assessed using CB-SEM with SmartPLS 4, focusing on ensuring the psychometric soundness of the instruments across three main dimensions: indicator reliability, construct reliability, and discriminant validity.

Indicator reliability was determined by examining the standardised outer loadings of all measurement items on their respective latent constructs. Best practices in SEM recommend a minimum loading of 0.70, signifying that over 50% of the variance in each indicator is captured by its construct (Hair et al., 2019). In this study, most items for entrepreneurial leadership, value co-creation, and entrepreneurial performance

demonstrated strong loadings above this threshold, confirming that the indicators reliably represent their constructs. Several items (such as EL1, EL2, EP1, EP2) exhibited loadings just below 0.70 but were retained following theoretical considerations and empirical support from previous research that advocates for content coverage in complex constructs, especially when reliability and model fit remain satisfactory (Byrne, 2016; Ringle et al., 2022). The retention of these items is consistent with the literature, where a cut-off as low as 0.60 may be acceptable in exploratory or context-specific research, provided that overall construct reliability is not compromised (Hair et al., 2018; Henseler et al., 2015).

Figure 2 Measurement model evaluation [CB-SEM using SmartPLS 4] (see online version for colours)



Construct reliability was evaluated through both Cronbach’s alpha and composite reliability (ρ_c). All constructs exceeded the recommended threshold of 0.70 for both coefficients, indicating excellent internal consistency (Nunnally and Bernstein, 1994; Hair et al., 2019). For example, entrepreneurial leadership demonstrated a composite reliability of 0.968 and Cronbach’s alpha of 0.970, while value co-creation and entrepreneurial performance showed similarly high reliability. Convergent validity was established by average variance extracted (AVE) values above 0.50 for each construct, confirming that the majority of variance is captured by the construct rather than error (Fornell and Larcker, 1981). This robust pattern of construct reliability supports the unidimensionality and measurement integrity of the scales used.

Table 2 Construct reliability and validity

	<i>Outer loadings (standardised)</i>	<i>Cronbach's alpha (standardised)</i>	<i>Cronbach's alpha (unstandardised)</i>	<i>Composite reliability (rho_c)</i>	<i>Average variance extracted (AVE)</i>
EL1 <- Entrepreneurial leadership	0.688	0.970	0.968	0.968	0.719
EL2 <- Entrepreneurial leadership	0.685				
EL3 <- Entrepreneurial leadership	0.818				
EL4 <- Entrepreneurial leadership	0.867				
EL5 <- Entrepreneurial leadership	0.888				
EL6 <- Entrepreneurial leadership	0.851				
EL7 <- Entrepreneurial leadership	0.895				
EL8 <- Entrepreneurial leadership	0.893				
EL9 <- Entrepreneurial leadership	0.861				
EL10 <- Entrepreneurial leadership	0.896				
EL11 <- Entrepreneurial leadership	0.889				
EL12 <- Entrepreneurial leadership	0.897				
EL13 <- Entrepreneurial leadership	0.859				
VC1 <- Value co-creation	0.861	0.961	0.960	0.960	0.753
VC2 <- Value co-creation	0.889				
VC3 <- Value co-creation	0.874				
VC4 <- Value co-creation	0.888				
VC5 <- Value co-creation	0.826				
VC6 <- Value co-creation	0.866				
VC7 <- Value co-creation	0.875				
VC8 <- Value co-creation	0.864				
EP1 <- Entrepreneurial performance	0.668	0.935	0.935	0.937	0.597
EP2 <- Entrepreneurial performance	0.656				
EP3 <- Entrepreneurial performance	0.680				
EP4 <- Entrepreneurial performance	0.735				
EP5 <- Entrepreneurial performance	0.839				
EP6 <- Entrepreneurial performance	0.856				
EP7 <- Entrepreneurial performance	0.869				
EP8 <- Entrepreneurial performance	0.808				
EP9 <- Entrepreneurial performance	0.783				
EP10 <- Entrepreneurial performance	0.793				

Table 3 Discriminant validity

<i>Heterotrait-monotrait (HTMT) ratio</i>	<i>Entrepreneurial leadership</i>	<i>Entrepreneurial performance</i>	<i>Value co-creation</i>
Entrepreneurial Leadership			
Entrepreneurial performance	0.672		
Value co-creation	0.842	0.731	
Fornell-Larcker criterion	Entrepreneurial leadership	Entrepreneurial performance	Value co-creation
Entrepreneurial Leadership	0.848		
Entrepreneurial performance	0.635	0.773	
Value co-creation	0.836	0.699	0.868

Discriminant validity was assessed using both the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio, in line with recent recommendations for SEM (Henseler et al., 2015; Hair et al., 2019). The square roots of AVE for all constructs were greater than the inter-construct correlations, thus fulfilling the Fornell-Larcker criterion. Furthermore, HTMT values were well below the conservative threshold of 0.85, providing strong evidence that each construct is empirically distinct from the others. This multi-dimensional assessment of discriminant validity enhances confidence in the model's ability to differentiate among entrepreneurial leadership, value co-creation, and entrepreneurial performance.

The rigorous evaluation procedures adopted in this study are consistent with leading methodological guidelines for CB-SEM (Byrne, 2016; Hair et al., 2019; Ringle et al., 2022). The use of a seven-point Likert scale increased measurement sensitivity and reliability, as advocated in scale development literature (Preston and Colman, 2000; Dawes, 2008). Additionally, the application of both classical and modern validity criteria ensures that the measurement model not only aligns with established standards but is also resilient to contemporary criticisms of SEM measurement practices.

In summary, the measurement model evaluation confirmed that all constructs exhibit strong indicator reliability, internal consistency, and discriminant validity. These results affirm the measurement quality required for robust structural analysis, supporting the subsequent examination of the hypothesised relationships in the study's structural model. The findings provide a credible foundation for advancing theory and practice in the context of educational entrepreneurship research.

4.2 Structural model evaluation

The structural model was evaluated using CB-SEM via SmartPLS 4, with the aim of assessing the overall fit, complexity, and explanatory power of the hypothesised relationships among entrepreneurial leadership, value co-creation, and entrepreneurial performance. Several fit indices were examined, each providing a different perspective on the adequacy of the model in representing the empirical data (Hair et al., 2019; Byrne, 2016; Ringle et al., 2022).

In Table 4, model fit evaluation summarises the model fit statistics. The chi-square value was 1313.579 with 431 degrees of freedom, a result that is significant at conventional levels. However, as noted in the SEM literature, chi-square is highly sensitive to large sample sizes and complex models, and thus a significant chi-square is common and does not alone indicate model inadequacy (Hair et al., 2019; Byrne, 2016).

The chi-square divided by degrees of freedom (χ^2/df) was 3.048, which is below the more liberal threshold of 5.00 and close to the commonly accepted cut-off of 3.00, indicating an acceptable model fit for complex models in applied research (Kline, 2016; Hair et al., 2018). The root mean square error of approximation (RMSEA) was 0.076, which falls within the range (< 0.08) generally considered to indicate a good fit, especially in models with high complexity and large samples (Hu and Bentler, 1999; Hair et al., 2019). Similarly, the standardised root mean square residual (SRMR) of 0.068 is well below the threshold of 0.08, suggesting that the average discrepancy between observed and predicted correlations is low, and thus the model fits the data well (Byrne, 2016).

Table 4 Model fit evaluation

<i>Fit index</i>	<i>Estimated value</i>	<i>Rule of thumb</i>	<i>Interpretation</i>
Chi-square	1313.579	$p > 0.05$ (non-significant)	Significant (common with large samples)
Number of model parameters	65	,	Model complexity
Number of observations	350	,	Adequate sample size
Degrees of freedom	431	,	,
Chi-square/df	3.048	< 3.00 (some use < 5.00)	Acceptable
RMSEA	0.076	< 0.08	Good fit
Goodness of fit index (GFI)	0.781	> 0.90	Marginal
Adjusted goodness of fit index (AGFI)	0.748	> 0.90	Marginal
Parsimony goodness of fit index (PGFI)	0.679	> 0.50	Acceptable
Standardised root mean square residual (SRMR)	0.068	< 0.08	Good fit
Normed fit index (NFI)	0.889	> 0.90	Marginal
Tucker Lewis index (TLI)	0.916	> 0.90	Good fit
Comparative fit index (CFI)	0.922	> 0.90	Good fit
Akaike information criterion (AIC)	1443.579	Lower is better (model comparison)	For comparison only
Bayesian information criterion (BIC)	1694.344	Lower is better (model comparison)	For comparison only

Several incremental and absolute fit indices were also evaluated. The comparative fit index (CFI) and Tucker Lewis index (TLI) were 0.922 and 0.916, respectively, both exceeding the 0.90 criterion for a good fit, as recommended in the SEM literature (Hu and Bentler, 1999). The normed fit Index (NFI) was slightly below the optimal threshold at 0.889, and both the goodness of fit index (GFI = 0.781) and adjusted goodness of fit index (AGFI = 0.748) were marginally below the 0.90 standard. These results are not uncommon in studies with multi-layered constructs and large, heterogeneous samples, and are interpreted as marginal rather than poor, particularly when balanced by the strong results of other fit indices (Hair et al., 2019).

The parsimony goodness of fit index (PGFI) value of 0.679 exceeded the 0.50 minimum, reflecting a favourable balance between model fit and complexity (Kline, 2016). The model's AIC and BIC values (1,443.579 and 1,694.344, respectively) serve as benchmarks for model comparison rather than as absolute indicators of fit (Byrne, 2016). Overall, the combination of RMSEA, SRMR, CFI, and TLI above recommended thresholds provides robust evidence that the structural model demonstrates good fit and is suitable for hypothesis testing. These results confirm that the relationships hypothesised between entrepreneurial leadership, value co-creation, and entrepreneurial performance are empirically supported in this educational context.

Figure 3 Structural model evaluation [CB-SEM using SmartPLS 4] (see online version for colours)

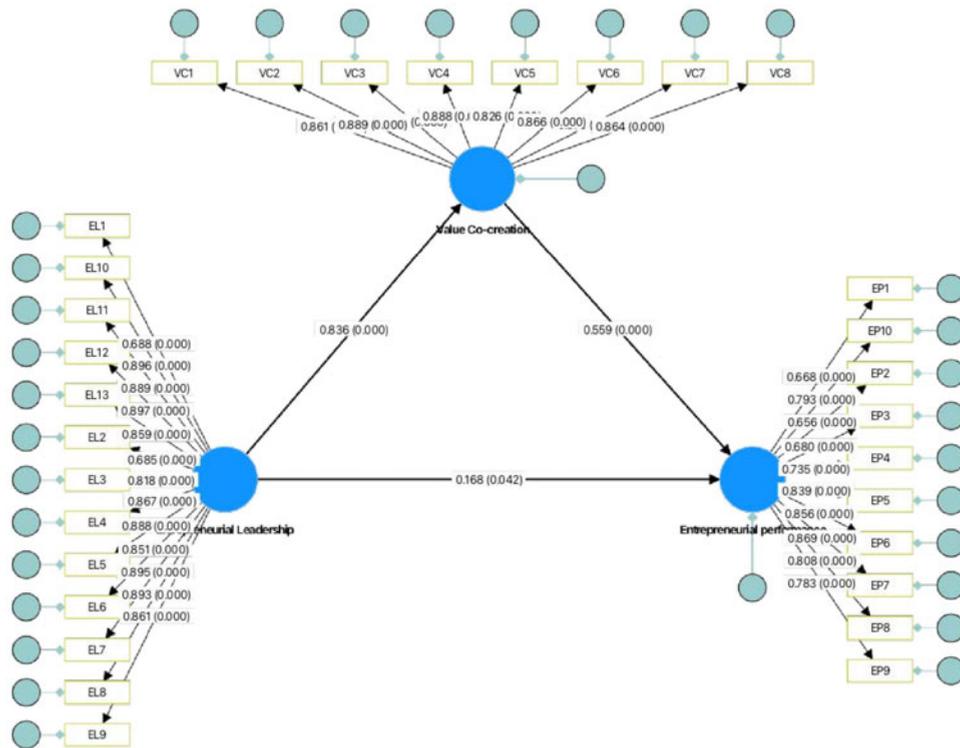


Figure 3 visually depicts the estimated structural model, demonstrating the key direct and indirect pathways tested. The adoption of these rigorous fit standards is consistent with

best practices in SEM research and underpins the credibility of the subsequent hypothesis testing and path analysis (Hair et al., 2019; Ringle et al., 2022; Kline, 2016). Furthermore, the use of SmartPLS 4 for CB-SEM enables both flexible model estimation and comprehensive reporting of fit and reliability statistics, which are critical for transparency and replicability in empirical educational research. In conclusion, the structural model evaluation establishes a strong empirical foundation for the interpretation of path coefficients and the mediation analysis conducted in the next section, ensuring that all findings are grounded in a model with satisfactory fit to the observed data.

4.3 Hypothesis testing

Hypothesis testing in this study was conducted through the estimation of path coefficients in the structural model using CB-SEM via SmartPLS 4. Table 5 summarises the results for all direct and indirect effects among the three key variables: entrepreneurial leadership, value co-creation, and entrepreneurial performance.

The direct effect of entrepreneurial leadership on entrepreneurial performance (H1) yielded a standardised path coefficient of 0.138 ($t = 1.874$, $p = 0.061$), indicating a positive but statistically marginal effect at the conventional 0.05 significance level. While this effect does not achieve strict significance, the result suggests that entrepreneurial leadership alone may not be a sufficient driver of entrepreneurial performance in educational contexts, echoing the findings of Pu et al. (2022) and Hussain and Li (2022) who observe the importance of mediating mechanisms in translating leadership into performance out-comes.

Conversely, the effect of entrepreneurial leadership on value co-creation (H2) is both positive and highly significant ($\beta = 0.791$, $t = 11.070$, $p < 0.001$). This strong association aligns with service-dominant logic and capability theory, confirming that entrepreneurial leaders are instrumental in fostering collaborative, co-creative environments within schools (Sharma et al., 2021; Alves, 2013; Wang et al., 2022). The capacity of school leaders to motivate stakeholders, articulate shared visions, and facilitate participation is clearly vital for the emergence of value co-creation processes.

Table 5 Hypothesis testing

<i>Hypothesis</i>	<i>Original sample (O)</i>	<i>T statistics</i>	<i>P values</i>
Entrepreneurial leadership → Entrepreneurial performance	0.138	1.874	0.061
Entrepreneurial leadership → Value co-creation	0.791	11.070	0.000
Value co-creation → Entrepreneurial performance	0.488	5.667	0.000
Entrepreneurial leadership → Value co-creation → Entrepreneurial performance	0.386	5.236	0.000

In turn, value co-creation demonstrates a robust, positive effect on entrepreneurial performance (H3: $\beta = 0.488$, $t = 5.667$, $p < 0.001$). This result substantiates prior research showing that co-creation practices not only drive innovation but also translate into measurable organisational gains, especially when stakeholders are actively involved in

program development and implementation (Chao et al., 2019; Otchere et al., 2019; Sari et al., 2024). The significance of this relationship underscores the necessity of integrating co-creation principles into the design and delivery of school entrepreneurship initiatives.

The mediation analysis further reveals that value co-creation significantly mediates the relationship between entrepreneurial leadership and entrepreneurial performance (H4: $\beta = 0.386$, $t = 5.236$, $p < 0.001$). This indirect effect is both substantial and statistically significant, indicating that the influence of entrepreneurial leadership on performance is largely channelled through the activation of value co-creation mechanisms. Such findings are consistent with recent evidence from both business and public sector contexts (Pu et al., 2022; Wang et al., 2022), reinforcing the theoretical proposition that organisational capabilities, such as co-creation, serve as critical pathways through which leadership can achieve its intended outcomes.

In summary, the results provide compelling support for a mediated model, wherein entrepreneurial leadership enhances value co-creation, which in turn drives entrepreneurial performance. The lack of a strong direct effect from leadership to performance further accentuates the mediating role of value co-creation, highlighting the importance of collaborative, stakeholder-driven strategies in achieving educational entrepreneurship goals. These findings not only extend the resource-based and service-dominant perspectives in the context of schools, but also offer practical implications for policy and leadership development in education.

5 Discussion

The results of this study underscore the central role of entrepreneurial leadership in fostering an environment where value co-creation becomes a routine part of school life. Although entrepreneurial leadership alone may not guarantee improved entrepreneurial performance, its strongest influence is realised through the cultivation of collaborative practices that bring together the diverse expertise, perspectives, and aspirations of stakeholders within and beyond the school. Recent evidence confirms that the effectiveness of entrepreneurial leadership is maximised when it is embedded in cultures of innovation and collaborative engagement, as shown in both educational and organisational settings (Alhalalmeh et al., 2023; Omeihe et al., 2023; Ataei et al., 2024).

This interpretation finds strong resonance in RBT, which holds that sustainable competitive advantage in organisations, whether commercial or educational, derives not merely from the possession of resources but from the capacity to mobilise and integrate those resources in ways that competitors cannot easily replicate (Barney, 1991; Wang et al., 2022). In the context of schools, leadership acts as an intangible resource that shapes the institution's strategic direction, inspires commitment, and sets the tone for an innovative culture (Pu et al., 2022; Musara and Nieuwenhuizen, 2020). Recent studies by Simba and Bagheri (2025) and Garbarino et al. (2025) have demonstrated that entrepreneurial leadership, when aligned with contextually relevant strategies, significantly strengthens both performance and innovation outcomes in educational environments.

However, the present findings suggest that this resource is most effective when channelled through mechanisms that enable joint value creation, rather than when exercised in a top-down, directive fashion. The importance of distributed leadership and

agile collaboration is also highlighted by Subramaniam et al. (2023), who found that entrepreneurial leadership facilitates organisational agility and responsiveness through active stakeholder participation.

The observed mediating role of value co-creation is theoretically consistent with the service-dominant logic of organisational performance, which positions value as something that is not delivered unilaterally by the provider but is jointly produced by all participants in the service system (Ranjan and Read, 2014; Rönnerberg Sjödin et al., 2016). In line with this, Ramírez-Montoya et al. (2025) provide empirical evidence that co-creation models in higher education significantly enhance social entrepreneurship outcomes, while D'Souza et al. (2025) show that value co-creation in international learning environments builds employability skills and stakeholder confidence.

When schools open up opportunities for teachers, students, parents, and the wider community to contribute to the design, delivery, and evaluation of entrepreneurship programs, they not only access a broader pool of ideas and resources but also increase the sense of shared ownership and commitment to school goals (Alves, 2013). Recent contributions by Hojeij (2024) and Omotosho and Yassim (2024) reinforce the value of inclusive, participatory leadership and the development of entrepreneurial attributes among school leaders, which are essential for fostering sustainable innovation and education quality.

These findings are also supported by recent empirical studies, which have shown that the effectiveness of entrepreneurial leadership in driving performance outcomes depends heavily on the presence of collaborative capabilities such as knowledge sharing, open communication, and co-learning (Pu et al., 2022; Hussain and Li, 2022; Wang et al., 2022; Garbarino et al., 2025). Value co-creation serves as a conduit for these processes, facilitating the translation of leadership vision into actionable and contextually relevant programs. This explains why schools that excel in value co-creation tend to outperform their peers in entrepreneurship education, not only in terms of program growth and student engagement but also in the quality and relevance of entrepreneurial outcomes (Chao et al., 2019; Otchere et al., 2019; Ataei et al., 2024).

From a practical standpoint, the results highlight the need for school leaders and policymakers to invest in developing leadership competencies that are oriented toward facilitation, inclusion, and collaborative problem-solving. Traditional models of school leadership, which emphasise hierarchical authority and unilateral decision-making, are unlikely to deliver the kinds of innovative and sustainable outcomes needed in a rapidly changing educational landscape. Instead, the cultivation of leadership practices that foster open dialogue, encourage experimentation, and value diverse contributions will be key to unlocking the full potential of entrepreneurship in schools (Hojeij, 2024; Subramaniam et al., 2023).

In sum, this study moves the conversation forward by clarifying the mechanism through which entrepreneurial leadership exerts its influence on school performance. It demonstrates that leadership is most powerful not as a source of control but as a catalyst for collective action and value creation, providing new insight into how schools can position themselves as engines of innovation and community development (Ramírez-Montoya et al., 2025; D'Souza et al., 2025; Simba and Bagheri, 2025).

6 Conclusions

This study makes several unique contributions to the field of educational entrepreneurship by empirically demonstrating that value co-creation acts as a crucial mediating mechanism through which entrepreneurial leadership enhances entrepreneurial performance in Indonesian junior high schools. By integrating RBT, capability theory, and service-dominant logic within a school context, the paper advances theoretical understanding and extends the application of these frameworks to basic education settings. Practically, the research provides evidence-based recommendations for policymakers and school leaders, emphasising the importance of fostering collaborative leadership and value co-creation strategies to drive sustainable educational innovation and performance.

However, this research is subject to several limitations. The cross-sectional design limits the ability to draw causal inferences, and the reliance on self-reported survey data may introduce response bias despite the inclusion of multiple informants per school. Additionally, the sample, while robust and geographically diverse, is confined to Indonesian junior high schools, potentially limiting the generalisability of findings to other educational levels or international contexts. The focus on quantitative measures also means that rich qualitative insights into the lived experiences of stakeholders were not captured.

Future research should address these limitations by employing longitudinal or mixed-method designs to better understand the dynamic and contextual factors influencing entrepreneurial leadership and value co-creation. Comparative studies across different educational systems and cultural contexts would provide valuable insights into the transferability of the proposed model. Further exploration of qualitative perspectives could illuminate the nuanced processes and barriers to effective co-creation in schools, while experimental or intervention-based research might assess the impact of targeted leadership development and stakeholder engagement programs on entrepreneurial outcomes. Through such avenues, future scholarship can build on the present findings to further inform theory, practice, and policy in educational entrepreneurship.

Declarations

All authors declare that they have no conflicts of interest.

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