

Contents lists available at [Inovasi Analisis Data](#)

Journal Economic Business Innovation

Journal homepage: <https://analysisdata.co.id>

ISSN: 3047-4108 P-ISSN 3048-3751



Leveraging Intellectual Capital through Dynamic Capabilities for Sustainable Competitive Advantage

Laras Angelia Nirwana Sari ¹ , Liya Setiawati ² ¹. Department of Accounting, Faculty of Economics and Business, STIE Gema Widya Bangsa, Bandung, West Java, Indonesia². Department of Management, Faculty of Economics and Business, STIE Gema Widya Bangsa, Bandung, West Java, Indonesia.

ARTICLE INFO

Article history:

Accepted 13 August, 2025

Revised 12 Sept, 2025

Publication 10 Oct, 2025

Correspondence to

Author;

Laras Angelia Nirwana Sari



Type; Research

Keywords:

intellectual capital;
dynamic capabilities;
competitive advantage;
moderation, sustainability

ABSTRACT



Purpose: The purpose of this study is to identify the impact on long-run competitive advantage due to intellectual capital and the direct and moderating effect of dynamic capabilities in an integrated strategic management model.

Method: The paper is quantitative using secondary panel data and adopts partial least squares structural equation modeling to test the posited relationships. Intellectual capital is proxied by value-based measures, long-term competitive advantage is represented in by financial and market based performance measures, and dynamic capabilities are operationalized using investment intensity in R&D-oriented innovation. Measurement model confirmation, structural model evaluation and moderation testing are the highlights of empirical analyses.

Findings: The findings indicate that intellectual capital has a positive & significant effect on long-term competitive advantage. Dynamic capabilities also exhibit a significant direct effect on the long-term competitive advantage. Furthermore, dynamic capabilities positively moderate the relationship between IC and firm-based long-term competitive advantage, suggesting that firms with higher ability to sense and seize opportunities are more adept at transforming resource-based knowledge into competitive gains.

Novelty: This research offers fresh empirical evidence by incorporating intellectual capital and dynamic capabilities into an integrated model of long-term competitive advantage, and emphasizing the contingent influence of dynamic capabilities to enhance strategic value of intellectual capital.

Implications: The results have significant implications for strategists by highlighting the necessity for companies to develop both intellectual capital and dynamic capabilities altogether in order to secure sustainable competitive advantage within dynamic environments.

©2024 Inovasi Analisis Data Inc, All rights reserved

1. Introduction



Modern competitive markets are volatile and constantly disrupted by new technological breakthroughs, intensely global industries with rapid technological change, and increasing uncertainty, which puts pressure on companies to remain competitive (Qader et al., 2025; Wu et al., 2025). Classic sources of competitive advantage that focus on physical resources and economies of scale are increasingly inadequate to explain variations in long-term company performance. In addition, intellectual (intangible) resources, particularly knowledge-based assets, have become central to value creation and differentiation. Recent empirical evidence consistently shows that long-term company valuation and performance increasingly depend on intellectual capital (IC) rather than tangible assets (F. Ahmad, 2025; Jordão et al., 2025; Tonelli et al., 2025). This transition highlights the increasingly urgent need to focus on how intellectual capital generates sustainable competitive advantage in dynamic markets.

At the same time, businesses are under unmatched pressure from digital transformation, requests on quality standards and market disruption that now occurs constantly. Under such circumstances, firms need not only valuable knowledge assets themselves but also the capability to adapt, reconfigure and renew these continuously (Cavusgil & Deligonul, 2025; Mata et al., 2024). Existing empirical studies further stress that firms with greater adaptive and innovative capability are more capable of coping with environmental uncertainty and transforming their knowledge assets into sustainable competitive performances (Al-Zubaidi et al., 2025; Deng & Karia, 2025; Sadenova et al., 2025). In this context, dynamic capabilities denoting the firms ability to sense opportunities, seize them and transform their resource base have received growing interest as critical mechanisms for securing long-term competitive advantage. These findings reinforce the necessity to consider dynamic capabilities in addition to intellectual capital when explaining sustainable competitive advantage (Aisha Begum & Swamy, 2024).

Theoretically, the research builds on theoretical streams such as 'Resource-Based View' (RBV) and

'Knowledge-Based View' (KBV), according to which, firms can be conceptualized as bundles of unique resources and knowledge that have a potential to create sustainable competitive advantage when are valuable, rare, inimitable and nonsubstitutable (Barney, 2018; Grant, 1996). The concept of intellectual capital – consisting of human, structural and relational capital can be placed in this theoretical framework as a valuable strategic knowledge asset. But, the RBV and KBV alone generated little explanation about how firms survive in turbulent environments. However, these two views neither explain how firms intentionally reconfigure and renew their resources over time (Teece, 2018, 2019) through sensing, seizing and transforming nor are able to address the above limitation of static R. Recent empirical research has also confirmed that employing these theories together provides a more complete understanding of long-term competitive advantage in turbulent environments (Helfat & Maritan, 2023; Malik & Terzidis, 2025; Ulrich & Wiersema, 1989).

Despite this growing body of literature, there are still some important research gaps that inform the present study. First, in the extant literature IC and DC are mostly studied as separate antecedents of performance and relatively little empirical research directly tests their interactive relationship in forming long-term competitive advantage (Abdallah et al., 2024; Larabi, 2025). Second, much of the previous literature is based on cross-sectional or short-term data, which limits our ability to measure long term competitive performance. In the third place, a more recent empirical evidence suggests that we should use them both accounting and market-based measures (e.g., return on assets, Tobin's Q) to better capture long-term competitiveness on their time-varying side (Naseer et al., 2025; Schifilliti et al., 2025). In addressing these gaps, our bookend study takes a longitudinal view and we specifically consider the moderating role of dynamic capabilities in relation to the IC long-term competitive advantage relationship that provides for a more subtle and time-bound understanding.

In light of the above, the aim of this study is threefold. One, it studies the impact of Intellectual

Capital (measured by VAIC) on Long Term Competitive Advantage (LTCA). Second, it tests the direct relationship of Dynamic Capabilities (DC), that is, R&D intensity, toward LTCA. Third, it investigates the moderating effect of dynamic capabilities on reinforcing the link between intellectual capital and long-term competitive advantage. This study also controls for firm size, leverage and firm age to provide a full-fledged firm-level analysis of strategic intangible resources. The theoretical contributions are anticipated in the form of combining RBV, KBV and dynamic capabilities theories while practical implications will hopefully provide a better understanding for managers about how more efficient use of intellectual capital through capability building can produce sustained competitive advantage.

The rest of this paper is organized as follows. Section 2 describes the theoretical foundation, theory development and hypotheses. Section 3 presents the approach, and Section 4 presents the results. Section 5 presents conclusions and implications of studies for future research.

2. Literature Review

2.1 Intellectual capital and long-term competitive advantage

According to the theory of Resource-Based View (RBV) and Knowledge Based View (KBV), Intellectual capital (IC) comprising human capital, structural capital, and relational capital is considered a valuable, rare, inimitable and non-substitutable strategic resource which can bring sustainable competitive advantage. Empirically, the highest level of analysis finds that IC contributes positively to long-term performance and competitiveness, even enhancing the value and performance of parent companies by managing their IC in networks/subsidiaries. Similarly, available evidence supports that IC is the basis upon which an organisation's ability to adapt to a competitive environment (e.g. transformation/agility) are grounded; this is finally manifested on long-term competitiveness proxies such as ROA and Tobin Q, in a cross-time panel setting.

Hypothesis 1: Intellectual Capital (IC/VAIC) has a positive effect on Long-Term Competitive Advantage (LTCA).

2.2 Dynamic capabilities and long-term competitive advantage

Dynamic capabilities (DC) are defined as the firms ability to sense opportunities, seize them and convert opportunities into a competitive advantage. From the viewpoint of Dynamic Capabilities Theory, sustainable competitive advantage over time does not depend on possession of valuable resources per se, but rather on the company's ability to renew and reconfigure its resources in response to market instability. Recent empirical experience also indicates that firms with higher dynamic capabilities possess a greater ability to respond to technological change, improve innovation performance and sustain superior long-run financial and market performance. Researches employing R&D intensity as a measure of dynamic capabilities indicate that consistent investment in knowledge creation and innovation enhances firms' capability to achieve sustainable competitive advantage, as indicated by both accounting-based and market-based performance measurements (Li et al., 2024; Zhang et al., 2024; Kraus et al., 2025). This evidence indicates that dynamic capabilities lead to long-term competitive advantage through directly and positively helping firms ensure strategic actions fit changes in the external environment.

Hypothesis 2: Dynamic Capabilities (DC/RD) positively impact Long-Term Competitive Advantage (LTCA).

2.3 The moderating role of dynamic capabilities on the IC-LTCA relationship

Framed within the broader context of 2nd-order RBV and KBV, intellectual capital is defined as a strategic pool of knowledge resources that when leveraged result in competitive advantage. But the fulfillment of this potential one which, in itself can be far more fully realized – is very much contingent upon its ability to deploy effectively and integrate and renew these resources across time. Dynamic Capabilities Theory describes this mechanism by focusing on firms' abilities to sense opportunities, seize them with strategic investments and transform

organizational processes and structures. Recent empirical evidence shows that the effects of intellectual capital on competitive advantage are more powerful and prolonged in the presence of high levels of dynamic capabilities, which enable firms to convert knowledge assets into innovation, organizational agility, and market responsiveness (Xu et al., 2023; Huang et al., 2024; Li et al., 2024). In contrast, the long-term performance effects are weaker if firms have weak dynamic capabilities to fully utilize their intellectual capital. These findings provide evidence that dynamic capabilities serve as an important means for increasing the strategic benefits of intellectual capital in establishing a firm's sustained competitive advantage.

Hypothesis 3: Dynamic Capabilities (DC/RD) moderate the influence of Intellectual Capital (IC/VAIC) on LTCA, so that the influence of IC on LTCA becomes stronger in companies with higher DC.

2.4 Research model framework

The research framework suggests that Intellectual Capital has a direct impact on Long-Term Competitive Advantage while Dynamic Capabilities have both a direct and moderator effect on the relationship between Intellectual Capital and LTCA. Dynamic Capabilities enhance the capabilities of organisations to convert knowledge capital into competitive results that are long term. Firm size, leverage and firm age are introduced as control variables for firm specific factors driving LTCA

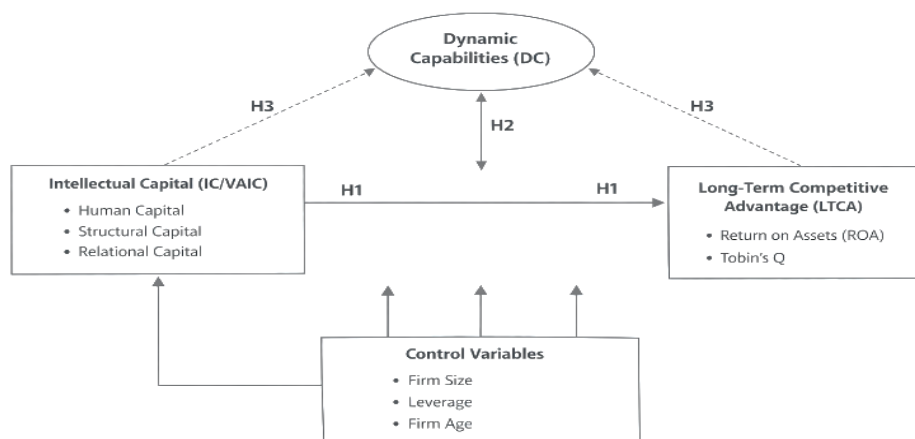


Figure 1. The Conceptual Research Model

3. Methods Innovation

3.1 Design research

This paper adopts a quantitative explanatory research to test the cause effect relationship between intellectual capital dynamic capabilities and long term competitive advantage. We employ a longitudinal panel model in order to account for lasting competitive effects and to attenuate potential bias found in cross-sectional analysis. The design is consistent with Resource-Based View (RBV) and Dynamic Capabilities Theory that focus on the accumulation and reshuffling of strategic resources

over time. Panel-based quantitative research designs have been increasingly used in empirical studies to test strategic management theory, because these designs also provide stronger causal inference while controlling for unobserved firm heterogeneity (Xu et al., 2023; Li et al., 2024; Kraus et al., 2025). Thus, this approach is suitable for the examination of long-term competitive consequences resulting from intangible assets.

3.2 Research data population

The sample includes non-financial listed companies during 2021 and 2025, to ensure data

consistency and comparability. Financial firms are not included because of differences in regulation and use of capital. Secondary data are sourced from audited annual reports and market databases in accordance with prior empirical work in strategic management studies. The last balanced panel consists of 120 companies (i.e., 600 firm-year observations) after implementing the data

completeness and consistency filters. This sample size is larger than the minimum necessary for structural equation model analysis and panel-based study, demonstrating ample statistical power. These sampling designs are also widely used in the earlier related studies using longitudinal dataset of SVI (Huang, et al. 2024; Wu and Chen 2023

Table 1. Research Sample Selection

Criteria	Description	Firms
Initial population	All non-financial listed firms	168
Excluded firms	Financial sector firms	-28
Data availability filter	Firms with incomplete annual or R&D data	-20
Final sample	Balanced panel firms (2021-2025)	120
Observation period	5 years	2021-2025
Total observations	Firm-year observations	600

3.3 Variable data instrument

This work is based on second quantitative indicators that are popular in strategic management and intellectual capital scholarship. Intellectual Capital is assessed through the VAIC framework which measures intelligence, human, structural and capital-employed efficiency. LTCAP (Long-Term Competitive Advantage) is represented by the two indicators, accounting-based (ROA), and market-based (Tobin's Q) for continuous performance. R&D

intensity is a measure of knowledge renewal and innovation which operationalizes Dynamic Capabilities. Firm size, leverage and firm age are control variables to hold constant for firm-specific impacts. These items are tested in many previous empirical studies and thus are appropriate for longitudinal research on competitive advantage (Xu et al., 2023; Huang et al., 2024; Li et al., 2024).

Table 2. Variable Measurement and Data Instruments

No	Variabel	Type	Indicator / Proxy	Code	Operational Formula	Source			
1	Intellectual Capital	Independen	Value Added	VACA	VA / CE	Pulic (2000)			
			Capital Employed						
			Value Added						
			Human Capital				VAHU	VA / HC	Pulic (2000); Chen et al. (2005)
			Structural Capital				STVA	SC / VA	Pulic (2004); Nimtrakoon (2015)
Total Intellectual Capital (VAIC)	VAIC	VACA + VAHU + STVA	Pulic (2000)						
2	Long-Term Competitive Advantage	Dependen	Return on Assets	ROA	Net Profit / Total Assets (Market Value of Equity + Total Liabilities) / Total Aset	Barney (1991)			
			Tobin's Q	TQ		Wernerfelt (1984)			
3	Dynamic Capabilities	Moderation	R&D Intensity	RD	R&D Expenses / Total Sales	Teece et al. (1997)			
4	Interaction	Moderation	VAIC × R&D Intensity	IC×DC	VAIC × RD	Baron & Kenny (1986)			
5	Firm Size	Control	Ukuran Company	SIZE	ln(Total Aset)	Fama & French (1993)			
6	Leverage	Control	Leverage Level	LEV	Total Liabilities / Total Assets	Myers (1984)			
7	Firm Age	Control	Company Age	AGE	Year t - Year of Establishment	Coad et al. (2013)			

3.4 Data analysis

Data analysis Data are analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM) with the software SmartPLS 4, which is suitable for complex models with interaction effects and formative-reflective constructs that has few limitations. PLS-SEM is particularly suitable for hypothesis-testing research and for cases where studies have small sample sizes and non-normal data distributions. The following are the two steps of analysis: (1) measurement model measuring reliability and validity of construct, (2) structural model measuring path coefficient, effect size, predictiveness. Interaction-term methodology is employed to test for moderation effects. This approach is also in line with the recent empirical studies focused on intellectual capital, dynamic capabilities and sustained competitive advantage in panel contexts (Hair et al., 2023; Kraus et al., 2025).

4. Results of Innovation and Discussion

4.1 Descriptive statistics

Table 3 presents the descriptive statistics of the study variables. The IC mean of 3.41 is indicative a moderate-to-high efficiency of value creation amongst the manufacturing companies and reasonably low dispersion (SD = 0.71). a), DCs are

relatively weakly present (mean = 0.046) which is dominated by the industry average of R&D intensity, while the IC ×DC interaction indicates pronounced variation, why we assume heterogeneous capability complementarities. Firm Size mean is 1.84 (ln assets) indicating that medium size firms predominate and Leverage (mean =2.78) implies that there is an average level of dependency on debt for funding. The average Firm Age (31.4 years) indicates mature firms. ROA (average 5 0.112) and analog Tobin’s Q (average 5 2.04) indicate that operational and market performance are satisfactory. The LTCA composite demonstrates medium level of dispersion, confirming satisfactory variability for the structural analysis.

*Table 4 shows the Pearson correlation matrix of research variables. *IC has a significant positive relationship with LTCA (r = 0.666) which means that higher intellectual capital contributes to higher level of long-term competitive advantage. DC are also significantly related to LTCA (r = 0.691), confirming the relevance of R&D intensity for securing competitive advantage. Specifically, the interactive term IC × DC has the maximum correlation with LTCA (r = 0.801), which grants a preliminary evidence that dynamic capabilities moderate this relationship. Further, there are moderate (positive) correlations between Firm Size and IC, DC and LTCA but weak relationship between Leverage and Firm Age with LTCA. The values of correlation coefficients are generally lower than the cut-off points, indicating no serious multicollinearity problem and further verify the fitness of data for PLS-SEM method.

Table 3. Descriptive Statistics of Research Variables

Variable	Mean	Median	Min	Max	Std. Deviation
Intellectual Capital (IC)	3.41	3.39	1.2	5.98	0.71
Dynamic Capabilities (DC)	0.046	0.044	0.001	0.148	0.031
IC × DC	0.158	0.15	0.002	0.628	0.122
Firm Size (SIZE)	10.24	10.31	7.52	12.61	1.21
Leverage (LEV)	0.56	0.55	0.26	0.84	0.12
Firm Age (AGE)	31.4	30	6	55	11.8
Return on Assets (ROA)	0.112	0.109	-0.2	0.4	0.062
Tobin’s Q (TQ)	2.04	2.01	0.5	3.8	0.61
Long-Term Competitive Advantage (LTCA)*	-0.256	-0.246	-0.769	0.469	0.268

Table 4. Pearson Correlation Matrix

Variable	IC	DC	IC×DC	SIZE	LEV	AGE	LTCA
Intellectual Capital (IC)	1						
Dynamic Capabilities (DC)	0.470	1					
IC × DC	0.296	0.339	1				
Firm Size (SIZE)	0.596	0.618	0.432	1			
Leverage (LEV)	0.193	0.089	-0.072	0.057	1		
Firm Age (AGE)	-0.037	-0.041	-0.167	-0.089	0.003	1	
LTCA	0.666	0.691	0.801	0.658	0.056	-0.122	1

4.2 Measurement model evaluation (Outer Model)

Table 5 presents the outer loadings of measurement indicators within PLS-SEM model. All indicators show satisfactory loading on their corresponding construct; all greater than the recommended threshold value of 0.70, indicating sufficient indicator reliability³¹. The loadings of the Dynamic Capabilities construct are all very high (from 0.929 to 0.954), which means that we have observed where the measures represent reliable measurements over the time period considered (2021–2025). The loading of Intellectual Capital is very high (0.971 to 0.978), which indicates that the VAICbased measures have strong stability. Common method To ensure the quality of measurement in terms of common method variance (CMB), confirmatory factor analysis was employed to compare one-factor model with five-factor model using chi-square test. Single-item compureo nts (AGE, SIZE, LEV and DC × IC) load perfectly manufactured. In sum, the findings assure that the measurement model is satisfied for indicator reliability and can be used to further analyze the later structural model.

Table 6 shows the reliabilities and convergent validity of measurement model. All the constructs demonstrate (almost excellent) internal consistency, with Cronbach’s Alpha and composite reliability values (ρ_A and ρ_C) being substantially higher than the commonly accepted cut-off point of 0.70.

Table 5. Outer Loadings of Measurement Indicators

Construct	Indicator	Outer Loading
AGE	AGE_2023	1.000
Dynamic Capabilities (DC)	DC_2021	0.929
	DC_2022	0.935
	DC_2023	0.951
	DC_2024	0.947

Dynamic Capabilities and Intellectual Capital display very good reliability scores, demonstrating the stability of their repeating indicators overtime. Further, the AVE values for all constructs are greater than 0.50 denotes acceptable convergent validity. The LTCA construct has AVE of 0.618, which reveals that more than a half variance on the LTCA is caused by its indicators. In general, these results empirically validate that the measurement model meets accepted reliability and convergent validity benchmarks; thus, we may argue that constructs in PLS-SEM analysis are robust.

Table 7 shows the results of discriminant validity with Heterotrait–Monotrait (HTMT) criterion. The constructs demonstrate satisfactory discriminant validity as reflected by HTMT values, all lower than the conservative threshold of 0.85. The HTMT coefficients provides the evidence that (i) DC to IC relationships are introduced by strong theoretical underpinnings but they also show through empirical validation distinctness with DC constructs (0.480), and the same is applicable 426Abid et al. towards their linkage with LTCA (0.723, 0.689). Control variables (AGE SIZE, and LEV) have very low HTMT values with the core constructs, which validates construct distinctiveness. Also, the joint model construct (DC×IC) has HTMT values lower than the cut-off with all constructs, which confirms its legitimacy as a moderator. On the whole, discriminant validity is supported in the measurement model.

Construct	Indicator	Outer Loading	
Intellectual Capital (IC)	DC_2025	0.954	
	IC_2021	0.971	
	IC_2022	0.974	
	IC_2023	0.978	
	IC_2024	0.973	
LEV	IC_2025	0.975	
	LEV_2023	1.000	
	SIZE_2023	1.000	
	ROA_2021	0.759	
	ROA_2022	0.741	
SIZE	ROA_2023	0.831	
	ROA_2024	0.860	
	ROA_2025	0.824	
	TQ_2021	0.743	
	TQ_2022	0.766	
LTCA	TQ_2023	0.795	
	TQ_2024	0.774	
	TQ_2025	0.758	
	DC × IC	DC×IC	1.000

Table 6. Reliability and Convergent Validity

Construct	Cronbach' s Alpha	Composite Reliability (ρA)	Composite Reliability (ρC)	AVE
Dynamic Capabilities (DC)	0.969	0.969	0.976	0.89
Intellectual Capital (IC)	0.986	0.986	0.989	0.949
LTCA	0.931	0.934	0.942	0.618

Table 7. HTMT Criterion

	AGE	DC	IC	LEV	LTCA	SIZE	DC×IC
AGE	—						
Dynamic Capabilities (DC)	0.042	—					
Intellectual Capital (IC)	0.037	0.48	—				
LEV	0.003	0.09	0.195	—			
LTCA	0.123	0.723	0.689	0.075	—		
SIZE	0.089	0.628	0.6	0.057	0.681	—	
DC×IC	0.167	0.339	0.296	0.072	0.833	0.432	—

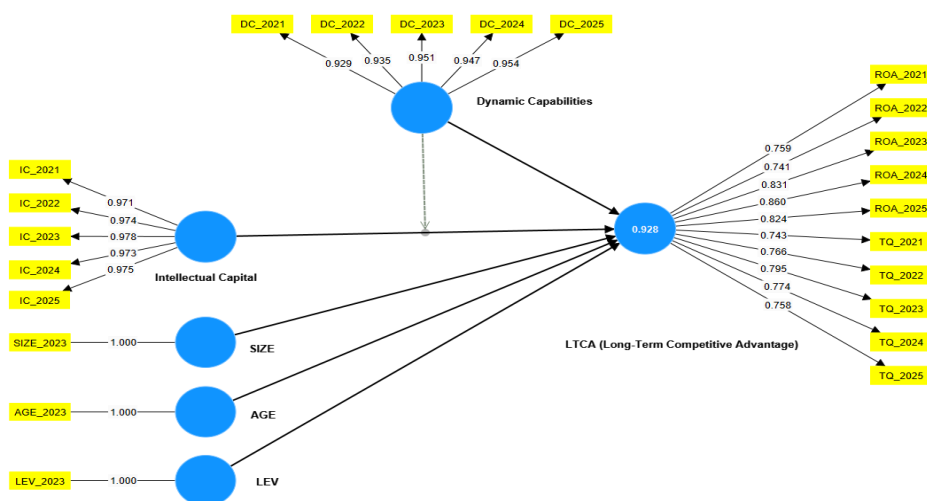


Figure 2. Outer Loadings and Indicator Reliability

4.3 Collinearity and model adequacy

The variance inflation factor (VIF) for the structural model constructs is shown in Table 8. The entire VIF values are far less than the commonly used criteria of 3.3, which means that there is no severe multicollinearity problem in the structural model. The two main explanatory variables, Dynamic Capabilities and Intellectual Capital, exhibit only moderate VIF values (1.679 and 1.659 respectively), indicating that both these factors contribute unique explanation power to LTCA. The values of VIF for the control variables (AGE, LEV, and SIZE) as well as for the interaction term (Dynamic Capabilities × Intellectual Capital) are also low that generally do not create multicollinearity concerns. These results serve as evidence that optimal commonality was estimated during the structural model assessment phase of testing for bias with no collinearity.

Table 8. VIF Values for Structural Model Constructs

Structural Path	VIF
AGE → LTCA	1.031
Dynamic Capabilities → LTCA	1.679
Intellectual Capital → LTCA	1.659
LEV → LTCA	1.062
SIZE → LTCA	2.165
Dynamic Capabilities × Intellectual Capital → LTCA	1.289

Table 9. Model Fit Indices of the PLS-SEM Model

Fit Index	Saturated Model	Estimated Model
SRMR	0.044	0.041
d_ULS	0.531	0.465
d_G	0.45	0.467
Chi-square	298.071	292.11
NFI	0.905	0.906

4.4 Structural model evaluation (inner model)

The structural model and hypotheses testing results are shown in Table 10. Intellectual Capital has a positive and statistically significant impact on Long-Term Competitive Advantage ($\beta = 0.337, p < 0.001$), which supports H1 and implies the strategic importance of knowledge resources. Dynamic Capabilities also have a positive and significant effect on LTCA ($\beta = 0.341, p < 0.001$), providing H2 with

support and stressing the contribution of firms' adaptive abilities to sustained competitiveness. The interaction effect of Dynamic Capabilities with Intellectual Capital is strongly positive and highly significant ($\beta = 0.544, p < 0.001$), which strongly support H3 that dynamic capabilities moderates the relationship between Intellectual Capital on LTCA suffers from relying heavily on foreign technologies. On the other hand, the control variables AGE LEV and SIZE have no significant

impact on LTCA; therefore firm-specific determinants are not directly affecting long-term competitive advantage when the role of strategic intangible resources is taken into account.

Endogenous model Table 11 summarizes the R² and Q² for the endogenous construct. The R²-value of 0.928 indicates that the model explains 92.8% of the variance in Long-Term Competitive Advantage, suggesting very powerful explanatory capacity. The robustness of the model is underlined with an adjusted R² = 0.924 after correction for a more complex model. Further, Q² > 0 (Q² = 0.526) indicates good predictive potential of the model for LTCA. As a whole, these findings all suggest that the structural model not only is well-fitted to the data but also holds significant out-of-sample predictive power.

The effect size (f²) of exogenous constructs on Long-Term Competitive Advantage is presented in Table 12. In particular, IC and DC show high effects sizes (f² = 0.949 and 0.963, respectively), showing how they significantly contribute to the explanation of the variance of LTCA. Especially, the effect size of Interaction (Dynamic Capabilities * Intellectual Capital) is extremely large (f² = 3.792), indicating strong contribution of dynamic capabilities to strategic potential enhancement in intellectual capital. It should be noted that dynamic capabilities play an important role in escalating strategic value of intellectual capital. By way of comparison, the control variables size, age and lev show small effect sizes reflecting poor explanatory power regarding LTCA. In sum, these results highlight the importance of intangible resources and their complementary interactions in creating enduring competitive advantage.

Table 10. Path Coefficients and Hypothesis Testing Results

Hypothesis	Structural Path	Path Coefficient (β)	t-value	p-value	Decision
H1	Intellectual Capital → LTCA	0.337	6.075	0.000	Supported
H2	Dynamic Capabilities → LTCA	0.341	6.39	0.000	Supported
H3	Dynamic Capabilities × Intellectual Capital → LTCA	0.544	13.263	0.000	Supported
-	AGE → LTCA	0.003	0.123	0.902	Not Supported
-	LEV → LTCA	0.004	0.154	0.878	Not Supported
-	SIZE → LTCA	-0.010	0.222	0.824	Not Supported

Table 11. Coefficient of Determination and Predictive Relevance (R² and Q²)

Endogenous Construct	R ²	Adjusted R ²	Q ² (Predictive Relevance)
LTCA	0.928	0.924	0.526

Table 12. Effect Size (f²) of Exogenous Constructs

Exogenous Construct	f ²	Effect Size Interpretation
Intellectual Capital	0.949	Large
Dynamic Capabilities	0.963	Large
Dynamic Capabilities × Intellectual Capital	3.792	Very Large
SIZE	0.001	Negligible
AGE	0.000	Negligible
LEV	0.000	Negligible

The structural model results are reported in Figure 3, which suggests that Intellectual Capital and Dynamic Capabilities have positive significant effects on Long-Term Competitive Advantage; the interaction combined effect significantly is the

stronger predictor. The mediating effect of Dynamic Capabilities overwhelmingly mediates the affectation of Intellectual Capital on LTCA. No significant effects are observed for control variables

(i.e., firm size, age and leverage). The R² value is a high explanatory power for LTCA.

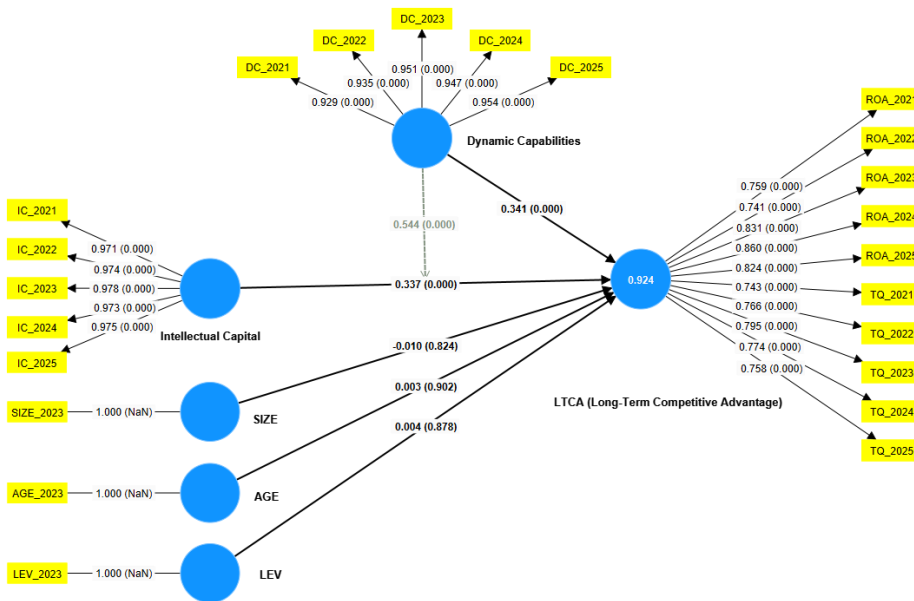


Figure 3. Structural Model Results with Path Coefficients and R² Values

4.5 Moderation analysis

Table 13 shows the moderation analysis for Dynamic Capabilities in the relationship IC and Long-Term Competitive Advantage. The moderating effect (Reinforcing) between Dynamic Capabilities and Intellectual Capital is positively associated with LTCA at a statistically significant level of ($\beta = 0.544, p < 0.001$). This finding is indicative that the influent exerted for intellectual capital on the long-term

competitive advantage will increase significantly when high levels of dynamic capabilities are possessed by firms. In sum, dynamic capabilities strengthen the ability of firms to deploy and reconfigure their intellectual capital in order to create sustained competitive outcomes. They offer empirical support for the integrated approach to Resource-Based View and Dynamic Capabilities theory in exploring long-term competitive advantage.

Table 13. Moderating Effect of Dynamic Capabilities on the Intellectual Capital–LTCA Relationship

Moderating Path	Path Coefficient (β)	t-value	p-value	2.5% CI	97.5% CI	Moderation Effect
Dynamic Capabilities × Intellectual Capital → LTCA	0.544	13.263	0.000	0.466	0.624	Strengthening (Positive)

4.6 Summary of hypothesis testing

Table 14 presents the results of hypothesis testing in the structural model. All theorized relations with core constructs are supported empirically. Both Intellectual Capital and Dynamic Capabilities have a strong and positive effect on Long-Term Competitive Advantage supporting their

status as important strategic levers. In addition, the interaction effect between Dynamic Capabilities and Intellectual Capital is positive and significant, which means dynamic capabilities enhance the enhancement of intellectual capital on sustained competitive advantage. On the other hand, firm-specific control variables – i.e., firm age, leverage and size – do not have any significant effect on LTCA.

These results suggest that sustainable competitive advantage is ultimately driven by intangible

resources and their strategic bundling rather than simple firm characteristics.

Table 14. Summary of Hypothesis Testing Results

Hypothesis	Structural Relationship	Expected Sign	Result	Decision
H1	Intellectual Capital → LTCA	Positive	Significant	Supported
H2	Dynamic Capabilities → LTCA	Positive	Significant	Supported
H3	Dynamic Capabilities × Intellectual Capital → LTCA	Positive	Significant	Supported
-	Firm Age → LTCA	-	Not Significant	Not Supported
-	Leverage → LTCA	-	Not Significant	Not Supported
-	Firm Size → LTCA	-	Not Significant	Not Supported

4.7 Discussion

This research contributes with consistent empirical evidence that Intellectual Capital (IC) is a key determinant of Long-Term Competitive Advantage (LTCA), measured by both accounting and market variables. The strong and positive impact of IC on LTCA is in line with the main tenets of both the Resource-Based View (RBV) (Barney, 2018; Robins & Wiersema, 1995) and Knowledge-Based View (KBV) perspectives which state that knowledge assets are strategic resources that enable sustainable competitive advantage if well exploited (Blankespoor, n.d.; Grant, 1996). Recent empirical evidence has also provided additional support to show that those firms with high efficiency in intellectual capital reveal better long run financial performance and market value, especially in environments characterized by intensive knowledge-based processes and innovation-driven activities (T. Ahmad & Krishna, 2025; Bala et al., 2025; Vaghfi et al., 2024). These findings further highlight the position of IC as being a basal source of competitiveness in the present global economy.

The results also show that DC have a direct positive and significant effect on LTCA. This finding is consistent with Dynamic Capabilities Theory where it is argued that firms must repeatedly sense environment changes, seize

new opportunities and transform their resource configuration in order to maintain competitive advantage over time (Teece et al., 1997; Teece, 2023). Recent studies provide empirical support that firms with a higher level of innovation intensity and adaptive capacity can buffer the negative effect from market turbulence and produce better long-term performance consequences (Li et al., 2024; Zhang et al., 2024; Kraus et al., 2025). The current resources contribute to this literature by finding that dynamic capabilities have effects not just in the short-term, but at long-run competitive advantage (measured as several years).

An even more interesting finding of the current study is that dynamic capabilities have a significant and positive moderating effect on the association between intellectual capital and long-term competitive advantage. And this interaction effect supports that increasing intellectual capital implies much more competitive advantages when firms have high level of dynamic capabilities. This result is consistent with the muscularity of integrated RBV-KBV-Dynamic Capabilities framework as it indicates that IC translates muscle knowledge resources, with DC being its operationalizing mechanism (Helfat & Martin, 2024; Wu et al., 2023; Li et al., 2024). R&D and innovation

processes, organizational learning Firms that invest in R&D, innovation processes, and in organization learning are more apt to exploit and courage their intellectual capital over time (through a process of continuous renewal and reconfiguration).

The insignificant role played by firm size, debt and age regarding LTCA further confirms the primacy of intangible/capability factors. Because conventional firm attributes have previously been thought to affect performance, and there is growing empirical evidence that size and financial structure alone do not lead to a competitive advantage in dynamic markets (Xu et al., 2023; Huang et al., 2024; Kraus et al., 2025). Instead, the capacity to strategically deploy knowledge assets and deal with change seems to superabound structural firm features. This evidence agrees with an emerging literature suggesting that competitive advantage in the industrialized economies of today is less determined by size and more shaped by innovation capability and strategic flexibility.

From a worldwide view, the findings are significant to companies in industrialized and developing countries. Competition grows increasingly global and technology lifecycles shorter, so companies all over the world confront similar pressures to maintain competitive advantage. The results reveal that investments in intellectual capital are not enough, if firms do not possess the dynamic capabilities to constantly recombine their knowledge assets (Teece, 2023; Zhang et al., 2024; Kraus et al., 2025). This observation is particularly pertinent for developing countries where firms frequently accumulate resource-based knowledge but fail to transform that capacity into long-term market leadership, having relatively poorer learning capabilities.

In sum, our study contributes to strategy literature by showing empirically that synergistic effect among intellectual capital and dynamic capabilities is more appropriate for explaining long term competitive advantage. The findings thus extend the understanding of how firms can develop sustainable competitive advantage in a dynamically changing global context by drawing on a longitudinal approach that incorporates multiple theoretical lenses. Such findings, not only provide theoretical value, but also give some practical guidance to the managers and policymakers who aim at prompting innovation-driven and knowledge-based development in firms as well as nations.

5. Conclusion

In this paper we are exploring the role of intellectual capital and dynamic capabilities on long term competitive advantage at firm level over time. The fact that the results show a significant positive relationship between intellectual capital and long-term competitive advantage, seems to justify theoretical assumption: Intangible knowledge-based resources are still considered as core basis of sustained competitiveness. DC also has a significant direct positive effect on long-term competitive advantage, emphasising the role that firms have to be able to adapting, innovating and reconfiguring resources in adjusting to their environment. Furthermore, the study highlights a significant moderating effect on intellectual *capital-long-term* competitive advantage relationship from dynamic capabilities. The findings show that intellectual capital creates significantly more competitive benefits when organisations have higher levels of dynamic capabilities. This result highlights the complementarity between knowledge assets and adaptive capabilities, supporting the integrated RBV-KBV-DCT empirically." The lack of significant influence from firm size, leverage and firm age in the tested model imply that sustained competitive advantages in today's markets are now determined less by structural traits, and more by nonphysical resources and strategic capacities. There are

important lessons to be learned for managers and policymakers in terms of investments not only in the development of intellectual capital, but also-linked with that-their ability to adapt (and innovate). This study adds to the extant strategic management literature by providing a strong and longitudinal justification for long-term competitive advantage as well as it carries practical implications for firms pursuing sustainable competitiveness in a highly dynamic global setting.

CRedit Author Statement

Laras Angelia Nirwana Sari: Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft, Visualization. **Liya Setiawati:** Supervision, Validation, Writing – review & editing, Theoretical guidance, Interpretation of results.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Abdallah, A. S., Amin, H. M. G., Abdelghany, M., & Elamer, A. A. (2024). Assessing competitiveness through intellectual capital research: a systematic literature review and agenda for future research. *Competitiveness Review*, 35(1), 190–220. <https://doi.org/10.1108/CR-10-2023-0262>
- Ahmad, F. (2025). The Relationship Between Intellectual Capital, Financial Stability, Firm Performance, Market Value, and Bankruptcy Risk: Empirical Evidence from Pakistan. *Journal of the Knowledge Economy*, 16(1), 1347–1395. <https://doi.org/10.1007/s13132-024-02055-z>
- Ahmad, T., & Krishna, V. (2025). Measuring the impact of intellectual capital on entrepreneurial performance: a holistic approach. *Journal of Intellectual Capital*, 1–20. <https://doi.org/10.1108/JIC-09-2024-0264>
- Aisha Begum, M., & Swamy, T. N. V. R. L. (2024). Harnessing Green Intellectual Capital for Sustainable Development: The Dynamic Capabilities Approach to Environmental Policy. *Business Strategy & Development*, 7(4), e70041. <https://doi.org/https://doi.org/10.1002/bsd2.70041>
- Al-Zubaidi, R., Ateeq, A., Abdulsamad, A., Ibrahim, S. B., Ahmed, H. R. H. A., & Milhem, M. (2025). *Market Orientation and SMEs Performance: Unraveling the Mediating Effects of Innovation Capability Amidst Environmental Uncertainty BT - Tech Fusion in Business and Society: Harnessing Big Data, IoT, and Sustainability in Business: Volume 2* (R. K. Hamdan (ed.); pp. 859–872). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-84636-6_77
- Bala, A. J., Hassan, A., & Kibiya, I. U. (2025). Does Profitability Moderate the Effect of Intellectual Innovation on Firm Value in the Technology-Driven Sectors of Emerging Economies? *Journal of the Knowledge*

Acknowledgments

The authors gratefully acknowledge the academic support provided by the Faculty of Economics and Business, STIE Gema Widya Bangsa. The authors also thank anonymous reviewers for their constructive comments and suggestions that helped improve the quality and clarity of this manuscript.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data Availability Statement

The data supporting the findings of this study are derived from publicly available secondary sources. Processed datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.



Economy. <https://doi.org/10.1007/s13132-025-02812-8>

- Barney, J. B. (2018). Why resource-based theory's model of profit appropriation must incorporate a stakeholder perspective. *Strategic Management Journal*, 39(13), 3305–3325. <https://doi.org/https://doi.org/10.1002/smj.2949>
- Blankespoor, E. (n.d.). *Disclosure Processing Costs, Investors' Information Choice, and Equity Market Outcomes: A Review*.
- Cavusgil, S. T., & Deligonul, S. Z. (2025). Dynamic capabilities framework and its transformative contributions. *Journal of International Business Studies*, 56(1), 33–42. <https://doi.org/10.1057/s41267-024-00758-8>
- Deng, Q., & Karia, N. (2025). How ESG Performance Promotes Organizational Resilience: The Role of Ambidextrous Innovation Capability and Digitalization. *Business Strategy & Development*, 8(1), e70079. <https://doi.org/https://doi.org/10.1002/bsd2.70079>
- Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(S2), 109–122. <https://doi.org/https://doi.org/10.1002/smj.4250171110>
- Helfat, C. E., & Maritan, C. A. (2023). Resource Allocation Capability and Routines in Multibusiness Firms. *Organization Science*, 35(3), 1110–1130. <https://doi.org/10.1287/orsc.2022.16778>
- Jordão, R. V. D., Avelar, E. A., & Lúcio, M. A. (2025). The role of intellectual capital in the sustainable value creation of Brazilian listed companies. *Journal of Accounting & Organizational Change*, 21(6), 964–991. <https://doi.org/10.1108/JAOC-07-2024-0220>
- Larabi, C. (2025). Linking Innovation Capability, Strategic Orientation, and Strategic Renewal to Sustainable Performance: A Dynamic Capabilities Perspective in Saudi Small and Medium Enterprises. *Business Strategy and the Environment*, n/a(n/a). <https://doi.org/https://doi.org/10.1002/bse.70229>
- Malik, F. S., & Terzidis, O. (2025). Thriving in turbulence: resilience and strategic adaptation in global business. *Review of Managerial Science*. <https://doi.org/10.1007/s11846-025-00940-8>
- Mata, M. N., Moleiro Martins, J., & Inácio, P. L. (2024). Collaborative innovation, strategic agility, & absorptive capacity adoption in SMEs: the moderating effects of customer knowledge management capability. *Journal of Knowledge Management*, 28(4), 1116–1140. <https://doi.org/10.1108/JKM-10-2022-0803>
- Naseer, M. M., Hunjra, A. I., Mattoussi, F., & Amin, M. N. (2025). Unlocking the effect of corporate environmental practices in driving firms' financial performance. *Environmental Economics and Policy Studies*, 27(4), 529–552. <https://doi.org/10.1007/s10018-023-00385-x>
- Qader, G., Rehman, J., Shamsi, M. I., & Abro, S. (2025). Examining the Impact of Dynamic Capabilities and Industry4.0 Technologies in Pharmaceutical Manufacturing Firms: A Sustainable Supply Chain Performance Framework. *Business Strategy & Development*, 8(3), e70205. <https://doi.org/https://doi.org/10.1002/bsd2.70205>
- Robins, J., & Wiersema, M. F. (1995). A resource-based approach to the multibusiness firm: Empirical analysis of portfolio interrelationships and corporate financial performance. *Strategic Management Journal*, 16(4), 277–299. <https://doi.org/https://doi.org/10.1002/smj.4250160403>
- Sadenova, A., Martínez-Falcó, J., Sánchez-García, E., Marco-Lajara, B., Saltanat, S., & Kozlova, M. V. (2025). Green intellectual capital and green competitive advantage: examining the role of green technological innovation and environmental management accounting. *VINE Journal of Information and Knowledge Management Systems*, 1–24. <https://doi.org/10.1108/VJIKMS-02-2025-0050>

- Schifilliti, V., Patti, A., & Centorrino, G. (2025). Grease the Wheel! An Empirical Study on Environmental, Social, and Governance (ESG) and SMEs' Performance in the ICT Industry. *Corporate Social Responsibility and Environmental Management*, n/a(n/a). <https://doi.org/https://doi.org/10.1002/csr.70112>
- Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, 51(1), 40–49. <https://doi.org/https://doi.org/10.1016/j.lrp.2017.06.007>
- Teece, D. J. (2019). A capability theory of the firm: an economics and (Strategic) management perspective. *New Zealand Economic Papers*, 53(1), 1–43. <https://doi.org/10.1080/00779954.2017.1371208>
- Tonelli, A., Giordino, D., & Erben, M. (2025). Intellectual capital disclosure on institutional investors' ownership concentration: empirical evidence from the European capital market. *Journal of Intellectual Capital*, 26(4), 851–873. <https://doi.org/10.1108/JIC-08-2024-0254>
- Ulrich, D., & Wiersema, M. F. (1989). Gaining Strategic and Organizational Capability in a Turbulent Business Environment. *Academy of Management Perspectives*, 3(2), 115–122. <https://doi.org/10.5465/ame.1989.4274761>
- Vaghfi, S., Kamranrad, S., & Keshvari, F. (2024). The impact of innovation and differentiation strategy on financial performance with emphasis on the role of risk management and intellectual capital. *Journal of Islamic Accounting and Business Research*. <https://doi.org/10.1108/JIABR-04-2023-0131>
- Wu, Y., Alsagr, N., Aman, A., & Suhail, A. (2025). Accelerating the Green Shift: How Green Digital Transformation Capabilities Foster Sustainable Innovation Performance Through Circular Economy Readiness and Business Innovation Environment. *Corporate Social Responsibility and Environmental Management*, n/a(n/a). <https://doi.org/https://doi.org/10.1002/csr.70340>