

Upper Echelons in Crisis: Do Executive Characteristics Drive Firm Value in the Primary Sector During the COVID-19 Pandemic?

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ABSTRACT

The COVID-19 pandemic has intensified uncertainty in Indonesia's primary sector, making executive leadership an increasingly important determinant of firm resilience and market valuation. Grounded in Upper Echelons Theory (UET), this study investigates the influence of CEO characteristics—education, tenure, and age—on firm value and examines whether the COVID-19 pandemic strengthens these relationships. The study employs a quantitative approach using balanced panel data from 80 mining and agricultural companies listed on the Indonesia Stock Exchange (IDX) over the period 2015–2024 (800 firm-year observations). Firm value is measured using Tobin's Q, while CEO education, tenure, and age serve as the independent variables. The COVID-19 pandemic is modeled as a moderating dummy variable, with firm size, leverage, and profitability included as control variables. Panel data regression with the Fixed Effect Model (FEM) and robust standard errors is applied following model specification and diagnostic tests. The findings reveal that CEO education and CEO tenure have significant positive effects on firm value, whereas CEO age has no significant influence. Furthermore, the COVID-19 pandemic significantly strengthens the positive relationships between CEO education and firm value as well as between CEO tenure and firm value, indicating that leadership quality becomes more valuable during periods of heightened uncertainty. These findings extend the application of Upper Echelons Theory to emerging markets by demonstrating that investors place greater value on executives with superior cognitive and experiential capabilities during systemic crises. The study provides practical implications for corporate boards, investors, and policymakers in strengthening executive selection and corporate governance strategies to enhance organizational resilience.

Keywords: Upper Echelons Theory; CEO Characteristics; Firm Value; Tobin's Q; COVID-19 Pandemic; Primary Sector; Indonesia.

INTRODUCTION

The primary sector, encompassing mining and agriculture, serves as the backbone of the Indonesian economy but remains highly susceptible to global commodity price volatility and supply chain disruptions. The COVID-19 pandemic introduced an unprecedented market anomaly, forcing firms into a trade-off between operational efficiency and long-term sustainability (World Bank, 2021; IMF, 2022). Amidst this shock, firm value on the Jakarta Stock Exchange (IDX) exhibited sharp fluctuations, driven not only by economic fundamentals but also by market perceptions of leadership quality (IDX, 2023). Upper Echelons Theory (UET) posits that strategic choices and organizational outcomes are reflections of the cognitive and demographic characteristics of top executives (Hambrick & Mason, 1984; Hambrick, 2007).

Previous empirical findings remain inconsistent; while some studies suggest that executive education enhances firm resilience (Carpenter et al., 2004), others argue that long tenure during crises may foster structural rigidity that inhibits adaptation (Henderson et al., 2006; Zhao et al., 2021). In the Indonesian context, prior research (e.g., Armashita, 2026) has primarily focused on SMEs using primary data, which limits generalizability and objective market metrics. A significant **research gap** exists: first, the lack of UET testing in capital-intensive primary sectors during systemic crises; second, the limited use of longitudinal secondary data (2015–2024) to capture

value dynamics pre- and post-pandemic; and third, the scarcity of evidence regarding how COVID-19 moderates the link between executive traits and market valuation in emerging markets.

Consequently, this study addresses the following research questions:

- a) To what extent do executive characteristics (age, education level, and tenure) influence the firm value of primary sector companies on the IDX?
- b) Does the COVID-19 pandemic moderate the relationship between these executive traits and firm value?
- c) Which executive characteristics most effectively signal resilience to investors during global economic shocks?

Research Objectives

Grounded in Upper Echelons Theory (UET) and the literature on corporate resilience during systemic crises, this study aims to empirically investigate the role of executive characteristics in shaping firm value within Indonesia's primary sector. By employing longitudinal secondary data of publicly listed firms on the Indonesia Stock Exchange (IDX) over the period 2015–2024, this research seeks to capture both structural leadership effects and shock-induced dynamics associated with the COVID-19 pandemic.

Specifically, the objectives of this study are as follows:

- a) **To examine the direct effect of executive characteristics—namely age, education level, and tenure—on firm value** of primary sector companies listed on the IDX, thereby assessing whether observable top management attributes systematically influence market valuation in capital-intensive industries.
- b) **To analyze the moderating role of the COVID-19 pandemic** in the relationship between executive characteristics and firm value, in order to determine whether investors' assessments of leadership attributes change under conditions of heightened uncertainty and systemic economic disruption.
- c) **To identify which executive characteristics function as the strongest signals of organizational resilience** during global economic shocks, as reflected in market-based firm value, thereby distinguishing between traits that are valued in normal conditions and those that become critical during crises.
- d) **To extend the empirical application of Upper Echelons Theory** to the context of emerging markets and resource-based sectors, where environmental uncertainty, regulatory intervention, and commodity dependence may alter the strength and direction of executive effects on firm value.

Research Contributions and Practical Implications

Theoretical Contributions

This study offers several contributions to the existing literature. First, it enriches **Upper Echelons Theory** by providing longitudinal, market-based evidence from an emerging economy during a systemic global crisis. While prior UET studies have predominantly focused on developed markets and manufacturing or service sectors, this research demonstrates how executive characteristics operate within capital-intensive primary industries that face heightened exposure to exogenous shocks.

Second, by incorporating the COVID-19 pandemic as a moderating variable, this study advances crisis-oriented corporate governance research. It moves beyond static performance analysis by highlighting how the **value relevance of executive traits is context-dependent**, varying between normal economic conditions and periods of extreme uncertainty. This approach contributes to a more dynamic understanding of leadership effectiveness under systemic risk.

Third, the use of firm value as a market-based outcome variable provides a forward-looking perspective that complements accounting-based performance measures commonly employed in prior studies. As such, this research bridges the gap between leadership theory, financial economics, and behavioral finance in emerging markets.

Practical and Managerial Implications

From a practical standpoint, the findings of this study are expected to offer valuable insights for multiple stakeholders. For corporate boards and nomination committees, the results may inform executive selection and succession planning by identifying leadership attributes that enhance firm value and investor confidence, particularly during periods of economic turbulence.

For investors and financial analysts, this research provides empirical evidence on how executive characteristics can serve as **credible signals of resilience** when firm fundamentals are difficult to assess. Understanding which traits are positively priced by the market during crises may improve investment decision-making and risk assessment in resource-dependent sectors.

For policymakers and regulators, particularly in emerging markets, the study highlights the importance of governance quality and leadership transparency in stabilizing capital markets during systemic shocks. The findings may support the development of governance guidelines that emphasize leadership competence as a component of market resilience.

Societal and Policy Relevance

Finally, given the strategic importance of the primary sector to national economic stability, this study holds broader policy relevance. By identifying leadership characteristics that contribute to firm resilience and value preservation during crises, the research offers insights that may support sustainable resource management, employment stability, and long-term economic development in Indonesia and comparable emerging economies.

LITERATURE REVIEW AND HYPOTHESES

The conceptual framework of this study is anchored in the **Upper Echelons Theory (UET)**, which posits that organizational outcomes—strategic choices and performance levels—are partially predicted by the managerial background characteristics of top executives (Hambrick & Mason, 1984). In the capital-intensive primary sector, where environmental shifts are volatile, the cognitive base and values of the CEO act as filters for interpreting complex data, ultimately shaping the firm's market valuation (Hambrick, 2007; Finkelstein et al., 2009). While traditional financial metrics capture past performance, **Tobin's Q** serves as a forward-looking proxy for firm value, reflecting the stock market's confidence in the leadership's ability to generate future cash flows amidst systemic shocks (Gottesman & Morey, 2010; Tolikas & Callonnec, 2023).

Executive Education and Firm Value (H1) Formal education serves as a proxy for cognitive ability, information-processing capacity, and receptivity to innovation (Hambrick & Mason, 1984). In the primary sector, which faces stringent environmental regulations and global price fluctuations, highly educated CEOs are better equipped to implement sophisticated risk-mitigation strategies and capitalize on technological advancements (Carpenter et al., 2004). Empirical evidence suggests that advanced degrees signal professional prestige to investors, thereby reducing information asymmetry and enhancing the firm's market-to-book ratio (Gottesman & Morey, 2010). Thus, we propose:

H1: CEO education level is positively associated with firm value.

Executive Tenure and Firm Value (H2) Tenure reflects the accumulation of firm-specific human capital and a deep understanding of industry-wide operational risks (Henderson et al., 2006). Long-tenured executives in the mining and agricultural sectors possess the "institutional memory" required to navigate cyclical commodity downturns and maintain stable relations with stakeholders (Simsek, 2007). Although excessive tenure can lead to cognitive inertia, in the context of high-stakes primary production, the expertise gained through years of service provides a stabilizing signal to the capital market (Zhao et al., 2021). Therefore:

H2: CEO tenure is positively associated with firm value.

The Moderating Role of the COVID-19 Pandemic (H3) External shocks, such as the COVID-19 pandemic, create a "weak situation" where formal organizational constraints diminish, and **managerial discretion** increases (Finkelstein et al., 2009). During such crises, the market's reliance on executive quality intensifies, as leadership decisions regarding supply chain survival and liquidity management become more visible (IMF, 2022). The pandemic acts as a catalyst that amplifies the impact of education and experience; highly capable leaders are expected to navigate the crisis more effectively than their peers, leading to a stronger correlation between executive traits and firm value during the 2020–2022 period (Tolikas & Callonnec, 2023). Accordingly:

H3: The COVID-19 pandemic positively moderates the relationship between executive characteristics and firm value.

METHODOLOGY

This study adopts a quantitative deductive approach, utilizing a longitudinal panel data design to observe the dynamics of the primary sector on the Indonesia Stock Exchange (IDX) over a ten-year horizon (2015–2024).

Population and Sampling

The target population comprises all companies listed in the **Mining** and **Agriculture** sectors of the IDX. A purposive sampling technique is applied with the following criteria: (1) Listed on the IDX prior to January 2015; (2) Consistently published audited annual reports (AR) and sustainability reports (SR) from 2015 to 2024; (3) Possesses complete executive profile data.

Operational Definition of Variables

All variables are measured using objective secondary data to eliminate the subjectivity inherent in previous survey-based research.

- **Dependent Variable (DV):** Firm Value (FV), proxied by **Tobin's Q**.

Where MVE is **Market Value of Equity**.

- **Independent Variables (IV):**

- **CEO Education (EDUC):** Ordinal scale based on highest formal degree (1: Bachelor, 2: Master, 3: Doctorate).
- **CEO Tenure (TEN):** Number of years the CEO has held the position within the firm.
- **CEO Age (AGE):** Chronological age of the CEO at the end of the fiscal year.
- **Moderating Variable (MV): COVID-19 Pandemic (COV):** A dummy variable (0 for pre-pandemic 2015–2019; 1 for pandemic/recovery 2020–2024).

- **Control Variables (CV):**

- **Firm Size:** $SIZE = \ln(\text{Total Assets})$

- **Leverage:** $LEV = \frac{\text{Total Debt}}{\text{Total Equity}}$

- **Profitability:** ROA

Data Quality and Diagnostic Tests

To ensure the Blue Best Linear Unbiased Estimator (**BLUE**) property, the following diagnostic tests are performed:

1. **Multicollinearity:** Measured via Variance Inflation Factor (\$VIF < 10\$).
2. **Heteroscedasticity:** Tested using the **Breusch-Pagan/Cook-Weisberg** test.
3. **Autocorrelation:** Verified through the **Wooldridge** test for panel data.

Model Selection and Specification

The study utilizes **Panel Data Regression Analysis**. To select the most appropriate model (Pooled Least Square vs. Fixed Effect vs. Random Effect), three decision-making tests are conducted:

1. **Chow Test:** To decide between PLS and FE.
2. **Hausman Test:** To decide between FE and RE.
3. **Breusch-Pagan Lagrange Multiplier (LM) Test:** To decide between PLS and RE.

Given the focus on internal executive characteristics and the likelihood of time-invariant firm-specific traits, the **Fixed Effect Model (FEM)** with **Robust Standard Errors** is the preferred estimator to mitigate heteroscedasticity and unobserved heterogeneity.

Econometric Model

The moderation effect is tested using the following interaction equation:

$$Q_{it} = \alpha + \beta_1 EDUC_{it} + \beta_2 TEN_{it} + \beta_3 AGE_{it} + \beta_4 COV_t + \beta_5 (EDUC_{it} \times COV_t) + \beta$$

Where:

- i = firm; t = year.
- β_5, β_6 = Coefficients of the interaction (moderation) terms.
- ϵ_{it} = Error term.

RESULTS AND DISCUSSION

The empirical analysis begins with an examination of the distributional properties of the dataset, capturing the trajectory of Indonesia's primary sector over a decade of economic shifts. The descriptive statistics reveal a stark contrast between the pre-pandemic stability and the high volatility observed during the 2020–2021 period, where FV (Firm Value) exhibited significant standard deviations due to global supply chain disruptions. Despite these external pressures, the executive profiles remained relatively stable, with a notable trend toward higher educational attainment (EDUC) in the latter half of the decade, suggesting a strategic shift by firms to strengthen leadership capital in anticipation of complex market recoveries.

Descriptive Statistics

The following table summarizes the longitudinal data for the 80 sampled firms over the 10-year observation period ($N = 800$).

Table 1. Descriptive Statistics of Research Variables (2015–2024)

Variable	Unit	Mean	Std. Dev.	Min	Max
FV (Tobin's Q)	Ratio	1.42	0.85	0.45	5.12
EDUC	Scale	2.15	0.68	1.00	3.00
TEN	Years	6.45	4.12	1.00	18.00
AGE	Years	52.30	7.45	38.00	72.00
SIZE	Log	28.45	1.95	24.10	33.50
LEV	Ratio	1.15	0.92	0.12	4.85
ROA	%	6.85	5.30	-12.4	22.10

Note: N = 800 observations. The period 2020–2021 represents the peak COVID-19 pandemic shock characterized by increased volatility in FV and ROA.

Data Quality and Diagnostic Test Results

Before executing the hypothesis tests, a series of rigorous econometric evaluations were conducted to ensure the structural integrity of the panel data. The chow test ($F\text{-stat} = 12.45$, $p < 0.01$) and Hausman Test ($X^2 = 34.12$, $p < 0.01$) both favored the Fixed Effect Model (FEM) over Pooled OLS and Random Effects, indicating that firm-specific unobserved heterogeneity is significantly correlated with the regressors.

Comprehensive Hypothesis Testing Results

The results of the Fixed Effect regression analysis, including the interaction terms for the COVID-19 pandemic, are summarized below. The model exhibits strong explanatory power with an **Adjusted R² of 0.48**, meaning 48% of the variation in FV (Tobin's Q) is explained by the executive characteristics and the pandemic context.

Table 2. Panel Regression Results (DV: Tobin's Q)

Variables	Coefficient (β)	t-statistic	Sig. (p)	Decision
(Constant)	2.145	4.12	0.000	-
CEO Education (EDUC)	0.384	3.65	0.001***	H1 Accepted
CEO Tenure (TEN)	0.122	2.18	0.032**	H2 Accepted
CEO Age (AGE)	-0.045	-1.98	0.051	Rejected
COVID-19 Dummy (COV)	-0.512	-5.24	0.000***	-
EDUC x COV	0.428	4.88	0.000***	H3a Accepted
TEN x COV	0.195	2.94	0.004***	H3b Accepted
Control Variables	Included	Yes	-	-
Note: *** $p < 0.01$; ** $p < 0.05$				

The empirical results of this study provide critical insights into how executive characteristics are transformed into market valuation amidst global economic turbulence. The findings are categorized into three thematic pillars:

The Dominance of Cognitive Capital (H1 & H2)

The data confirms that **CEO Education** is the most potent predictor of firm value within the primary sector. Statistically, each incremental step in formal education (from Bachelor's to Master's or Doctorate) correlates with an average increase of **0.38** in the **Tobin's Q** ratio. This suggests that the capital market assigns a significant premium to the intellectual capacity of executives, viewing advanced degrees as a proxy for superior

information-processing skills. Furthermore, **CEO Tenure** exhibits a significant positive influence, indicating that in capital-intensive and high-risk industries—such as mining and agriculture—"experience-based intuition" and firm-specific knowledge are highly valued by shareholders as anchors of corporate stability.

The Systemic Impact of the Crisis (COV)

Regarding the Crisis Effect, the negative coefficient of the COVID-19 dummy (**-0.512**) illustrates the profound value destruction experienced across the IDX primary sector during the 2020–2021 period. This figure serves as an objective reflection of the severe exogenous pressures—ranging from nationwide logistical lockdowns to the precipitous collapse of global commodity prices. This baseline coefficient quantifies the extent to which external shocks suppressed market performance, independent of internal leadership intervention.

The Moderation Effect: Leadership as a Crisis Buffer (H3)

The interaction analysis yields the most compelling evidence of this study. The positive and significant coefficients for **EDUC x COV\$ (0.428)** and **\$TEN x COV (0.195)** prove that the importance of leadership quality nearly doubles during periods of high environmental uncertainty. Executives with high cognitive and experiential capacity—those both academically credentialed and practically seasoned—were able to mitigate the pandemic's negative impact more effectively than their peers. This phenomenon created a "**decoupling effect**," wherein firms led by superior "Upper Echelons" successfully detached their performance from the general market decline, maintaining resilience while competitors faced severe valuation erosion.

METHODOLOGICAL CONTRIBUTION

By pivoting to a longitudinal study using secondary data, this research successfully circumvents the "**halo effect**" and subjectivity bias inherent in previous survey-based dissertations (e.g., Armashita, 2026). These findings provide objective, market-validated confirmation that investors actively "price in" the cognitive traits of executives, particularly when navigating systemic global shocks.

HYPOTHESIS TESTING AND DISCUSSION

Discussion

The discussion section synthesizes the empirical results with the overarching theoretical framework and contemporary literature to explain the mechanisms through which executive characteristics influence firm value during a global crisis.

Theoretical Integration: Upper Echelons Theory in the Primary Sector

The findings strongly reinforce the **Upper Echelons Theory (UET)** by demonstrating that the strategic outcomes of primary sector firms—specifically their market valuation (\$FV\$)—reflect the cognitive orientations of their top leaders (Hambrick & Mason, 1984; Hambrick, 2007). In capital-intensive industries such as mining and agriculture, which are characterized by high environmental complexity and "managerial discretion" (Finkelstein et al., 2009), the CEO's background acts as a critical filter for interpreting volatile commodity prices and supply chain disruptions.

The positive impact of **Education (\$EDUC\$)** supports the notion that advanced formal training enhances cognitive flexibility and the ability to navigate sophisticated global market risks. This aligns with **Carpenter et al. (2004)**, who argued that educated elites possess superior information-processing capabilities. Furthermore, the significance of **Tenure (\$TEN\$)** suggests that "firm-specific human capital" provides a stabilizing signal to investors. In the IDX primary sector, long-tenured leaders possess deep institutional memory regarding previous commodity cycles, which helps mitigate investor perceived risk during periods of high volatility (Simsek, 2007).

Empirical Reflection: Crisis as a "Magnifier" of Leadership Quality

A pivotal contribution of this study is the confirmation of the **Moderation Effect (\$H3\$)**. The positive interaction coefficients for **EDUC x COV** and **TEN x COV** indicate that the pandemic acted as a "managerial filter." During stable periods (2015–2019), leadership traits had a significant but moderate impact on firm value. However, during the COVID-19 shock (2020–2021), the market's reliance on executive quality intensified.

These results correspond with the findings of **Tolikas & Callonnec (2023)**, suggesting that crises amplify the visibility of managerial competence. While the pandemic generally destroyed value due to logistical lockdowns (as shown by the negative COV dummy), firms led by highly educated and experienced CEOs experienced a **"resilience premium."** These leaders were likely more adept at implementing rapid digital transformations and liquidity management strategies, which decoupled their firms from the broader sectoral decline.

Addressing Prior Research Gaps

This study provides a critical counter-narrative to earlier research conducted in the Indonesian context, such as **Armashita (2026)**. While Armashita's dissertation found inconsistent impacts of demographic traits on the financial performance of SMEs (UMKM) using primary data, our longitudinal analysis of public firms using secondary data yields robust, significant results.

This discrepancy can be explained by two factors:

- Metric Objectivity:** By using **Tobin's Q** (secondary market data) instead of self-reported accounting profits (primary data), we eliminate the "halo effect" and subjectivity bias, capturing how the *market*—not the manager—values leadership quality.
- Institutional Context:** Publicly listed firms in the primary sector operate under stricter regulatory and market scrutiny than SMEs, making executive characteristics more transparent and "priced in" by sophisticated investors.

Practical and Policy Implications

The empirical evidence suggests that for Indonesian primary sector firms, **Executive Selection** is a strategic risk-management tool.

- For Shareholders/Boards:** Nomination committees should prioritize candidates with advanced academic credentials (S2/S3) and significant sector experience during periods of global uncertainty.
- For Investors:** CEO characteristics can serve as a reliable "early warning" signal or a resilience indicator when assessing portfolio risk during systemic shocks.
- For Regulators:** The findings underscore the importance of transparent disclosure regarding executive profiles in annual reports, as this information is vital for efficient market valuation.

Unlike the primary-data findings in **Armashita (2026)**, which found inconsistent results for demographic traits in SMEs, this secondary-data study on the IDX proves that for public companies, executive traits are objectively priced by the market. The use of Tobin's Q reveals that leadership quality affects not just current accounting profits, but long-term investor confidence—a distinction that is particularly visible when the economy is under the stress of a global pandemic.

CONCLUSION

This study concludes that executive characteristics—specifically education and tenure—are fundamental determinants of firm value in Indonesia's primary sector. The empirical evidence reinforces the **Upper Echelons Theory**, demonstrating that the stock market actively "prices in" the cognitive capital of CEOs. A pivotal finding is that the COVID-19 pandemic did not merely disrupt the market but served as a catalyst that amplified the

importance of leadership quality. High-capacity leaders who possessed advanced formal education and extensive industry experience were able to mitigate the negative impacts of the crisis, effectively creating a "resilience premium" that decoupled their firms' performance from the general sectoral decline. By utilizing a decade of longitudinal secondary data (2015–2024), this research provides a more objective and generalizable validation of how leadership traits safeguard firm value compared to previous studies.

Limitations

Despite its robust methodology, this study has several limitations that should be acknowledged. First, the focus on the primary sector (mining and agriculture) may limit the generalizability of the findings to more service-oriented or technology-heavy industries where the impact of physical lockdowns differed. Second, while secondary data provides objectivity, it cannot capture the "soft" psychological traits of executives, such as overconfidence, risk aversion, or emotional intelligence, which may also influence strategic decision-making during a crisis. Lastly, the use of a dummy variable for the COVID-19 pandemic, while effective, may not fully capture the nuanced phases of the pandemic and the varying degrees of government-imposed restrictions across different sub-regions in Indonesia.

RECOMMENDATIONS

Based on these findings, several recommendations are proposed for stakeholders and future research. For **corporate boards and nomination committees**, the selection of top executives should prioritize a combination of advanced academic credentials and significant industry tenure, particularly as a strategic risk-management tool against future global uncertainties. For **investors**, executive profiles should be treated as a reliable "early warning" signal when assessing the resilience of a portfolio during systemic shocks. Finally, **future researchers** are encouraged to expand the scope of this study by incorporating "Green Intellectual Capital" or "Digital Literacy" as emerging executive traits. Furthermore, future studies could integrate primary qualitative insights (such as executive interviews) with secondary panel data to provide a more holistic view of the behavioral mechanisms behind firm value creation in the post-pandemic era.

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