

Digital Transformation and Firm Performance: The Moderating Role of CFO Co-optation

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Abstract

Purpose: This study tests whether digital transformation affects firm accounting performance in Indonesian manufacturing firms, and whether Chief Financial Officer (CFO) co-optation moderates that effect.

Research Methodology: This study analyzes 285 firm-year observations from 95 Indonesia Stock Exchange manufacturing firms (2022–2024) using Fixed Effects panel regression with Moderated Multiple Regression, applying one-tailed significance tests at the 10%, 5%, and 1% levels. The study measures digital transformation through text-mining keyword frequency in annual reports and codes CFO co-optation as a binary indicator for CFO appointment during the sitting Chief Executive Officer (CEO) tenure. The study estimates a Fixed Effects panel regression in Stata 17, selected through Chow and Hausman tests, with Moderated Multiple Regression testing the interaction effect.

Results: Digital transformation lowers Return on Assets at the 10% significance level. CFO co-optation lowers ROA at the 5% level, but the interaction between digital transformation and CFO co-optation raises ROA at the 5% level, offsetting and reversing the direct penalty.

Conclusions: Executive alignment through CFO co-optation buffers the short-term cost digital transformation imposes on profitability, consistent with Resource Orchestration Theory operating alongside Agency Theory rather than replacing it.

Limitations: The sample covers manufacturing firms only, over a three-year window, using a keyword-based digital transformation proxy.

Contributions: The findings extend Agency Theory and Resource Orchestration Theory into a joint governance-technology model and offer Indonesian regulators, boards, and CFOs concrete guidance on staffing and timing digital transformation initiatives

Keywords: *Co-optation, Digital Transformation, Firm Performance, Resource Orchestration Theory*

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1. Introduction

Manufacturing firms worldwide treat digital transformation as a survival requirement, pouring capital into big data analytics, enterprise resource planning, and artificial intelligence to cut costs and sharpen

agility ([Surahman, & Legowo, 2024](#); [Xie, & Wang, 2023](#); [Zhao, Meng, Wang, Alam, & Zhang, 2023](#)). The spending does not pay off on schedule: heavy technology investment drags down asset turnover and erodes short-term profitability ([Guo, Zhang, & Zhou, 2026](#)). Scholars call this the digital productivity paradox, where firms absorb restructuring costs years before technological gains reach the income statement ([Dehnert, 2020](#); [Nguyen-Thi-Huong, Nguyen-Viet, Nguyen-Phuong, & Van, 2023](#)). Internal governance shapes how firms move through this paradox and determines whether digital investment recovers its cost.

Indonesian manufacturers face this paradox with less room to absorb it. Between 2022 and 2024, these firms recovered from pandemic disruption while national policy pushed rapid digital adoption, yet spending failed to translate into stronger results ([Febransyah, 2026](#); [Surahman and Legowo, 2024](#)). [Abdurrahman \(2022\)](#) ran Cobb-Douglas production functions across major Indonesian telecommunications providers and found information Technology capital contributed less to output than labor and capital in several operators. [traces this to an unfinished transition between the installation and deployment phases of technology adoption. Tight margins compound this problem, and a tightening governance regime under Law No. 4 of 2023 on Financial Sector Development and Reinforcement, UU P2SK, raises the stakes of any capital misallocation \(Ardianti & Lestari, 2023\). Firms that realign business models and tighten governance alongside technology spending recover that cost faster than firms that treat the rollout as a purchase alone \(Daeli & Wedari, 2025\).](#)

The literature has not settled this debate ([Guo, Li, Wang, & Mardani, 2023](#); [Vo, Vo, Dinh, & Tran, 2024](#)). One camp finds technology integration lifts profitability through supply chain efficiency and dynamic capabilities ([Febransyah, 2026](#); [Surahman and Legowo, 2024](#)); a second finds the opposite, that capital costs and administrative expenses outweigh early gains ([Daeli and Wedari, 2025](#); [Guo et al., 2023](#)). Scholars have tried to reconcile these findings through corporate governance: ownership concentration, board size, CEO celebrity status ([Fachrudin, Rohyana, & Hanum, 2026](#); [Sulastri, Noviarti, Siagian, & Stefhani, 2026](#); [Xu, Lv, & Wang, 2024](#); [Zareie, Attig, & Fooladi, 2024](#)). This body of work stops at the board and leaves out the Chief Financial Officer, the executive who signs off on capital budgets. The CFO co-optation literature explains why: existing studies tie a co-opted CFO to audit report lag, earnings management, and CSR decoupling ([Duong, Evans, & Truong, 2020](#); [Oradi, Ghannad, & Azar, 2025](#); [Sarang, Saeed, Rind, & Gull, 2026](#); [Valenzuela, & Zheng, 2023](#)) outcomes that track monitoring quality rather than capital deployment. No study has tested whether a co-opted CFO changes how a firm executes a capital-intensive strategic shift like digital transformation.

This study tests CFO co-optation as a moderator of the digital transformation-profitability relationship. Governance research on co-optation stops at the board level, ignoring the CFO's role during capital-intensive shifts ([Coles, Daniel, & Naveen, 2014](#); [Shams, Luong, & Ovi, 2025](#)). Agency Theory predicts a co-opted CFO monitors with less independence and raises agency costs ([Coles et al., 2014](#); [Shams et al., 2025](#)). Resource Orchestration Theory predicts the opposite: an aligned CEO and CFO resolve disagreements faster and deploy capital with less friction ([Sirmon, Hitt, Ireland, & Gilbert, 2011](#)). This study contributes in three ways. First, it tests CFO co-optation as a boundary condition on the digital transformation Return on Assets (ROA) relationship, unexamined at the CFO level. Second, it combines both theories to show how one governance feature produces a direct harm to profitability alongside an indirect buffer. Third, it grounds the test in Indonesian manufacturing firms during the 2022-2024 post-pandemic recovery, when technology adoption collided with tight margins and compliance pressure ([Nugroho, Suhardjanto, Widarjo, & Supriyono, 2026](#)).

2. Literature Review and Hypotheses Development

2.1 Grand Theory

This study anchors its theoretical foundation in Agency Theory [Jensen and Meckling \(1976\)](#) and extends it through Resource Orchestration Theory ([Sirmon, Hitt, Ireland, & Gilbert, 2011](#)). Agency Theory frames the firm as a site of conflict: shareholders hire managers as agents, but information asymmetry lets managers chase goals that serve themselves over owners. [Coles, Daniel, and Naveen \(2014\)](#) show that board oversight breaks down under co-optation: an appointee named after the sitting

CEO owes career debts to that CEO and defers rather than monitors. [Shams, Luong, and Ovi \(2025\)](#) confirm that co-opted executives weaken internal control. Resource Orchestration Theory complicates this: owning valuable resources, including digital technology by [Kane, Palmer, Phillips, and Kiron \(2015\)](#), does not win alone; firms win by deploying resources through coordinated action by [Sirmon et al. \(2011\)](#), and executive alignment cuts the friction that slows capital deployment ([Demirsoy, 2025](#)).

This framework maps onto the study's variables. Digital transformation strains cash flow during execution; Return on Assets measures the resulting profitability; CFO co-optation proxies eroded monitoring. [Jensen and Meckling \(1976\)](#) explain the direct negative link between co-optation and ROA, and the same logic drives digital transformation's drag on ROA [Daeli, & Wedari, 2025](#). [Sirmon et al. \(2011\)](#) reframe co-optation as managerial capability: the capacity to deploy capital without bureaucratic delay.

2.2 Hypothesis Development

2.2.1 Digital Transformation and Firm Performance

Theory explains the digital transformation-ROA link through two mechanisms: the digital productivity paradox and Agency Theory. Agency Theory [Jensen and Meckling \(1976\)](#) warns that technology deployments can serve managerial self-interest: executives pursue capital-intensive digital projects to signal a modern posture rather than serve shareholders, a pattern [Guo, Li, Wang, and Mardani \(2023\)](#) label empire-building. Even good-faith investment carries cost: digitization demands upfront capital expenditure and staff retraining that inflate expense ratios before efficiency gains appear ([Matias-Guiu, Temprana-Salvador, Kammerer-Jacquet, Rioux-Leclercq, & Clark, 2025](#)). Separates an installation phase from a mature deployment phase; firms stuck in the former suffer operational friction and slower asset turnover, pulling ROA down.

Empirical evidence splits. One camp finds digitization lifts performance through supply chain and ESG gains ([Chen, & Wang, 2024](#); [Nam, & Chang, 2026](#); [Wu, Li, Liu, & Li, 2024](#); [Xie, & Wang, 2023](#); [Zhao, Meng, Wang, Alam, & Zhang, 2023](#)). The other documents a digitalization paradox, such as [Guo et al. \(2023\)](#) find it impairs Chinese firms' profitability, [Daeli and Wedari \(2025\)](#) find the same in Indonesian banks, and [Dehnert \(2020\)](#) and [Abdurrahman \(2022\)](#) confirm it through different methods. The digital productivity paradox and Agency Theory's empire-building mechanism converge on the same prediction ([Cruz, 2025](#); [Han, 2026](#); [Matias-Guiu et al., 2025](#)). Digital transformation depresses short-term ROA in Indonesian manufacturing firms, whose thin margins amplify any near-term drop. Based on this argument, the study proposes the following hypothesis:

H₁: Digital transformation has a negative effect on firm performance (ROA) in the short term

2.2.2 The Moderating Role of CFO Co-optation on the Digital Transformation–Performance Nexus

Resource Orchestration Theory holds that firm performance depends less on which resources a firm owns and more on management's capacity to deploy them ([Sirmon et al., 2011](#)). Digital transformation tests this claim: it demands sustained managerial intervention and rapid capital reallocation, not a one-time purchase ([Chen & Wang, 2024](#); [Nam & Chang, 2026](#)). A firm pursuing digital transformation without executive alignment accumulates restructuring costs and delays that drag down ROA. CFO co-optation changes this trajectory: an appointment made during the sitting CEO's tenure builds strategic consensus and removes friction between intent and execution ([Oradi et al., 2025](#)), letting the CFO mobilize capital with less board friction.

Empirical evidence splits along a governance fault line, beyond the cost findings already discussed ([Cruz, 2025](#); [Han, 2026](#); [Matias-Guiu et al., 2025](#)). Agency Theory treats co-optation as a governance weakness that compromises board monitoring ([Coles et al., 2014](#); [Shams et al., 2025](#)). Upper Echelons Theory tells a different story: CEO-CFO alignment speeds decisions and improves capital allocation during major transitions ([Wu et al., 2024](#); [Zhao et al., 2023](#)). Resource Orchestration Theory supplies the mechanism this hypothesis tests: alignment eases digital transformation's friction ([Oradi et al., 2025](#)), and a co-opted CFO clears the path for capital deployment rather than blocking it. Indonesian manufacturers, facing tight margins and regulatory pressure, stand to gain most from this

buffering effect ([Rudyanto, 2023](#)). Based on this argument, the study proposes the following hypothesis:

H_2 : CFO co-optation reduces the negative effect of digital transformation on firm performance

3. Research Methodology

This study uses a quantitative panel design for Indonesian manufacturing firms across three consecutive years, 2022 through 2024, listed on the Indonesia Stock Exchange during this window. We chose a three-year window rather than a longer horizon because CFO tenure data for Indonesian manufacturing firms becomes less reliable further back, and a shorter, well-verified panel serves this study's purposes better than a longer panel built on shakier appointment records. We then applied a purposive, non-probability sampling technique and filtered that population against a strict, step-by-step set of criteria: firms had to remain listed for the entire three-year window, publish complete audited annual reports for each year, and report the disclosures needed to code CEO and CFO appointment dates. After we applied every filter, 95 manufacturing firms survived the screen. Because we observe each of these 95 firms across three years, the final dataset yields 285 balanced firm-year observations, and we use this panel as the estimation sample for every model. We measure firm performance, the dependent variable, through Return on Assets (ROA)_it equals net income after tax for firm i in year t divided by that firm's total assets at fiscal year-end, and this ratio captures management's efficiency in turning the asset base into earnings ([Lestari & Kholid, 2024](#); [Sa'diyah, Isthika, Triono, & Oktafiyani, 2025](#)).

3.1 Measurement of Digital Transformation

We operationalize digital transformation, the independent variable, through computerized text-mining content analysis of each firm's annual report. Specifically, DT_it equals the natural logarithm of the raw frequency of digital-technology keywords, normalized by the total word count of the annual report ([Lestari & Kholid, 2024](#)). We constructed the keyword dictionary based on the technology taxonomy through a systematic review of 156 studies on digital transformation in manufacturing. The taxonomy groups digital technologies into five categories, and we adapted representative terms from each category to reflect the terminology commonly used in Indonesian manufacturing firms' annual reports. The categories and representative keywords included in the digital transformation dictionary are presented in Table 1.

Table 1. Keyword dictionary for digital transformation

Category	Representative keywords included in the dictionary
AM Technologies	3D printing, additive manufacturing, digital manufacturing, rapid prototyping
Advanced Manufacturing Systems (Industry 4.0/IIoT)	Industry 4.0, Internet of Things (IoT), cyber-physical systems, smart factory, robotic process automation, automation, smart manufacturing
ICT	Big data, cloud computing, digital technology, information systems, Enterprise Resource Planning (ERP), artificial intelligence
Innovation Process	Digital transformation, digitalization, technological innovation, digital maturity
Digital Design Tools	CAD/CAM, digital design tools

3.2 Text-Mining Procedure and Software

We conducted the text-mining analysis in NVivo 14. For each firm-year, we imported the audited annual report as a PDF source file, ran a word-frequency query restricted to the keyword dictionary above with stemming enabled to capture morphological variants (digitize, digitized, digitizing count as one stem), and excluded a standard stop-word list plus firm-specific boilerplate (firm name, address, generic legal disclaimers) that would otherwise inflate the denominator without reflecting substantive disclosure. We then ran a text-search query on each matched keyword in context to exclude false positives, instances where a keyword appears in a boilerplate list of industry buzzwords,

a table of contents, or an auditor's disclaimer rather than in a substantive discussion of the firm's own technology use. DT_it equals the natural logarithm of the resulting keyword count divided by the total word count of the annual report body.

We code the moderating variable, CFO co-optation, as a binary indicator, such as CFO_CO_it equals 1 if the firm appointed its Chief Financial Officer after the sitting Chief Executive Officer assumed office, and 0 otherwise ([Lestari & Kholid, 2024](#)). We include three control variables. Fixed Asset Intensity, FAI_it , equals net property, plant, and equipment divided by total assets and captures each firm's reliance on physical infrastructure ([Lestari & Kholid, 2024](#)). Sales Growth, SG_it , equals the percentage change in total annual sales from period $t-1$ to period t and controls for revenue expansion ([Istiana & Rolanda, 2025](#); [Kong, Piao, Zhang, Liu, & Zhao, 2023](#); [Ningsih, Rusmianto, & Pentiana, 2025](#); [Rudyanto & Phang, 2026](#)). Executive Risk Characteristic, $RISK_it$, equals the standard deviation of EBITDA divided by total assets ([Alfiyah, Subroto, & Ghofar, 2022](#)).

3.3 Estimation Procedure and Diagnostic Tests

We processed and estimated every model in STATA Version 17 using a panel data framework. To identify the most efficient and unbiased specification among Pooled Ordinary Least Squares, the Fixed Effects Model, and the Random Effects Model, we ran three diagnostic tests in sequence, such as the Chow (F) test, the Lagrange Multiplier (Breusch-Pagan) test, and the Hausman specification test, and we selected the final model based on whichever test result the sequence indicated. We then ran multicollinearity, heteroskedasticity, and autocorrelation diagnostics to confirm the chosen model satisfies the Gauss-Markov assumptions before we interpret any coefficient. We test the hypotheses using Moderated Multiple Regression [1](#).

$$ROA_{it} = \beta_0 + \beta_1 DT_{it} + \beta_2 CFO_{CO_{it}} + \beta_3 (DT_{it} \times CFO_{CO_{it}}) + \beta_4 FAI_{it} + \beta_5 SG_{it} + \beta_6 RISK_{it} + \lambda_i + \varepsilon_{it}, \quad (1)$$

Where β_0 denotes the intercept, β_1 through β_6 denote the estimated coefficients of interest, λ_i absorbs unobserved, firm-specific, time-invariant effects, and ε_{it} denotes the idiosyncratic error term.

4. Results and Discussions

4.1 Statistical Results

4.1.1 Descriptive Statistics

Table 2. Descriptive statistics summary

Variables	Obs.	Mean	SD	Min	Max
ROA	285	0.0802	0.0616	0.0006	0.3319
DT	285	1.6386	1.2944	0	4.9698
CFO_CO	285	0.0842	0.2782	0	1
FAI	285	0.3513	0.1819	0.0159	0.8144
SG	285	0.0775	0.184	-0.5171	0.9917
RISK	285	0.0609	0.3925	0.0006	6.5384

Table [2](#) reports descriptive statistics for all 285 firm-year observations drawn from 95 Indonesian manufacturing firms listed on the Indonesia Stock Exchange between 2022 and 2024. 8.02% of the samples' total assets into net income, with meaningful spread around that average. Digital Transformation ranges from 0.0000 to 4.9698 shows firms in this sample sit anywhere from near-total silence on digital technology in their annual reports to heavy, repeated disclosure of it. 8.42% of the firm-year observations involve a CFO appointed during the sitting CEO's tenure. Executive Risk peaks at 6.5384, signaling a volatile subgroup.

4.1.2 Model Selection and Diagnostic Tests Results

We ran three tests in sequence to select the correct panel estimator. The Chow test rejects Pooled OLS in favor of a panel structure ($p < 0.05$), and the Hausman test rejects Random Effects in favor of Fixed Effects ($\chi^2 p = 0.0000$), so we estimate every model that follows using Fixed Effects. Variance

inflation factors confirm multicollinearity does not threaten the estimates: the interaction term carries the highest VIF at 3.55, followed by Digital Transformation at 3.38, CFO Co-optation at 2.39, Fixed Asset Intensity at 2.22, Sales Growth at 1.13, and Executive Risk Characteristic at 1.04, for a mean VIF of 2.28, well under the conventional threshold of 10. The Modified Wald test detects groupwise heteroskedasticity ($p = 0.000$), so we re-estimate the model with Huber-White robust standard errors clustered at the firm level, which corrects the standard errors before we interpret any coefficient. The Wooldridge test for first-order autocorrelation in panel data returns [$p=0.0395$], which detects serial correlation in the panel; the robust standard errors clustered at the firm level already reported above additionally correct for this.

4.1.3 Hypothesis Test Results

Table 3. Fixed effects panel regression analysis results (One-Tailed Evaluation)

Variables	Coef.	Robust SE	t-stat	One-tailed p	Decision
DT	-0.00496	0.00382	-1.3	0.093	Significant (10%)
CFO_CO	-0.0244	0.013	-1.88	0.03	Significant (5%)
DT × CFO_CO	0.0106	0.00513	2.07	0.019	Significant (5%)
FAI	-0.0147	0.0743	-0.2	0.421	Non-significant
SG	0.0403	0.0131	3.08	0.001	Significant (1%)
RISK	0.00062	0.00148	0.42	0.338	Non-significant
Constant	0.0904	0.0275	3.29	0.001	Significant (1%)

The Fixed Effects regression in Table 3 explains 13.8% of the within-firm variation in Return on Assets ($R^2 = 0.138$) across 285 observations and 95 firms. Digital Transformation carries a coefficient of -0.00496 (robust SE = 0.00382, $t = -1.30$, one-tailed $p = 0.093$). This coefficient points in the direction H_1 predicts, but it clears only the 10% threshold, not the conventional 5% threshold, so we treat this result as weak, marginal evidence for H_1 rather than strong confirmation. CFO Co-optation carries a coefficient of -0.02440 (robust SE = 0.01300, $t = -1.88$, one-tailed $p = 0.030$), which clears the 5% threshold and confirms that firms with a co-opted CFO post ROA about 2.44 percentage points lower than firms with an independent CFO, holding other variables constant.

The interaction between Digital Transformation and CFO Co-optation produces the coefficient this study cares about most: 0.01060 (robust SE = 0.00513, $t = 2.07$, one-tailed $p = 0.019$), significant at the 5% level. This positive sign means CFO co-optation does not add a second penalty on top of digital transformation's direct hit to ROA; it offsets part of that hit, so firms with a co-opted CFO absorb a smaller digital transformation penalty than firms with an independent CFO, which supports H_2 . Among the controls, Sales Growth carries a coefficient of 0.04030 (SE = 0.01310, $t = 3.08$, $p = 0.001$), significant at the 1% level, while Fixed Asset Intensity (coefficient = -0.01470, $p = 0.421$) and Executive Risk Characteristic (coefficient = 0.00062, $p = 0.338$) show no significant effect on ROA. The constant term sits at 0.09040 ($p = 0.001$).

We justify the 10% threshold for H_1 on two grounds rather than treating it as an automatic pass. First, the hypothesis is directional, and the one-tailed test already concentrates the rejection region in the predicted direction; a 10% one-tailed threshold carries less inferential weight than a 10% two-tailed threshold would, but it still falls short of the 5% benchmark this study applies to H_2 and to CFO Co-optation. Second, prior digital transformation studies in emerging-market settings report similarly modest effect sizes for the direct cost of technology adoption once firm and year effects absorb most of the variation (Daeli & Wedari, 2025). Suggests a small, real coefficient is a plausible outcome in this setting rather than a sign of a misspecified model. We report H_1 as receiving weak support and interpret the finding with that caveat throughout the discussion below, rather than treating a 10% result and a 5% result as equivalent evidence.

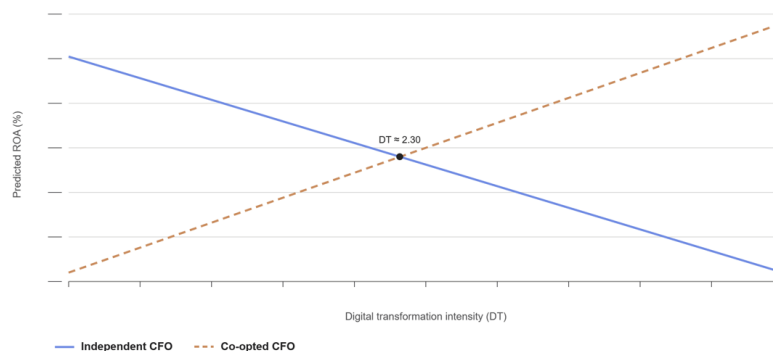


Figure 1. Predicted ROA vs. digital transformation intensity for independent vs Co-opted CEO

Figure 1 plots predicted ROA against Digital Transformation intensity separately for firms with an independent CFO and firms with a co-opted CFO, holding the control variables at the constant term. The independent-CFO line slopes downward across the observed range of Digital Transformation, consistent with the direct coefficient's sign. The co-opted-CFO line slopes upward, and the two lines cross at a Digital Transformation score of approximately 2.30, inside the observed sample range (mean = 1.64, maximum = 4.97). Below this crossing point, an independent CFO is associated with higher predicted ROA; above it, a co-opted CFO is associated with higher predicted ROA. This crossover gives the interaction coefficient a concrete, sample-relevant interpretation: co-optation only turns into an advantage once a firm's digital transformation intensity passes a specific, identifiable point, rather than helping or hurting uniformly across the full range of technology adoption.

4.2 Discussion

4.2.1 The Baseline Effect of Digital Transformation on Firm Performance: The Indonesian Digital Productivity Paradox

Our regression results show that digital transformation exerts a negative baseline effect on Return on Assets among Indonesian manufacturing firms, though the evidence for this effect is weak, clearing only the 10% significance threshold rather than the conventional 5% threshold. We interpret this result with the caution the significance level demands, and two mechanisms explain why a negative direction appears even at this modest strength. The digital productivity paradox supplies the first mechanism: when a firm integrates an ERP system, deploys industrial automation, or adopts artificial intelligence tools, it commits capital to infrastructure, absorbs a steep organizational learning curve, and pays a real integration cost before any of that investment converts into output. Firms amortize this technical debt over several years, and during that window they carry heavier operating expense ratios and slower asset turnover, which drags ROA down in the direction our coefficient shows. Agency Theory supplies a second, separate mechanism: information asymmetry between managers and shareholders around technology spending gives entrenched managers room to fund symbolic digital projects that signal modernity to the board without generating a matching return. A manager under this incentive structure allocates capital toward visible technology announcements rather than toward the automation or analytics investment that would move the needle on efficiency, and that misallocation compounds the implementation cost the productivity paradox already predicts. Both mechanisms push ROA in the same direction, which is why we observe a negative coefficient after controlling for fixed asset intensity, sales growth, and executive risk. Manufacturing firms in our sample report a Digital Transformation mean score of 1.64, with values ranging up to 4.97, spanning firms just beginning their digital disclosure alongside firms already deep into the technology adoption curve, and a moderate average effect across that range is what a real but not overwhelming cost mechanism should produce.

This finding sits inside a real literature split, and the split traces back to institutional context rather than to a flaw in either body of evidence. Our negative coefficient aligns with studies that document an implementation lag in digital investment, where operational expenditure outpaces revenue expansion during the early adoption window, a pattern visible above all in fixed-asset-heavy

manufacturing industries ([Manikas & Patel, 2020](#); [Sirmon et al., 2011](#)). Other studies report the opposite: an immediate, positive return to digitalization ([W. Guo, Zhang, & Zhou, 2026](#); [Jung & Gómez-Bengoechea, 2025](#)), and that divergence is not a contradiction once we account for where each sample of firms operates. Firms in developed economies draw on mature digital ecosystems, standardized IT supply chains, and a workforce that already carries the technical skills a digital rollout requires, so those firms convert technology spending into efficiency gains faster than a firm starting from a thinner digital base ([Erjavec, Redek, & Kostevc, 2023](#)). Indonesian manufacturers face a different starting point. They import much of their technology stack, which exposes their capital budgets to Rupiah exchange-rate swings on top of the sticker price of the equipment itself, and their supply chains show uneven digital readiness, so one supplier's slow digital adoption can stall the returns a buyer firm with a more mature digital base expects from its own investment ([Judijanto, 2025](#)). Under these conditions, technology adoption functions as a cost center for longer than it does in a developed-market firm, and the transition lag our data captures reflects this structural gap rather than any error in how firms here manage their digital rollouts. This asymmetry is a boundary condition on the productivity paradox, not a case where one literature is right and the other wrong; future work comparing transition-lag length across countries at different digital-supply-chain maturity levels would test this condition head-on.

These results carry direct weight for three groups: corporate executives, equity investors, and financial regulators. For a CEO or board weighing a digital transformation initiative, our finding rules out the assumption that a technology rollout pays for itself in the same year a firm launches it; a CEO who paces digital spending against realistic implementation timelines and pairs that spending with the organizational restructuring the rollout demands will see less of the ROA erosion our model detects than a CEO who treats a big-bang technology announcement as sufficient on its own. Investors on the Indonesia Stock Exchange should read a firm's digital transformation disclosure as a signal of future capability rather than current profitability; a market that rewards firms for announcing new technology alone, without checking whether that firm shows the organizational readiness to absorb the transition cost, sets up the entrenchment incentive our Agency Theory mechanism describes. Financial regulators, including the Financial Services Authority (*Otoritas Jasa Keuangan*/OJK) and the Ministry of Industry, have a concrete lever here, such as a targeted tax allowance or subsidy timed to the installation phase of digital transformation, rather than a blanket incentive for any technology spending, would ease the specific capital constraint our findings identify, without rewarding the symbolic, low-substance digital projects that Agency Theory predicts entrenched managers favor. None of these three groups needs to treat a negative short-term ROA coefficient as evidence against digital transformation; the finding tells each of them where the real cost sits and how long it lasts. A board that treats the first two or three reporting years after a major digital rollout as a defined cost window, rather than as a signal of a failed strategy, protects itself from the kind of short-horizon panic that can cut a promising digital investment off before it reaches the deployment phase where the return appears.

4.2.2 The Moderating Role of CFO Co-optation: A Resource Orchestration Perspective

Our interaction term flips the direction of the CFO co-optation story, and Resource Orchestration Theory explains why. CFO co-optation carries its own negative direct effect on ROA, consistent with the agency cost that a compromised financial gatekeeper produces, but the positive, significant interaction coefficient between digital transformation and CFO co-optation tells us that co-optation changes what happens once a firm enters a digital transition. Resource Orchestration Theory frames firm performance as a function of management's capacity to structure, bundle, and deploy resources, not just to hold them, and a co-opted CFO turns out to be better positioned for this deployment task during a digital rollout than an independent CFO is ([Sirmon et al., 2011](#)). An independent CFO owes the board rigorous scrutiny of every capital request and defends that scrutiny by extending review cycles, and each extension adds a delay to a digital project that already runs on a tight implementation clock. A co-opted CFO, who reached the office through the sitting CEO's tenure and shares that CEO's strategic priorities, clears technology expenditures with fewer review cycles, coordinates budget approval with the CEO's roadmap instead of contesting it, and moves capital toward the specific digital initiatives the firm has already committed to executing ([Adams & Kastrinaki, 2024](#)). This is not

a story about a co-opted CFO working harder; it is a story about a co-opted CFO removing the coordination friction that otherwise slows capital deployment during the fast-moving, capital-intensive shift digital transformation represents. Summing the direct coefficient of -0.00496 with the interaction coefficient of 0.01060 puts the net effect of digital transformation on ROA at 0.00564 for a firm with a co-opted CFO, a sign flip from negative to positive rather than a partial offset, which tells us CFO co-optation does more than cushion the digital productivity paradox for these firms; it reverses it.

This result forces a direct confrontation between two theoretical traditions, and our findings do not side with either tradition without qualification. Resource Orchestration Theory and the managerial capability literature predict what we find: executive teams that share strategic alignment execute major organizational shifts faster, and with fewer stalled decisions, than teams that do not share that alignment ([He & Harris, 2020](#); [Sirmon et al., 2011](#)), and our positive interaction coefficient is a direct empirical instance of that mechanism at work. Classic Agency Theory predicts the opposite baseline story, and it also turns out to be correct on its own terms: standalone CFO co-optation still degrades firm value through reduced board monitoring, the pattern governance scholars have long argued for ([Duong et al., 2020](#); [Sarang et al., 2026](#); [Valenzuela & Zheng, 2023](#)). Our data do not resolve this disagreement by declaring one theory wrong; the data show that both theories are correct within different operating conditions. Agency Theory's monitoring-failure story holds during stable operations, when a firm gains more from an independent CFO's scrutiny than it loses from any coordination friction that scrutiny creates. Resource Orchestration Theory's alignment story takes over during a capital-intensive, fast-moving shock like digital transformation, when the cost of coordination friction rises faster than the value of independent monitoring ([Sirmon et al., 2011](#)). This is a boundary-condition finding, not a referendum on which governance theory deserves priority, and it suggests that the entrenchment risk classic Agency Theory identifies is real but context-dependent rather than universal. A firm that never undertakes a major digital transition may gain nothing from CFO co-optation and pays only the direct agency cost our model detects, while a firm mid-transition gains an offsetting benefit large enough to flip the net effect of digital transformation into positive territory, which means the same governance arrangement helps one firm and hurts another depending on what strategic task that firm faces in a given period.

This contingency carries specific implications for how boards, CFOs, and regulators structure governance around digital transformation. Boards of Commissioners and nomination committees should treat executive alignment as an asset during a digital restructuring window rather than as a red flag by default; a nominations process that screens every CFO candidate for independence from the CEO alone risks selecting against the exact alignment that our data show buffers a firm's ROA during a technology transition. For CFOs and finance teams, this finding redefines the job during a digital rollout: the function shifts from a passive monitor who signs off on completed budgets to an active orchestrator who moves capital toward the CEO's digital roadmap before delays compound the underlying implementation cost. Regulators such as the OJK face a harder balancing act than a single governance rule can resolve; a blanket mandate that maximizes CFO independence across all firms and all periods would strengthen monitoring during stable operations but would also strip away the coordination advantage our data associate with co-optation during a digital transition, at the moment firms need that coordination most. A more calibrated regulatory stance, one that permits temporary executive alignment during a declared digital transformation initiative while preserving independent oversight the rest of the time, would let firms capture the buffering effect our results document without abandoning the monitoring protection Agency Theory exists to provide. Such a stance could take a concrete form: a disclosure requirement tied to the digital transformation initiative itself, under which a firm that appoints or retains a co-opted CFO during a declared technology transition reports the interaction to the market and the regulator as a time-bound governance choice rather than a permanent structural feature, giving both parties a way to monitor the arrangement without banning it outright.

5. Conclusions

5.1 Conclusion

This study examines the relationship between digital transformation and firm performance, with particular attention to the moderating role of CFO co-optation among Indonesian manufacturing firms. The findings indicate that digital transformation has a negative association with Return on Assets (ROA), although the evidence is relatively weak and statistically significant only at the 10% level. This suggests that digital transformation may impose short-term costs on firm performance, potentially reflecting the substantial investment and adjustment required during the adoption of new digital technologies.

CFO co-optation also has a significant negative direct relationship with ROA, indicating that co-opted CFOs may be associated with weaker firm performance under normal operating conditions. However, the interaction between digital transformation and CFO co-optation is positive and significant at the 5% level. This finding indicates that CFO co-optation weakens the negative relationship between digital transformation and ROA, suggesting that greater executive alignment may provide coordination benefits when firms undertake substantial digital transformation initiatives. Overall, the findings provide support for the moderating role of CFO co-optation and suggest that the effect of executive governance characteristics may depend on the strategic context in which firms operate.

5.2 Research Limitations

Three constraints bound these conclusions. The sample covers only manufacturing firms listed on the Indonesia Stock Exchange, so the capital structures and physical-asset intensities driving these results may not carry over to service, financial, or technology-sector firms, or to firms outside Indonesia. The three-year panel, 2022 through 2024, captures the post-pandemic acceleration in digital spending but stops short of the longer horizon a firm needs to realize a digital investment's full return, so later years could shift the balance between the direct cost and the moderating benefit this study documents. Text-mining keyword frequency proxies digital transformation intensity, and a firm's keyword density in its annual report may track disclosure habits and signaling incentives as much as it tracks the software capital the firm deploys, a gap between disclosed and real digital maturity that future measurement work should close.

5.3 Suggestions and Directions for Future Research

Researchers should extend this panel across ASEAN manufacturing markets, including Malaysia, Vietnam, and Thailand, and set capital-heavy manufacturing firms against asset-light service or fintech firms to map where executive resource orchestration stops mattering and where it never mattered at all. A longer panel, seven to ten years, would let scholars trace non-linear or lagged performance trajectories through Dynamic Panel System GMM, and pairing that quantitative model with executive interviews would surface the CFO-CEO decision dynamics a coefficient alone cannot show. Future studies should also replace or supplement keyword-frequency proxies with harder operational measures, IT expenditure ratios, cloud computing investment, and patent counts, and should fold in governance indicators such as board digital literacy and cybersecurity committee oversight to sharpen what executive alignment captures in a digital-era governance model.

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Author Contributions

AR was responsible for conceptualization, formal analysis, manuscript drafting, and final approval of the manuscript. FF and IAD was responsible for revision of the manuscript. VC was responsible for the study design and data collection. All authors have read and agreed to the published version of the manuscript.

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