A summary of

Contemporary Research in Indonesian Tax Administration

Empirical Insights and Policy Implications

Arifin Rosid, Ph.D.

v.1 | February 2026

“***The heart of science is measurement***.”

— Erik Brynjolfsson

Introduction

This summary synthesises contemporary empirical research on Indonesian tax administration drawn from fourteen studies that collectively analyse the interaction of institutions, behaviour, information, and policy. While each paper addresses a distinct issue, together they generate integrated insights with direct implications for administrative reform and policy design. Several contributions foreground institutional capacity, demonstrating that compliance outcomes depend not only on enforcement but also on organisational learning, process quality, and strategic alignment within the tax authority. Complementing this, studies on corruption perceptions and social norms show that compliance is strongly conditioned by trust, fairness, and beliefs about others' behaviour, thereby challenging purely deterrence-based approaches. A further theme is the expanding role of information and analytics: evidence on third-party reporting and machine-learning applications illustrates how enhanced data visibility can improve targeting, prediction, and evaluation, including during the Covid-19 period when tax incentives played a critical stabilising role in Indonesia. The final set of studies extends these insights to tax disputes, documenting systematic patterns in litigation outcomes and identifying opportunities for earlier resolution and greater legal certainty. Collectively, the summary illustrates how contemporary empirical research can inform more adaptive and effective tax administration, and underscores that robust policy design depends on the integration of institutional strength, behavioural insight, and high-quality information.

Content

Content (continued)

Content (continued)

“What can be asserted without evidence can also be dismissed without evidence.”

— Christopher Hitchens

A

Does strategy really drive tax performance?

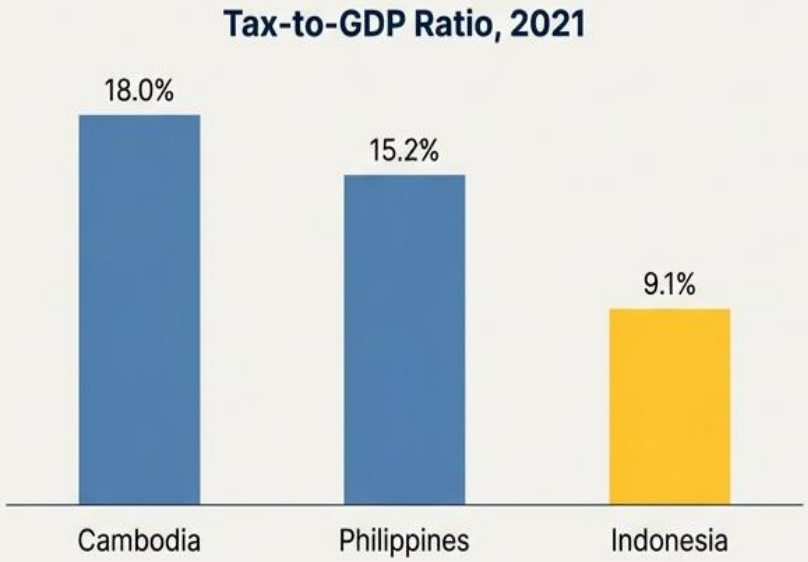
Source:

Rosid, A. (2025). Examining causal linkages in the Balanced Scorecard framework: Evidence from the Indonesian tax administration. *eJournal of Tax Research*, 23(1), 62–101.

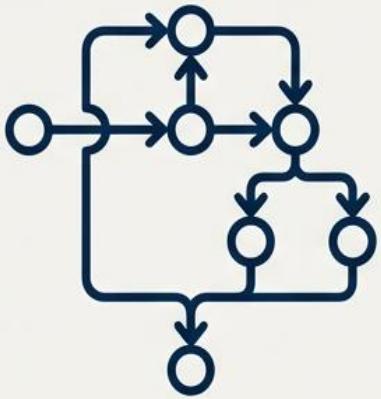
Summary

This research takes a close look at how the Balanced Scorecard (BSC) actually works in practice within the Indonesian tax administration. Using path analysis on performance data from 319 tax offices, the study asks a fundamental question: do internal strategic activities truly translate into higher tax compliance and revenue? The results point to a clear answer—taxpayer outreach and audit enforcement are the strongest levers for improving compliance. However, the story becomes more nuanced when geography enters the picture. Tax offices in Java tend to operate with higher administrative consistency, while offices outside Java depend more heavily on targeted outreach initiatives to achieve similar compliance outcomes. Perhaps the most thought-provoking finding is that higher taxpayer compliance does not always lead to proportional increases in revenue, highlighting a complex and sometimes inconclusive link between participation and fiscal returns. In response, the study argues for a shift away from rigid performance metrics toward a stakeholder-centered management model that emphasizes institutional learning and regional equity. Overall, the message is clear: effective tax administration in Indonesia requires tailored strategies that reflect its diverse socioeconomic and geographic realities, rather than a one-size-fits-all approach.

Does strategic theory translate to tangible results in public tax administration?



This study addresses a critical disconnect. On one hand, Indonesia faces formidable challenges in revenue collection, with a tax-to-GDP ratio of just 9.1% in 2021—significantly trailing regional peers like Cambodia (18.0%) and the Philippines (15.2%).



On the other hand, the Directorate General of Taxation (DGT) has implemented the Balanced Scorecard (BSC), a robust framework designed to align operations with strategic goals.

The Core Question

Can we empirically verify the causal chain of command that the BSC framework assumes? This study tests whether the intended linkages—from organizational capacity to taxpayer compliance and, ultimately, revenue—hold true in practice.

Indonesia's Directorate General of Taxation (DGT) uses the Balanced Scorecard to translate strategy into measurable outcomes.

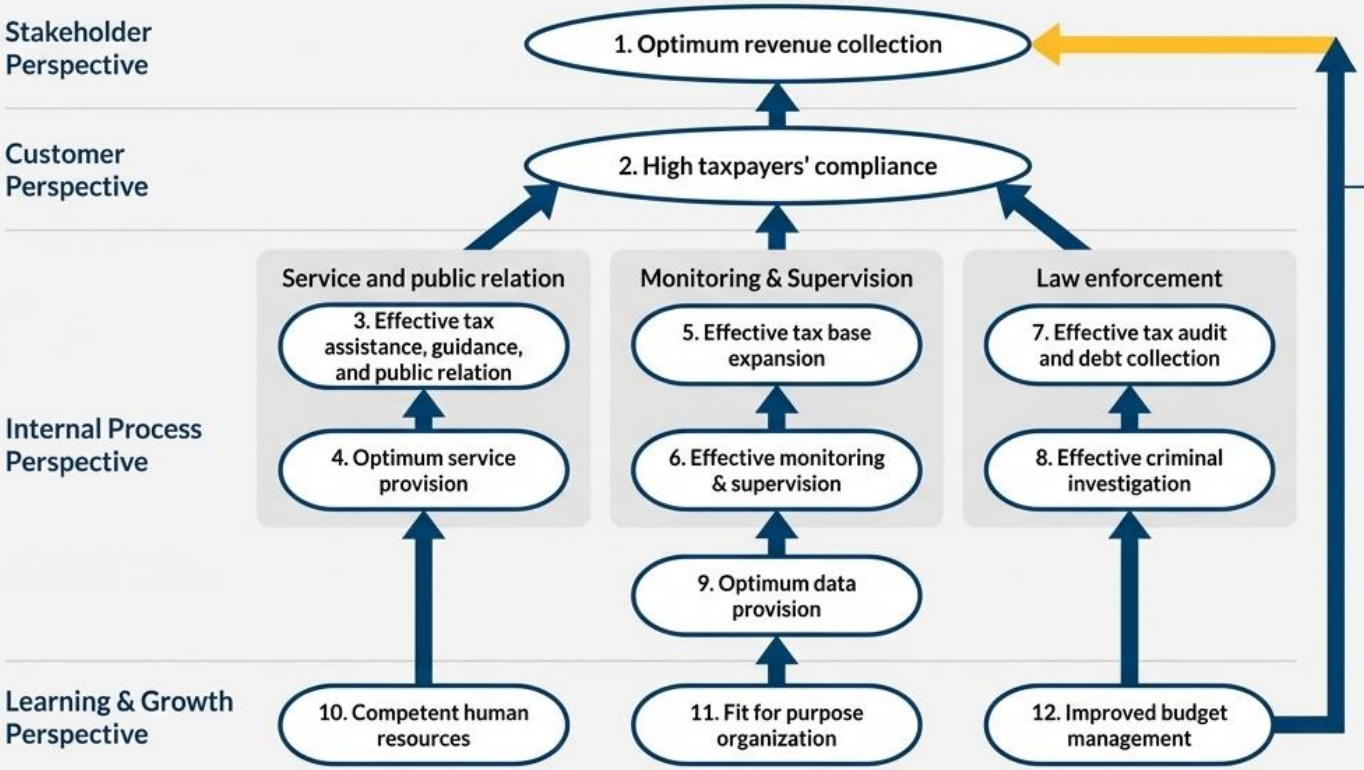
Core Principle

The BSC framework is built on hypothesized cause-and-effect relationships that link foundational capabilities (Learning & Growth) to strategic outcomes (Stakeholder).

DGT's Adaptation

The traditional 'Financial' perspective is replaced by a 'Stakeholder' perspective to better align with public value creation and societal outcomes.

The DGT's strategy map outlines a clear causal path from internal capabilities to optimum revenue collection.



Causal Logic

Improvements in **Learning & Growth** (e.g., competent staff, budget management) are hypothesized to enhance **Internal Processes** (e.g., service, supervision, enforcement). This, in turn, drives higher **Taxpayer Compliance** (Customer), ultimately leading to **Optimum Revenue Collection** (Stakeholder).

Two distinct economic realities demand a nuanced analysis.

Analytical Imperative

Failing to analyze these areas separately risks masking underlying disparities and generating misinterpreted policy implications. This study accounts for these region-specific variations to provide context-sensitive insights.

A three-step path analysis to test the strategy map's validity

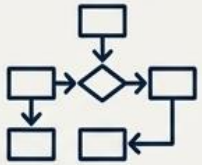
To empirically examine the causal linkages within the BSC framework, this study employed a robust three-step methodology:

1

Data Collection

A census approach was used, with hand-collected administrative data from all 319 small tax offices (Kantor Pelayanan Pajak Pratama - KPP) across Indonesia for the 2019 fiscal year. This dataset provides a nationally representative view of standard operations.

2



Model Specification

The study translated the DGT's strategy map into a testable statistical model, hypothesizing causal pathways between 19 distinct Key Performance Indicators (KPIs) that represent the BSC objectives.

3

Statistical Analysis

Path analysis, a form of structural equation modeling, was conducted using IBM SPSS Amos v.26 to quantify the direct and indirect effects between variables and assess the significance of each hypothesized link.

Step 1: Assembling a Unique National Dataset

Data Source: Administrative Key Performance Indicator (KPI) data for Fiscal Year 2019.

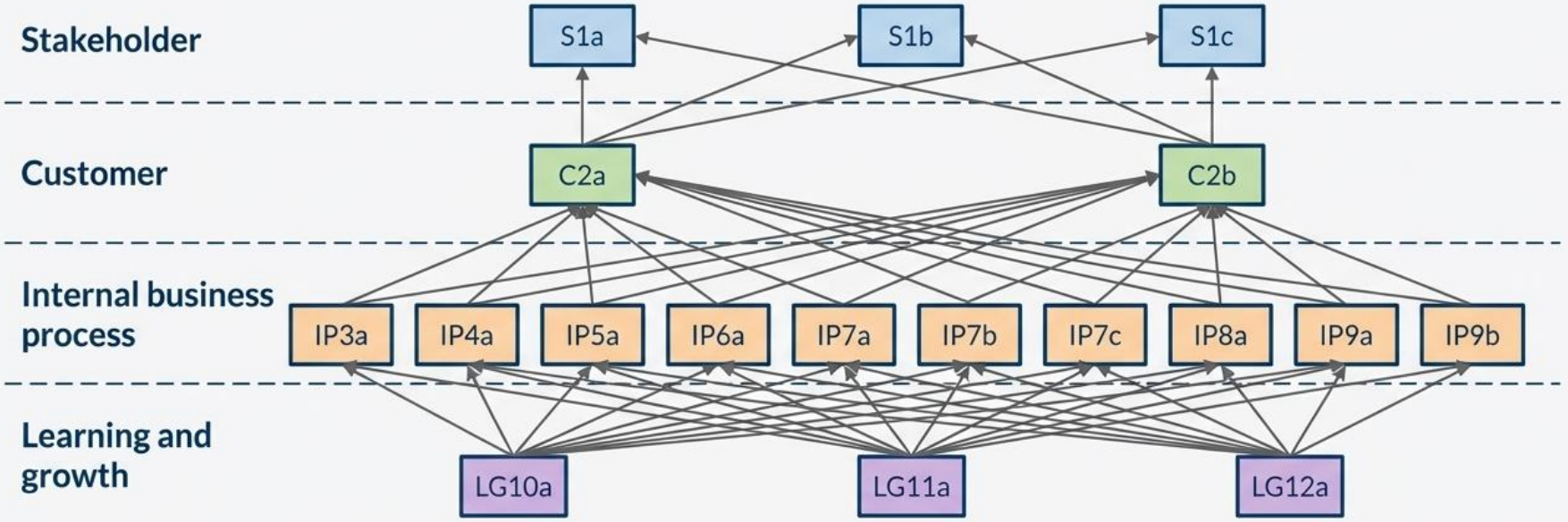
Scope: A census of all **319** small tax offices (KPP Pratama) in Indonesia.

Exclusions: 33 large and medium offices were excluded to ensure analytical homogeneity.

Core Analysis Unit: The study performs analysis at three levels:

- National (n=319)
- Java (n=176)
- Non-Java (n=143)

Step 2: Defining the Path Analysis Model



What is Path Analysis?
A statistical method used to evaluate hypothesized causal models. It allows us to measure the direct and indirect effects of each variable, testing whether the assumed causal chain holds true in reality.

Our Application
We constructed this path model to empirically test all 56 hypothesized causal linkages from the DGT's strategy map.

Translating strategic objectives into measurable metrics

The analysis is based on 19 KPIs from the DGT's official performance management system. These indicators are grouped into the four BSC perspectives:

Stakeholder Perspective

- Metrics focused on revenue outcomes, such as Percentage of Tax Revenue Realization (S1a) and Growth in Gross Tax Revenues (S1c).

Customer Perspective

- Metrics measuring taxpayer behavior, including Formal Compliance Rate (C2a) and Payment Compliance Rate (C2b).

Internal Process Perspective

- Metrics evaluating core operations, such as E-filing Participation Rate (IP4a), Payment Compliance of New Taxpayers (IP5a), and Audit Completion Rate (IP7a).

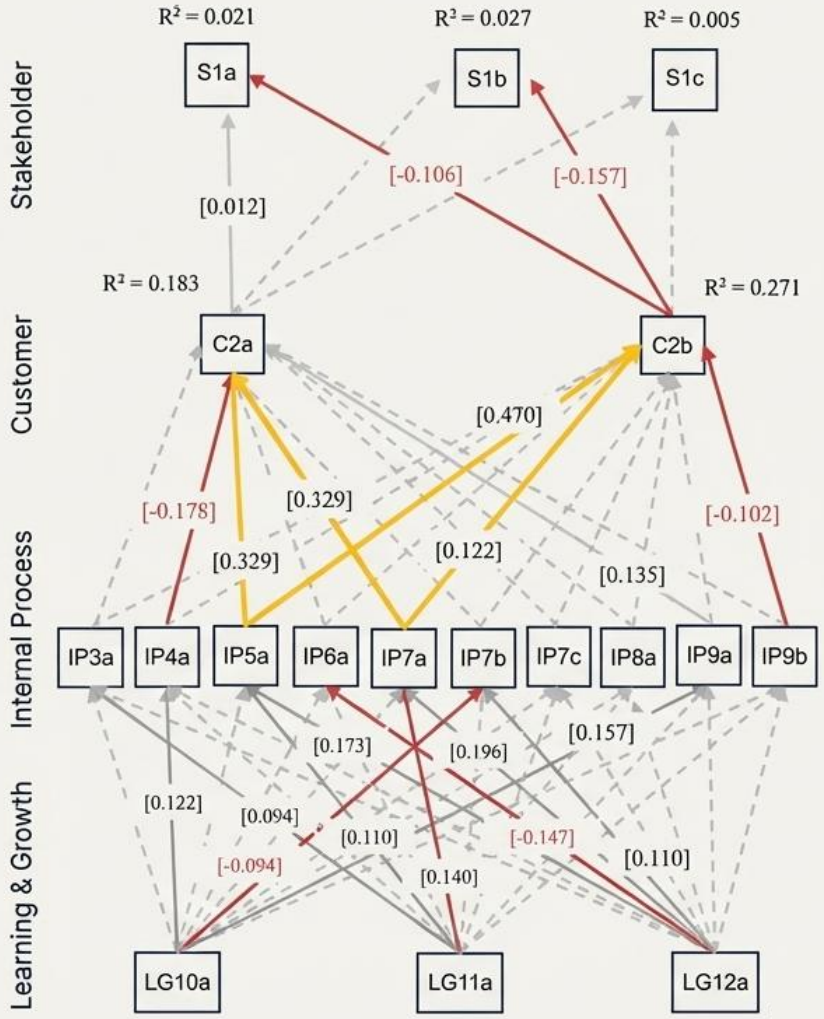
Learning & Growth Perspective

- Metrics assessing foundational capacity, including Compliance with Training Hours (LG10a) and Quality of Budget Execution (LG12a).

Outreach and enforcement activities emerge as key national drivers of tax compliance.

At the national level (all 319 tax offices), the path analysis reveals several significant relationships. The most prominent findings are:

- **Strongest Drivers of Compliance:** Taxpayer outreach (IP5a - Payment compliance of new taxpayers) and audit completion (IP7a) are the most significant positive predictors of both formal compliance (C2a) and payment compliance (C2b).
- **Key Path Coefficients:**
  - IP5a → C2a: β = 0.329
  - IP5a → C2b: β = 0.470
  - IP7a → C2a: β = 0.122
- **A Surprising Disconnect:** Payment compliance (C2b) shows a statistically significant *negative* relationship with revenue collection (S1a: β = -0.106; S1b: β = -0.157), suggesting an imbalance between compliance metrics and actual revenue targets.



A Tale of Two Systems: The Regional Divide

The national-level analysis masks critical underlying disparities. To truly understand the BSC's effectiveness, we must distinguish between Indonesia's two primary socioeconomic contexts.

Java

- The nation's economic and infrastructural hub.
- Benefits from concentrated development, government support, and mature market dynamics.
- Contains 176 of the 319 small tax offices in the study.

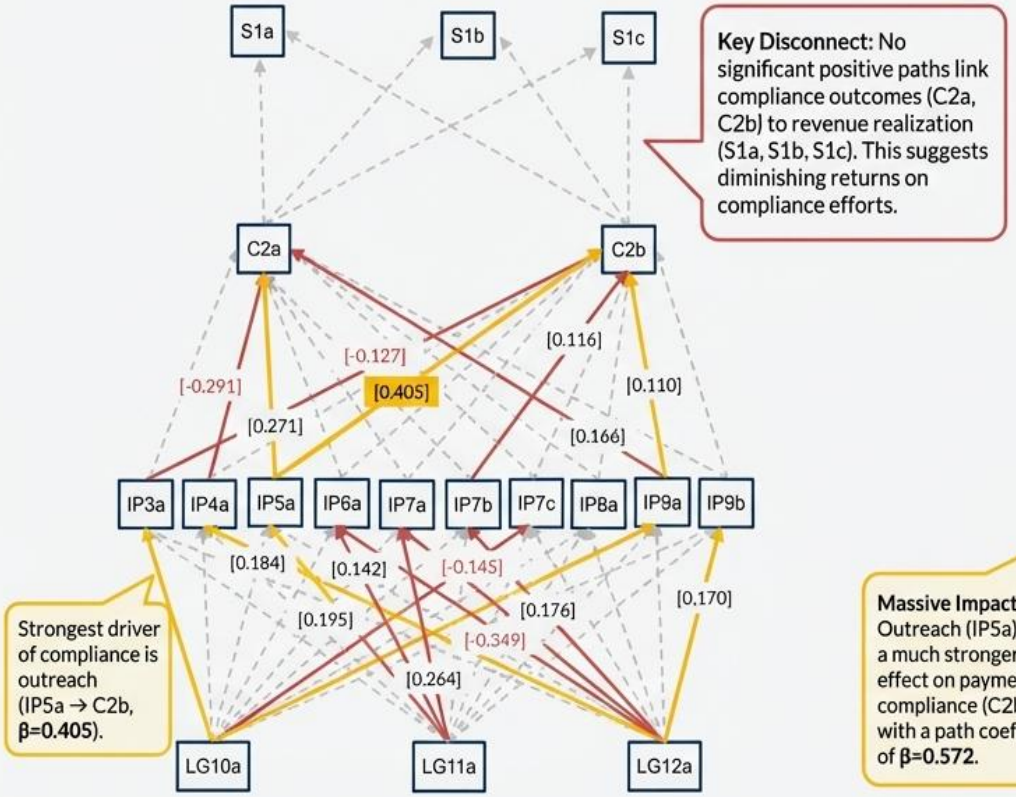
Non-Java

- Regions that often lag in economic progress and infrastructure.
- Characterized by varied environmental, demographic, and social characteristics.
- Contains 143 of the 319 small tax offices.

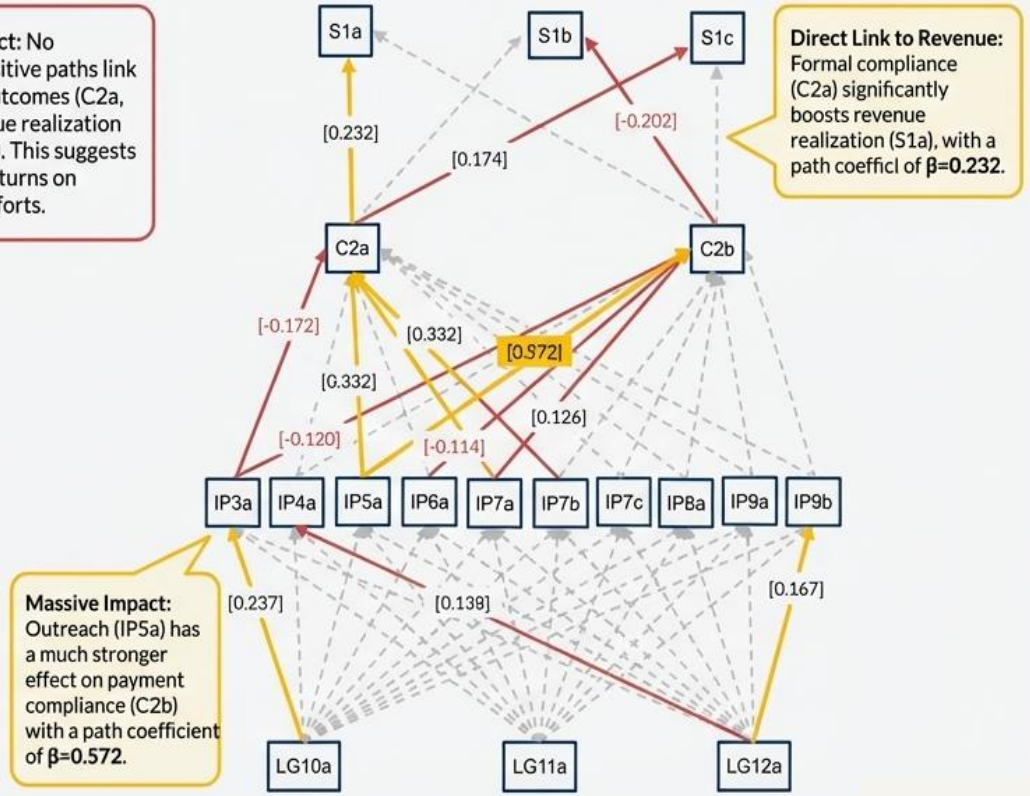
Does the BSC's causal logic operate differently in these two distinct environments?

Causal pathways are more integrated in Non-Java regions, while Java's model shows weaker links between compliance and revenue.

Java Results (n=176)



Non-Java Results (n=143)



Context is critical: administrative maturity, economic structure, and taxpayer characteristics shape strategic effectiveness.

1. Java: A Mature System with Saturation Effects

Well-established processes and higher compliance levels may lead to diminishing marginal returns.
The strategic focus must shift from the *quantity* of compliance to its *quality* and innovation in enforcement.

2. Non-Java: Foundational Activities are Paramount

In less developed administrative contexts, core activities like taxpayer outreach, fair audits, and building trust yield more direct and significant results.
Investments in basic **institutional capacity** are the primary drivers of performance.

3. Overall Implication: The Model Needs Adaptation

A standardized, one-size-fits-all BSC approach is failing. The

DGT's framework must be adapted to account for these crucial regional dynamics.

One size does not fit all: The case for adaptive performance management

Empirical Validation

It provides rare empirical evidence supporting the need for regionally differentiated strategies in public sector performance management. A uniform national strategy is suboptimal.

Rethinking KPIs

The weak compliance-to-revenue link in Java suggests a need to refine performance indicators. Mature systems may require metrics that capture the *quality* of compliance, not just the quantity.

Public Sector Adaptation

The results reinforce the argument that public sector BSC models should prioritize stakeholder trust and service equity, not just financial outcomes. In Non-Java regions, foundational service and enforcement build the trust necessary for compliance.

Four strategic imperatives to enhance Indonesia's tax administration

Based on the empirical findings, this study proposes a roadmap for a more effective and equitable DGT, centered on four key actions:

1. Adopt a Regionally Adaptive BSC

Move beyond a uniform national model. Tailor KPIs, targets, and strategic priorities to the distinct contexts of Java and Non-Java regions.

2. Institutionalize Continuous Learning

Invest in staff development, technology, and robust data analytics. Use the BSC not just for reporting, but as a dynamic tool for evidence-based decision-making.

3. Prioritize Regional Equity

Strengthen resources, accountability, and support in underserved Non-Java areas to ensure that tax administration contributes to inclusive development.

4. Ensure KPI Integrity

Standardize KPI definitions, data collection, and validation protocols across all offices to ensure performance diagnostics are accurate, reliable, and support valid causal interpretation.

Validating the BSC's causal links provides a data-driven foundation for a more equitable and effective tax system

Key Contribution

This study provides rare empirical evidence of BSC causal relationships in a public sector context. It demonstrates that for performance management to be effective, it must be context-specific and empirically validated.

Acknowledged Limitations

The analysis relies on cross-sectional data from a single year (FY2019), which precludes a temporal assessment of causal pathways and may not capture post-pandemic dynamics.

Path Forward for Research

Future studies should use longitudinal data to explore how these linkages evolve over time. Integrating taxpayer survey data and macroeconomic indicators will build a more robust and dynamic model.

B

How Corruption Undermines the Will to Comply

Source:

Rosid, A., Evans, C., & Tran-Nam, B. (2016). Do perceptions of corruption influence personal income taxpayer reporting behaviour? Evidence from Indonesia. *eJournal of Tax Research*, 14(2), 387–425.

Summary

This study examines how perceptions of corruption shape individual income tax reporting behavior in Indonesia, moving beyond technical compliance to the deeper issue of trust. Using a mixed-methods design that combines interviews and survey evidence, the research distinguishes between grand corruption, petty corruption, and tax-specific corruption to understand how each influences taxpayers' reporting decisions. The findings show a clear and troubling pattern: higher perceived corruption systematically weakens compliance by eroding positive attitudes toward the tax system. Among all forms, grand corruption involving senior officials exerts the strongest negative effect, significantly reducing individuals' intentions to report income accurately. When taxpayers believe that public resources are misused at the top, the moral justification for paying taxes deteriorates across the board. The study's contribution lies in highlighting that non-compliance is not merely a response to tax rates or enforcement intensity, but a reaction to perceived institutional integrity. The central policy implication is unequivocal. For developing economies, meaningful improvements in voluntary tax compliance require more than administrative reforms; they demand credible efforts to reduce corruption, rebuild trust in governance, and reinforce the social contract that underpins sustainable domestic revenue mobilization.

Tax Compliance is a Persistent Global Challenge, Especially in Developing Nations

The Global Context

- Tax non-compliance is a chronic issue worldwide, undermining public finance and development.
- Recent compliance strategies have shifted focus from purely economic deterrence to understanding psychological and behavioral drivers.

The Indonesian Case Study

Indonesia presents a critical case study due to two converging factors:

1. **Chronic Tax Compliance Issues:** Its individual income tax revenue to GDP (1.3%) is the lowest among its regional neighbors.
2. **Pervasive Corruption:** Ranked 88 out of 167 countries on the 2015 Corruption Perceptions Index (CPI), with a score of 36/100. 54% of Indonesian respondents felt corruption had increased in the prior two years.

The Core Question: How Does Perceived Corruption Impact Tax Compliance?

This study rigorously examines the impact of corruption perceptions on the tax reporting behaviour of personal income taxpayers (PITs) in Indonesia.

1. Pervasive Perception

High levels of perceived corruption are evident among taxpayers in Indonesia, confirmed by both qualitative and quantitative data.

2. Undermined Intentions

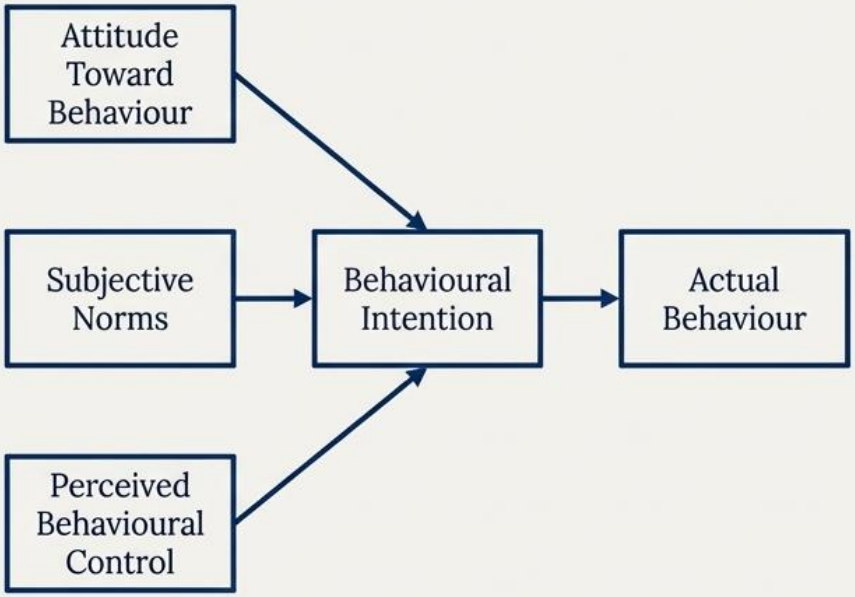
Perceptions of corruption directly and negatively undermine taxpayers' intention to accurately report their income.

3. Grand Corruption is Key

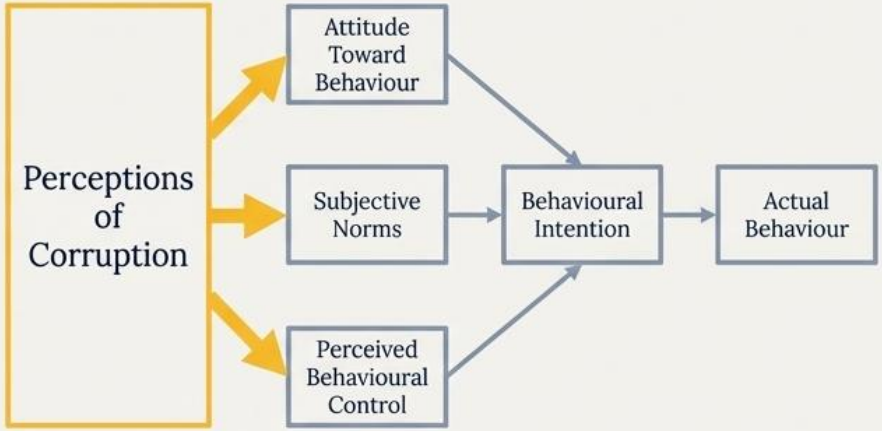
High-level ('grand') corruption has the most significant negative influence on intentional tax underreporting, more so than petty, day-to-day corruption.

Theoretical Framework: Linking Perception to Action

The Theory of Planned Behaviour (TPB)



The Study's Hypothesis



It is hypothesized that perceptions of corruption influence taxpayers' salient beliefs, negatively shaping their attitudes toward compliance and their subjective norms about what is socially acceptable behaviour.

A Sequential Mixed-Methods Approach to Build and Test Our Hypotheses

qual -> QUANT Priority Model

Step 1: Qualitative Foundation (qual)

Method: In-depth, semi-structured interviews.

Participants: 9 key stakeholders (3 taxpayers, 3 tax agents, 3 tax officers).

Objective: To clarify, modify, and develop robust variables for the quantitative phase; to generate initial hypotheses about the causal relationships.

Step 2: Quantitative Validation (QUANT)

Method: Extensive field survey using a 72-question instrument.
Participants: 397 personal income taxpayers (196 self-employed, 201 employed) surveyed across 12 tax offices in four Indonesian regions.
Objective: To statistically test the hypotheses and model the structural patterns between corruption perceptions and compliance intentions using Structural Equation Modeling (SEM).

Phase 1 Deep Dive: The Qualitative Evidence

Participants

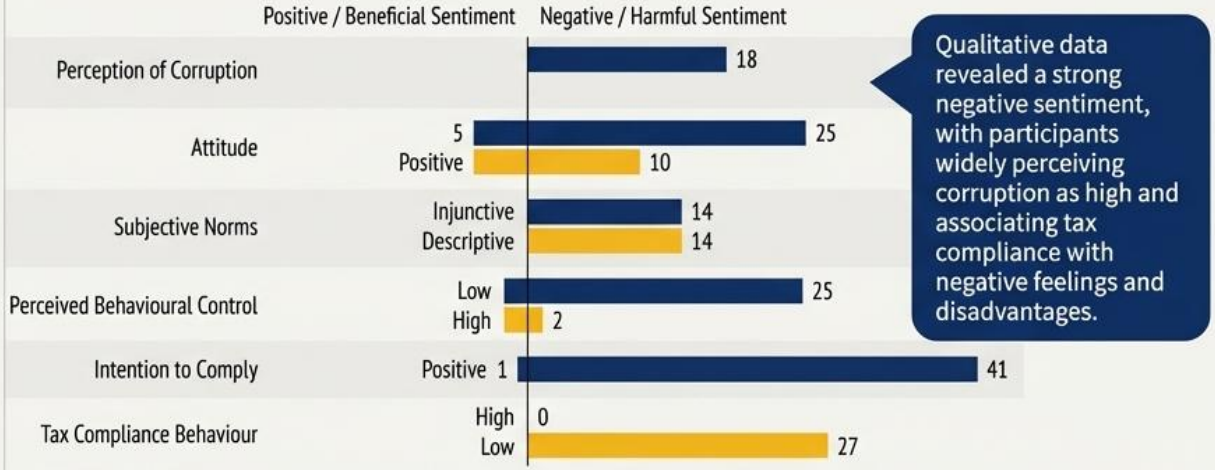
9 individuals (3 taxpayers, 3 tax agents, 3 tax officers) in East Java.

Procedure

In-depth interviews (31-76 minutes each) using semi-structured questions.

Data analyzed using deductive thematic analysis.

Key Findings Visual



Source: A professionally redesigned and simplified version of the qualitative coding chart based on original data.

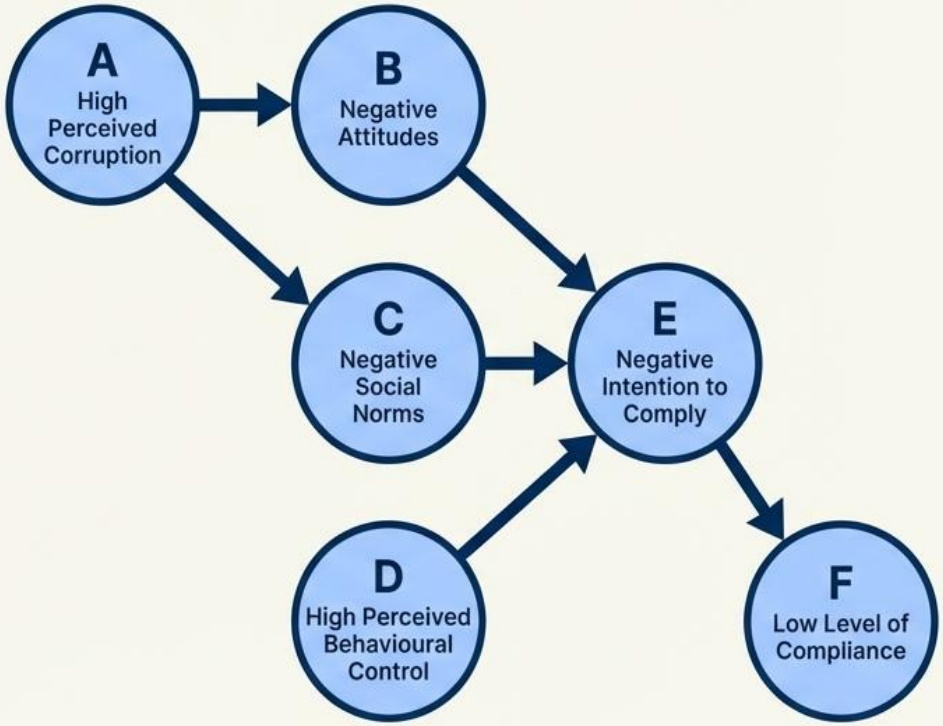
"Why should I pay tax if it is just being ***corrupted?****"*

(A sentiment expressed 18 times during interviews)

From These Clues, a Testable Hypothetical Model Emerged

The qualitative findings allowed us to propose a hypothetical causal model. This model conceptualizes that high levels of perceived corruption do not impact compliance directly, but rather indirectly by influencing taxpayers' attitudes and social norms.

This model was then rigorously tested using using survey data and Structural Equation Modeling.



Phase 2 Deep Dive: The Survey Instrument

Sample & Scope

Sample Size
397 Personal Income Taxpayers (PITs).

Breakdown
196 self-employed PITs and 201 employed PITs.

Coverage
Conducted across 12 tax offices in four Indonesian regions (Denpasar, Malang, Surabaya, Yogyakarta).

Instrument Structure
72 questions in total, using a 7-point rating scale.

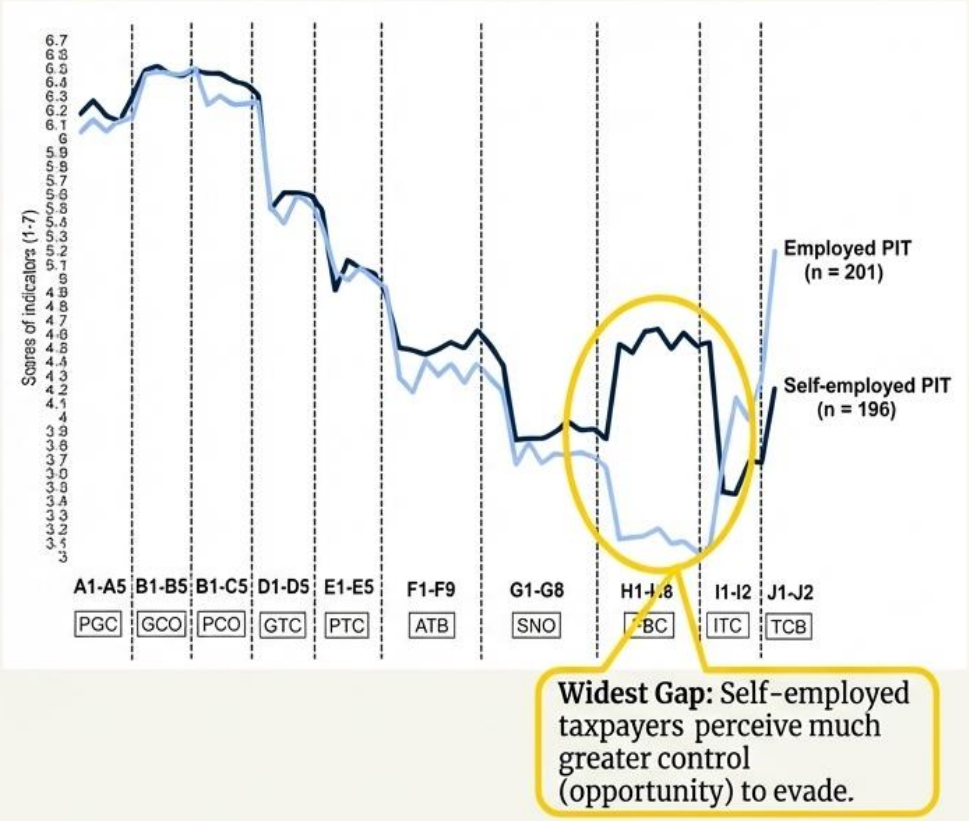
Measured Constructs

- Perceptions of General Corruption (PGC)
- Perceptions of Grand Corruption (GCO)
- Perceptions of Petty Corruption (PCO)
- Perceptions of Grand Tax-Corruption (GTC)
- Perceptions of Petty Tax-Corruption (PTC)
- Attitude Towards Tax Underreporting (ATB)
- Subjective Norm Towards Tax Underreporting (SNO)
- Perceived Behavioural Control (PBC)
- Intention to Correctly Report (ITC)
- Level of Reported Income (TCB)

Statistical Validation: Survey Data Confirms Pervasive Corruption Perceptions and Low Compliance

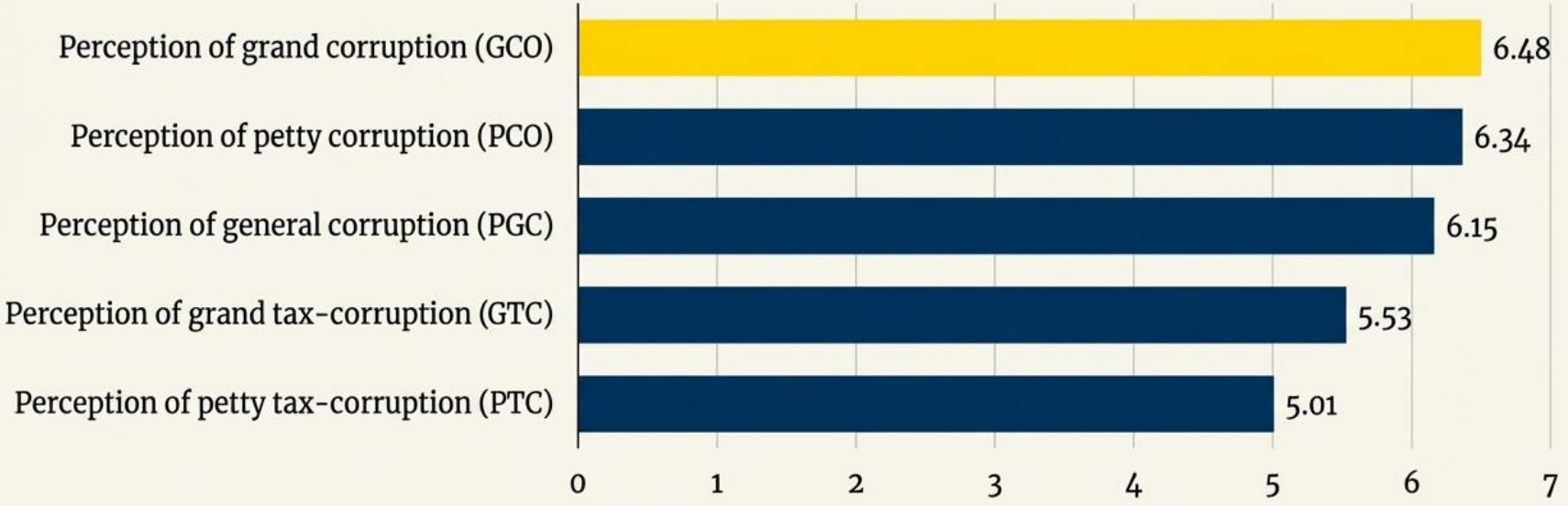
A survey of 397 taxpayers confirmed the qualitative findings on a larger scale.

- **Finding A:** Perceptions of all five forms of corruption were extremely high.
- **Finding B:** Self-reported compliance was low, particularly for self-employed taxpayers.
- **Finding C:** There was a clear opportunity gap, with self-employed taxpayers perceiving much greater control over their ability to underreport income.



Finding 1: Grand Corruption is Perceived as the Most Severe Problem

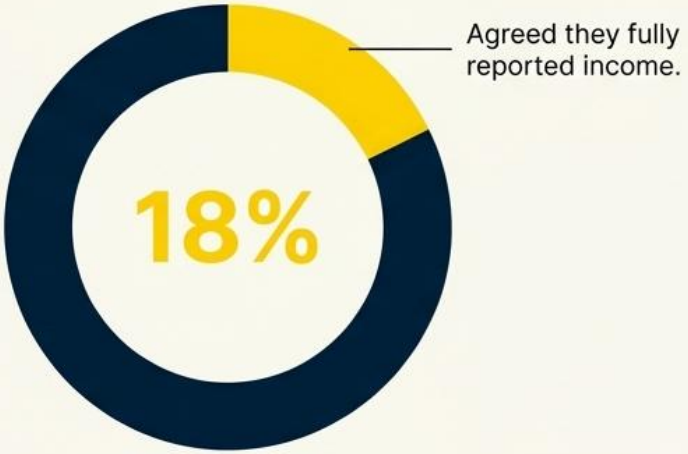
Across all 397 respondents, the perceived levels of corruption were very high. Grand corruption (misuse of power by high-level officials) was seen as the most significant, with a mean score of 6.48 out of 7. Even the 'lowest' perceived form, petty tax-corruption, scored a high 5.01 out of 7.



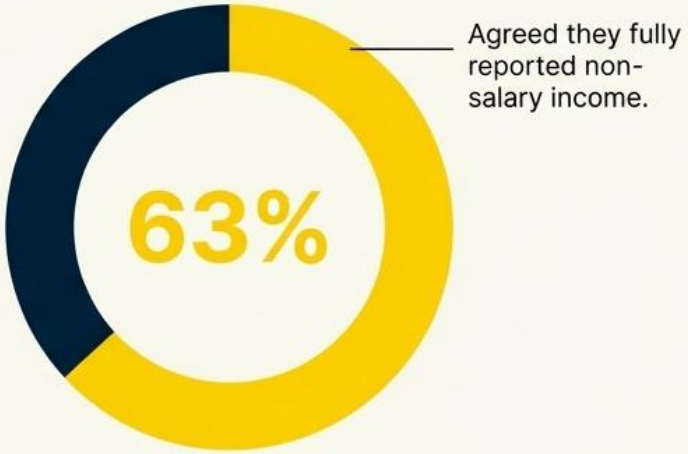
Finding 2: Only 18% of Self-Employed Taxpayers Agreed They Fully Reported Their Income

Self-reported compliance data reveals a significant gap between taxpayer types. While a majority of employed taxpayers reported their non-salary income, self-employed individuals showed widespread non-compliance.

Self-Employed (n=196)



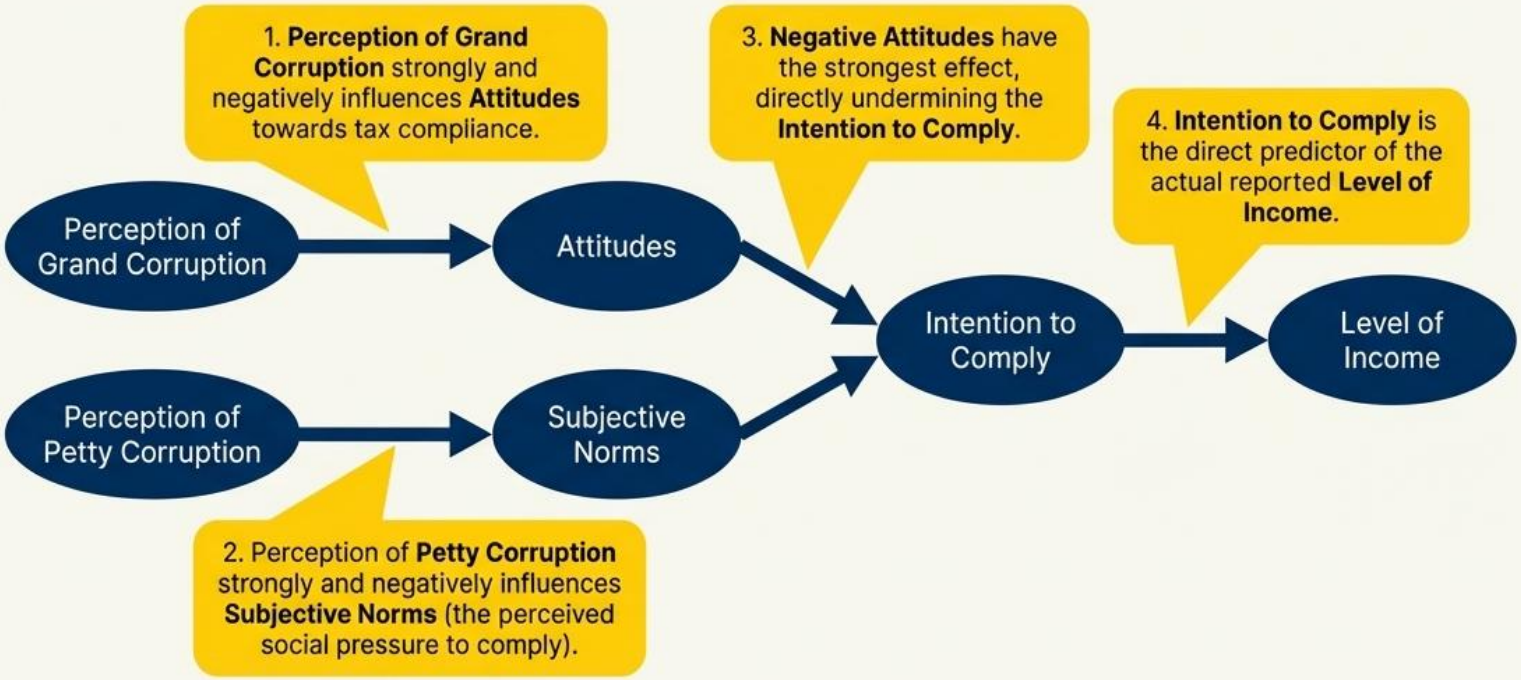
Employed (n=201)



Furthermore, 44% of self-employed taxpayers admitted to underreporting between 50% and 100% of their actual income.

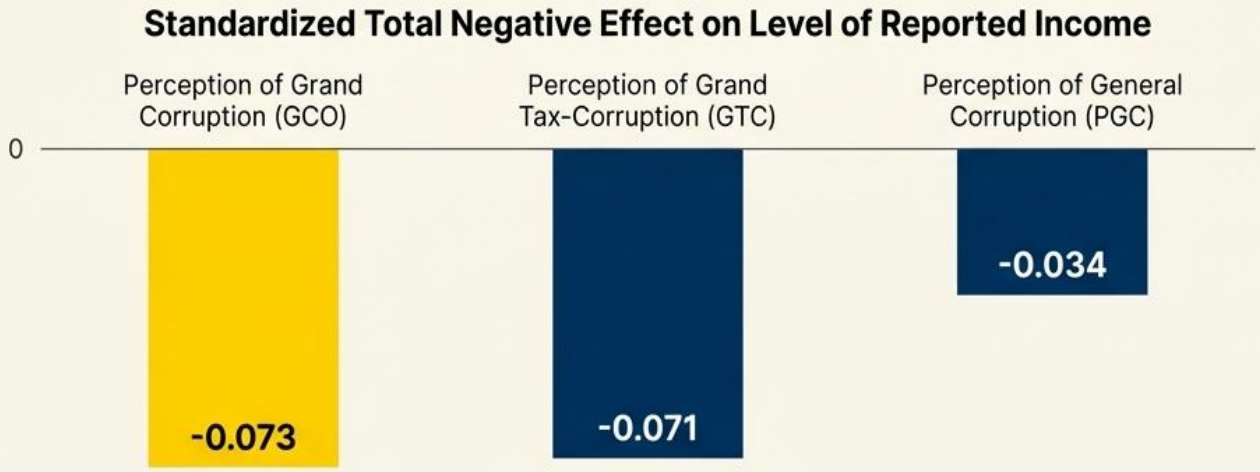
The Revealed Mechanism: How Different Corruption Perceptions Drive Non-Compliance

Structural Equation Modeling (SEM) confirms that perceptions of corruption undermine compliance through distinct psychological pathways. The model shows that different types of corruption affect either personal attitudes or social norms, which in turn influence the intention to comply.



Quantifying the Damage: Grand Corruption Has the Most Significant Total Effect on Tax Evasion

When analyzing the total indirect effects, three forms of corruption perception emerge as having a statistically significant negative impact on the actual level of reported income. Perceptions of high-level corruption are demonstrably more damaging than petty, street-level corruption.



For every one standard deviation increase in the perception of grand corruption, intentional tax underreporting increases by 0.073 standard deviations.

Perception of Petty Corruption (PCO): Not Statistically Significant

Perception of Petty Tax-Corruption (PTC): Not Statistically Significant

Conclusion: To Improve Tax Compliance, Governments Must First Address Perceptions of Grand Corruption

This study demonstrates that high levels of perceived corruption, particularly involving high-level officials (grand corruption), systematically erode the psychological foundations of voluntary tax compliance.

1. High-level corruption convinces taxpayers the system is unfair, creating negative **attitudes** toward paying taxes. →
2. These negative attitudes, more than any other factor, **reduce the intention** to report income accurately. →
3. **This** reduced intention translates directly into higher levels of intentional **tax evasion**.

The findings strongly suggest that combating high-level corruption would have a direct, beneficial effect on voluntary tax compliance in Indonesia and likely other developing nations with similar challenges.

Implications for Policy and Directions for Future Research

Policy Implications

- **Focus on the Top**: Anti-corruption efforts must be visible and focused on grand corruption to rebuild public trust. Merely cracking down on low-level tax evasion may **be ineffective** if the perception of a corrupt system remains.
- **Behavioral Interventions**: Policy should consider citizens' concerns about corruption as a primary driver of non-compliance, not just an externality. Public communication campaigns highlighting successful prosecutions of high-level officials could shift attitudes.

Future Research

- **Generalizability**: Replicating this study in countries with different levels of perceived **corruption could test the model's** robustness.
- **Other Taxpayer Types**: Investigating these mechanisms among corporate taxpayers.
- **Unintentional Non-Compliance**: Exploring the factors that drive non-compliance that is not deliberate.

C

From Corruption Perceptions to Compliance Strategy

Source:

Rosid, A., Evans, C., & Tran-Nam, B. (2018). Tax non-compliance and perceptions of corruption: Policy implications for developing countries. *Bulletin of Indonesian Economic Studies*, 54(1), 25–60.

Summary

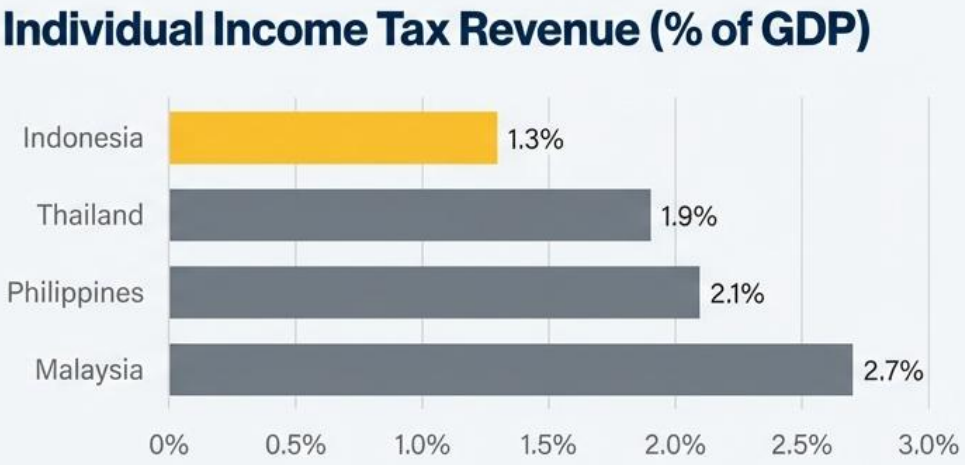
This study sheds light on a critical but often underappreciated driver of tax non-compliance in Indonesia: taxpayer perceptions of corruption. Drawing on the theory of planned behaviour, the article shows that when individuals perceive grand or petty corruption as pervasive, their attitudes toward paying taxes weaken and social norms around compliance erode. The findings are particularly striking for self-employed taxpayers, who feel they have greater control and opportunity to underreport income compared to salaried employees—an asymmetry that contributes directly to persistent revenue gaps. Beyond diagnosis, the paper offers a constructive way forward by proposing a compliance risk management framework that blends norm-based interventions, such as strengthening social expectations around honesty, with targeted enforcement for high-risk groups. The core message is clear and highly relevant beyond Indonesia: improving tax compliance is not solely a technical or administrative challenge, but an institutional one. Efforts to enhance integrity, reduce corruption, and rebuild trust in public institutions are indispensable if developing countries want to secure sustainable tax revenues and strengthen the social contract between the state and its citizens.

Developing countries face a critical and persistent tax compliance challenge.

Widespread non-compliance creates a revenue gap that hampers state-building. Indonesia's tax system exemplifies this issue.

1.3% of GDP

Indonesia's individual income tax revenue

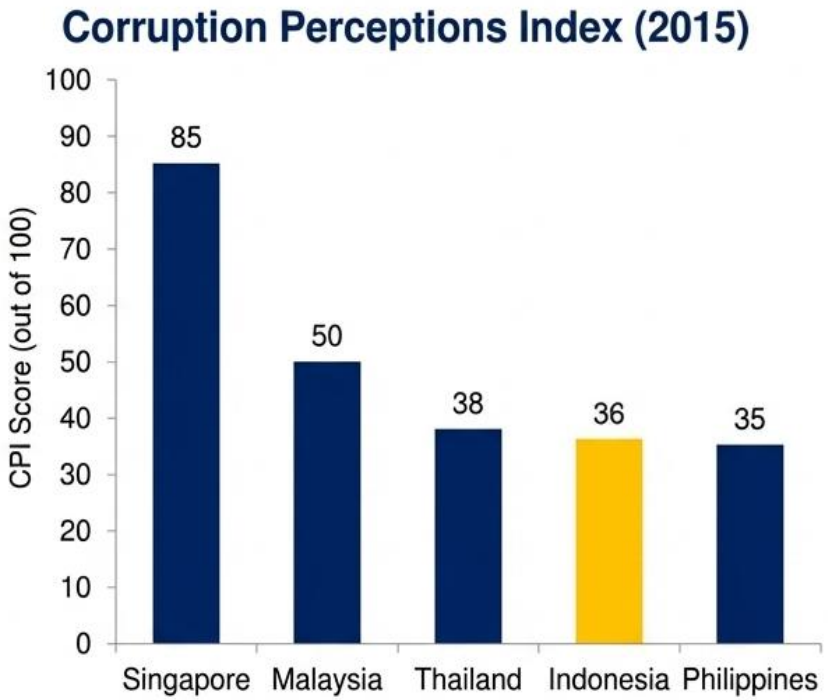


Context: The 2016–17 Tax Amnesty

The program revealed high levels of non-compliance, with 82% of participants being previously registered taxpayers and 89% of declared tax coming from individuals.

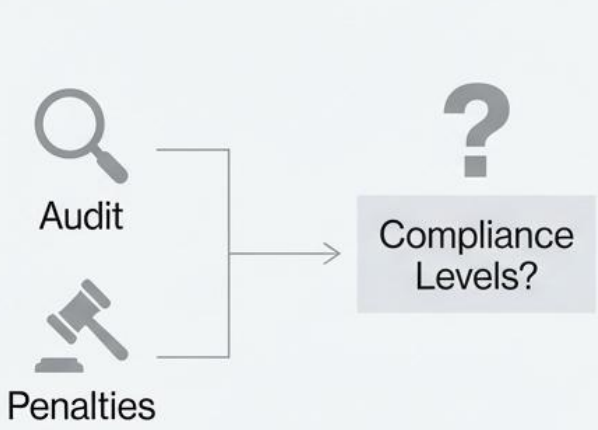
The Indonesian Case: A Crucible of Corruption and Tax Challenges

- **Major Developing Economy**
  Classified as a major developing country with persistent tax compliance issues.
- **Low Revenue Collection**
  Individual income tax revenue to GDP is the lowest among neighbours (1.3% for Indonesia vs. 1.9% Thailand, 2.1% Philippines, 2.7% Malaysia).
- **High Perceived Corruption**
  Ranked 88 out of 167 countries in the 2015 Corruption Perceptions Index (CPI), significantly lower than regional peers.



Traditional enforcement models of audits and penalties do not fully explain non-compliance.

The 'tax morale', or intrinsic motivation to pay taxes, is a critical factor. Our research posits that taxpayers' *perceptions of corruption* are a primary corrosive agent acting on this morale.



"Perceptions of corruption may be more harmful than corruption itself"
– Melgar, Rossi, and Smith 2010

To Understand the Impact, We Must First Deconstruct Corruption

Our study moves beyond a monolithic view of corruption by distinguishing it by the level of official involved and whether it occurs within the tax system. This allows for more precise analysis and targeted policy.

Defining the Variables: A Taxonomy of **Corruption**

The study examines five specific forms of perceived corruption.

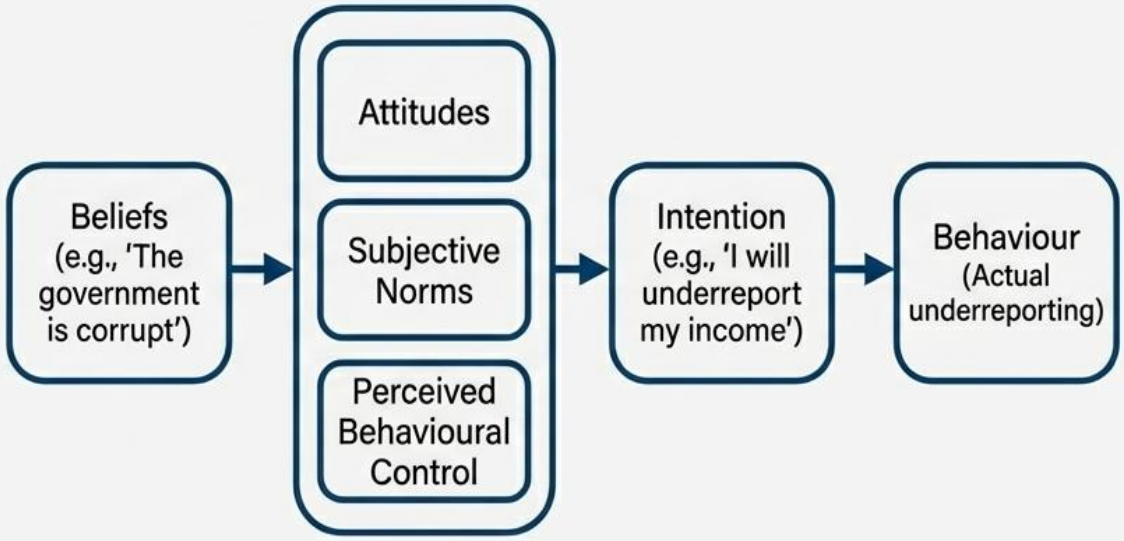
				
PGC (Perception of General Corruption)	**GCO (Perception of Grand Corruption)**	**PCO (Perception of Petty Corruption)**	**GTC (Perception of Grand Tax-Corruption)**	**PTC (Perception of Petty Tax-Corruption)**
The abuse of entrusted power by public officials for private gain.	Misuse of public power by *high-level* public officials, often involving large sums of money.	Extortion of *small payments* by *low-level* public officials in daily interactions ('grease money').	Misuse of public power by *high-level tax officials* for personal gain, often involving large illegal payments.	Extortion of *small payments* by *low-level tax officials* in daily interactions.

Our Analytical Lens: The Theory of Planned Behaviour (TPB)

Why a Psychological Approach?

Traditional economic models, based on audits and penalties, cannot fully explain tax compliance levels. The TPB provides a robust framework for understanding how external beliefs, like perceptions of corruption, shape a taxpayer's internal decision-making process.

The TPB Causal Chain



Research Design: A Sequential `qual -> QUANT` Mixed-Methods Approach

Phase 1: Qualitative Exploration

- **Method:** In-depth, semi-structured interviews.
- **Purpose:** To clarify, modify, and develop robust variables for the survey instrument.

Informs & Refines

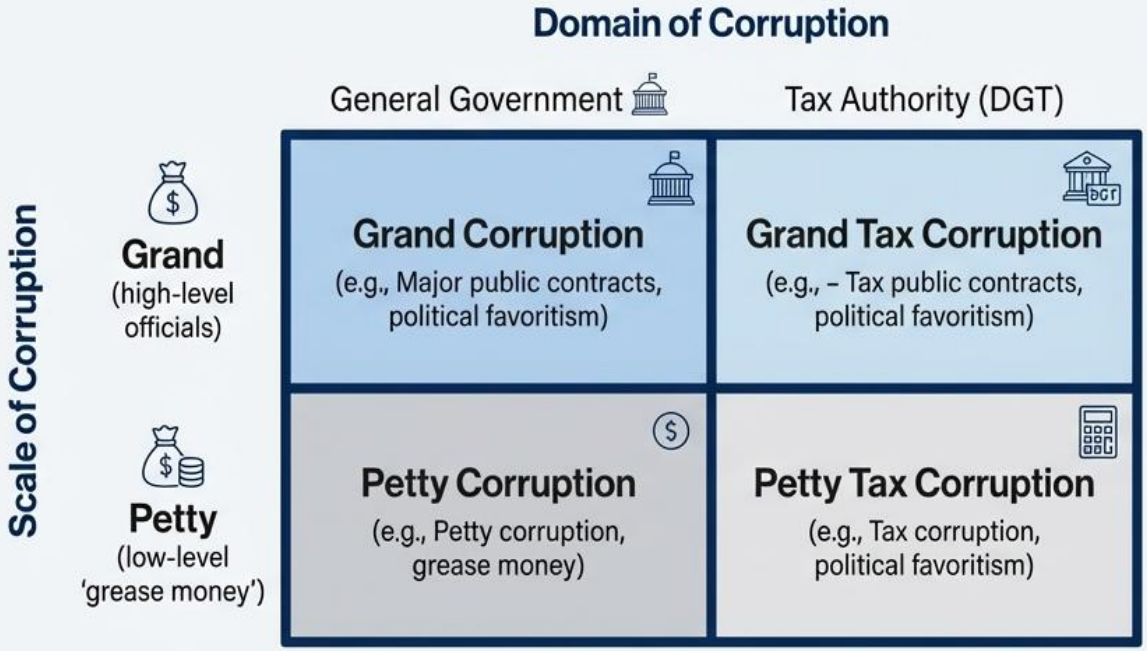
Phase 2: Quantitative Validation

- **Method:** Large-scale field survey.
- **Purpose:** To explain structural patterns and test relationships among variables using numeric measurement and quantitative analysis (SEM).

This design enhances research capabilities by grounding the quantitative survey in rich, contextual insights.

Finding 1: Taxpayers perceive corruption as pervasive and distinguish between its scale and domain.

Corruption isn't seen as a monolith. The study classifies perceived corruption along two axes: **Scale** (Grand vs. Petty) and **Domain** (General vs. Tax-Specific).

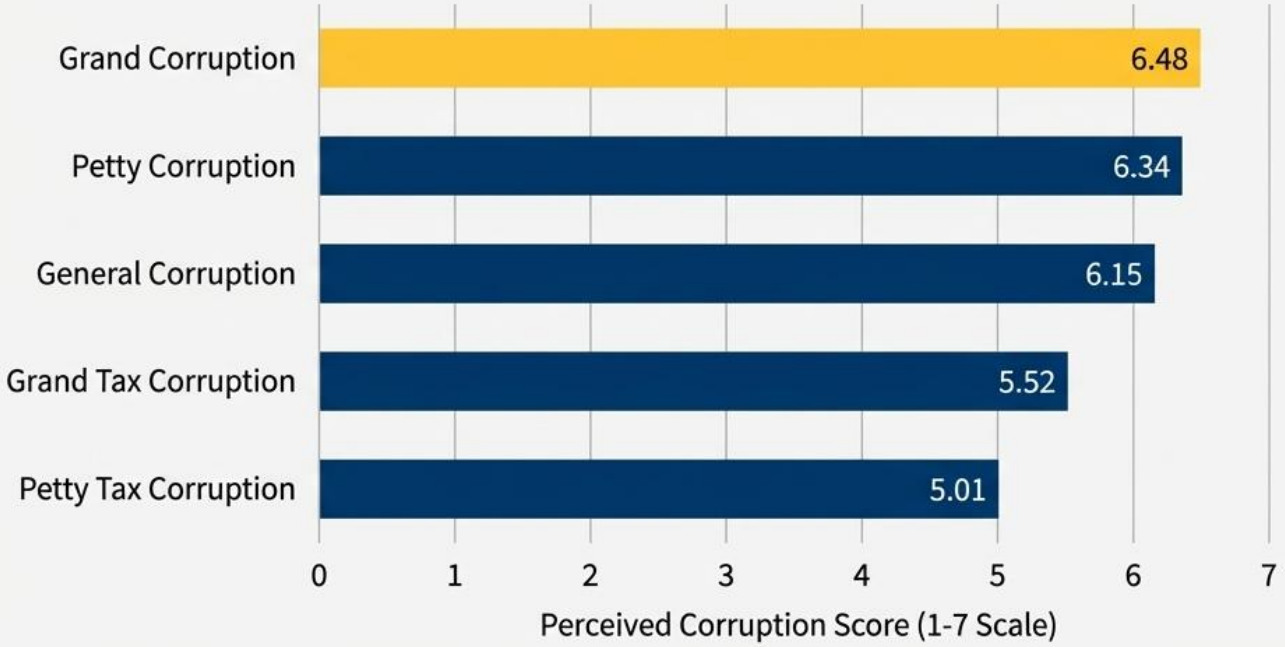


6.48 / 7.00

Mean score for perceived level of Grand Corruption, indicating an exceptionally high perception.

Finding 1: Perceptions of Corruption are Pervasive, with Grand Corruption Perceived as Highest

Survey respondents across all demographics believe corruption levels in Indonesia are very high. However, their perceptions vary significantly by type.



The highest perceived level of corruption was grand corruption, with a mean score of 6.48 out of 7.00.

Phase 2 Deep Dive: The Survey Instrument and Sample

Survey Scope

Respondents: **397** Personal Income Taxpayers (PITs)

Breakdown: **196** Self-Employed PITs
201 Employed PITs

Coverage: **12** tax offices across four major Indonesian regions

Measured Constructs

The survey employed 72 questions to measure ten core constructs using a 7-point rating scale.

Perceptions of Corruption (5 constructs)

- General Corruption (PGC)
- Grand Corruption (GCO)
- Petty Corruption (PCO)
- Grand Tax-Corruption (GTC)
- Petty Tax-Corruption (PTC)

TPB Variables (5 constructs)

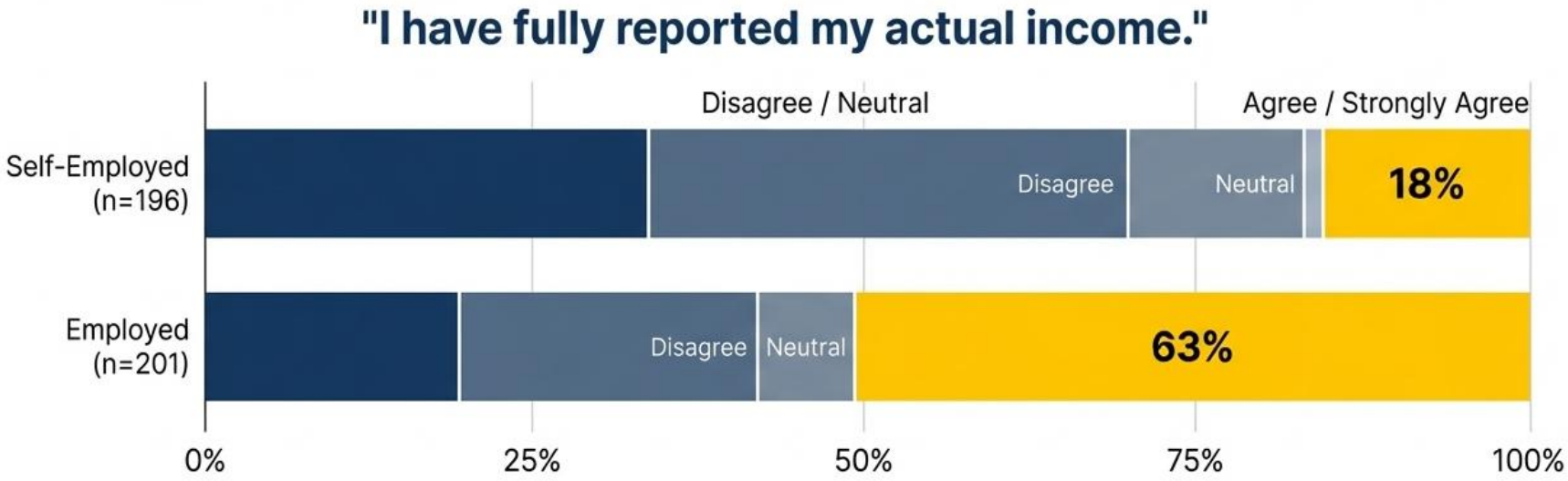
- Attitude (ATB)
- Subjective Norm (SNO)
- Perceived Behavioural Control (PBC)
- Intention to Comply (ITC)
- Level of Reported Income (TCB)

Finding 2: Perceived corruption poisons taxpayer attitudes and social norms, indirectly driving non-compliance.

The effect is not direct. Instead, different forms of corruption erode specific psychological pillars of compliance.

Revelation 2: Self-Reported Tax Underreporting is a Significant Issue

The data reveals a stark contrast in self-reported income compliance between taxpayer groups.



Stark Finding: 44% of self-employed taxpayers admitted to underreporting between 50% and 100% of their actual income.

An effective policy response requires a systematic, risk-based approach, not just more audits.

We apply the principles of Compliance Risk Management (CRM), defined as "a systematic process to select appropriate instruments to improve taxpayer compliance... based on knowledge of taxpayer behaviour."

Steps 1 & 2: The primary risk is intentional income underreporting, which is of High/Severe priority.

Risk Identification

The core risk is the intentional underreporting of income by individuals, particularly the self-employed and those with side income.

Risk Assessment

- Consequence: High - Evidenced by survey data showing 44% of self-employed underreport by 50-100%.
- Likelihood: Almost Certain - Evidenced by low intention to comply, with a mean score of 3.80 out of 7.00.

Step 3: Effective treatment requires analyzing the specific behavioral drivers of non-compliance

Attitudes

Negative psychological evaluation of paying taxes, driven by perceptions of grand corruption.

"My money will be wasted/stolen."

Social Norms

Weak social pressure to comply, driven by perceptions of petty corruption.

"No one else is honest, so why should I be?"

Perceived Control

High perceived opportunity to evade, especially for self-employed taxpayers (mean PBC score of 4.56 vs. 3.12 for employed).

"It's easy to get away with it."

Step 4: The treatment strategy must combine norm-based interventions with focused enforcement

Treatment Deep Dive: Shift norms and attitudes with carefully crafted 'injunctive' messaging.

Disseminate *injunctive* norm messages to targeted low-compliance groups. These messages focus on what is morally right, not what is common practice, as descriptive norms can backfire when compliance is low.

DO NOT USE: Descriptive Norms

"9 out of 10 Indonesians pay their tax on time."

(Feels untrue and can create distrust if perceived compliance is low)

USE: Injunctive Norms

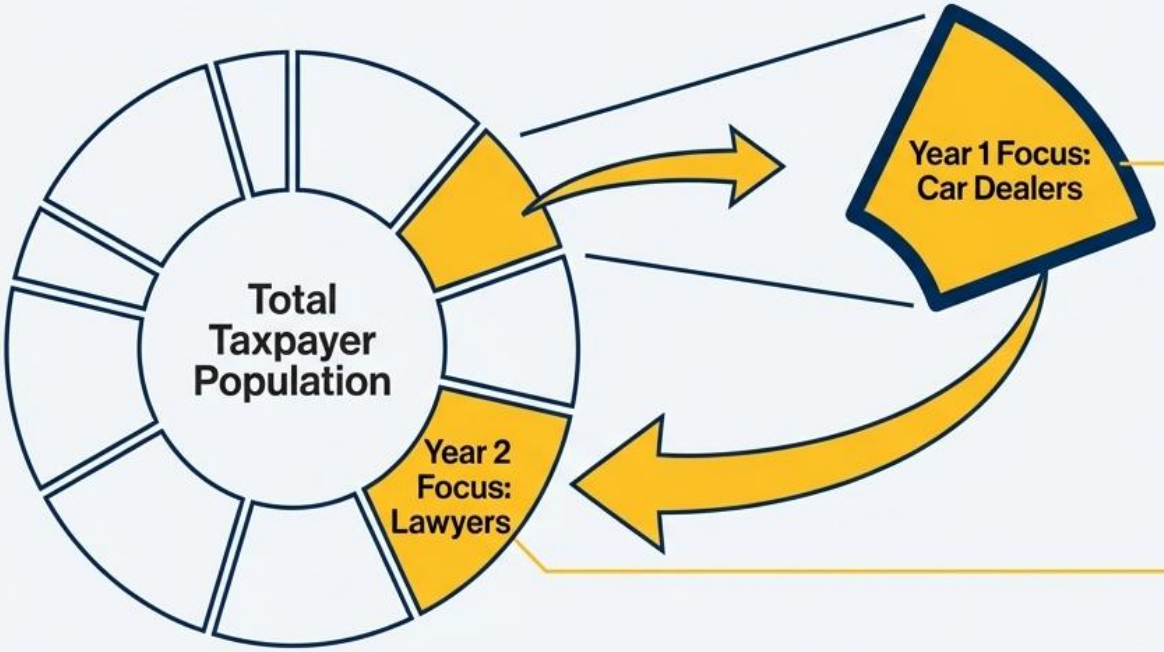
"Paying your fair share of tax is the right thing to do for our country's development."

(Appeals to moral duty and civic pride, effective regardless of perceived peer behavior)

Treatment Deep Dive: Increase the *perceived* risk of detection through rotational, focused enforcement

The Challenge

The DGT has limited resources and the actual audit rate is extremely low (0.1% target for individuals in 2014). A blanket increase is not feasible.



Publicly announce a "special audit project" on one segment, dramatically increasing their *perceived* audit probability.

Publicity creates uncertainty and leverages "availability bias" across the entire population.

Shift focus to a new segment the following year without announcing the end of the previous project.

The Integrated Solution: A Virtuous Cycle of Intervention and Enforcement

Neither strategy is sufficient on its own. Soft, norm-based interventions must be backed by the credible threat of hard enforcement to be effective. This combined approach creates a powerful, mutually reinforcing dynamic.

A behaviorally-informed, dual-pronged strategy offers a path to improved tax compliance.

1. 

The Cause is Clear: Perceptions of corruption are a major, quantifiable driver of tax non-compliance, operating through specific psychological channels (attitudes and norms).

2. 

The Diagnosis is Nuanced: Different forms of perceived corruption (grand vs. petty) require different, targeted responses. A one-size-fits-all approach will fail.

3. 

The Solution is Practical: A balanced combination of norm-based interventions and focused, rotational enforcement provides an evidence-based framework for tax authorities.

Evidence-based policy, grounded in behavioral science, is essential for mobilizing domestic revenue and fostering state-building in developing nations.

Full paper available at: doi.org/10.1080/00074918.2017.1364349

D

Why Stronger Enforcement Still Matters for Tax Compliance

Source:

Rosid, A., & Romadhaniah. (2023). Assessing the effectiveness of law enforcement on improving tax compliance in Indonesia: An empirical investigation. *Bulletin of Indonesian Economic Studies*, 59(2), 243–267.

Summary

This study offers clear empirical evidence on the role of law enforcement in shaping taxpayer compliance in Indonesia. Using internal data from 352 Indonesian tax offices and the Directorate General of Taxes' strategy map, the paper shows that audit coverage is the most powerful lever for improving both formal compliance, such as filing accuracy, and material compliance reflected in the correctness of tax payments. More importantly, the paper emphasizes that audits are most effective when supported by the credible threat of criminal investigation. Offices handling active investigation cases exhibit stronger enforcement outcomes, suggesting that legal follow-through amplifies the deterrent effect of routine audits. Based on these findings, the authors recommend that tax authorities strengthen law enforcement capacity not as a standalone punitive measure, but as an integral part of compliance strategy. Consistent audit coverage, combined with selective but visible criminal enforcement, sends a strong signal about the seriousness of compliance obligations. The central policy message is straightforward: improving tax collection in low-compliance environments requires firm, credible enforcement embedded within administrative strategy, not reliance on voluntary compliance alone.

12%

Indonesia's tax revenue collection faces a persistent compliance challenge.

Low Tax-to-GDP Ratio: Indonesia's average tax ratio is below 12%, which is lower than the average for low-income countries and has shown a decline over the past five years.

Unresolved Compliance Issues: Despite a self-assessment system being in place for nearly four decades, taxpayer compliance remains a major unresolved problem.

Identified Weakness: The Directorate General of Taxes (DGT) itself identifies "ineffective supervision and law enforcement" as a key concern in its 2015-19 Strategic Plan.

This study investigates a critical knowledge gap using the tax authority's own framework.

The Central Question:

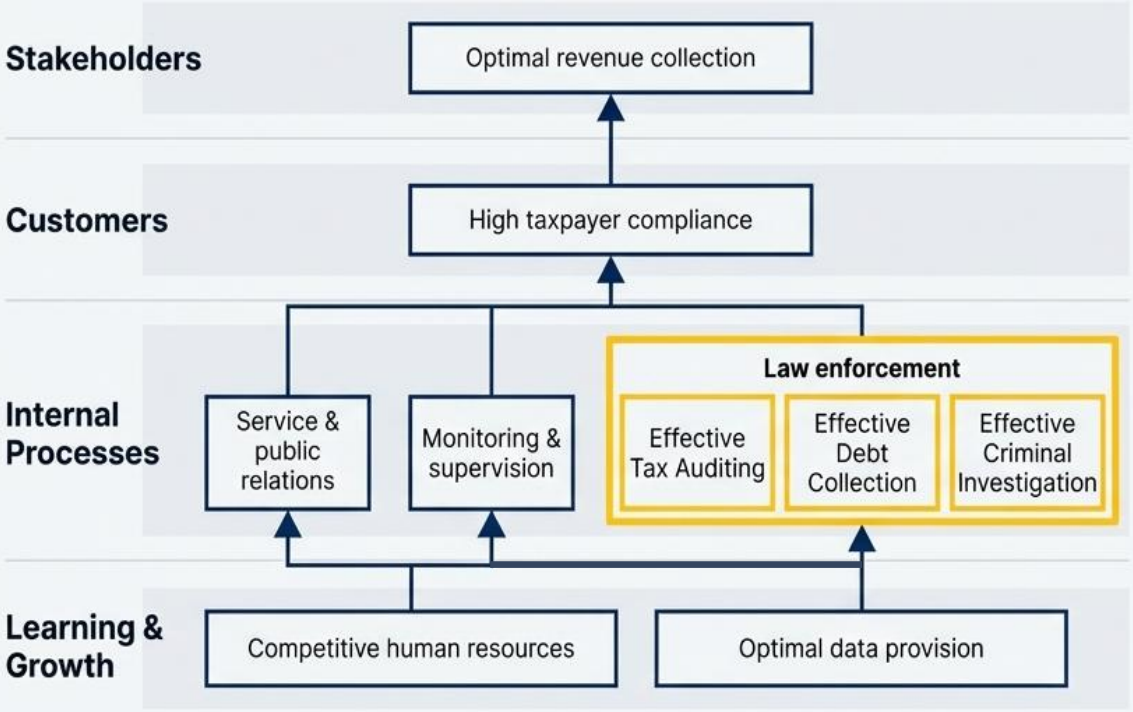
> *To what extent are law enforcement activities capable of increasing tax compliance in Indonesia?*

A Unique Analytical Lens:

Rather than using a purely theoretical model, this research empirically tests the causal relationships defined within the **Indonesian Directorate General of Taxes (DGT)'s actual strategy map**.

This provides the first comprehensive assessment of a tax authority's strategy map using administrative data from all 352 tax offices.

Step 1: The DGT's Strategy Map provides the blueprint for analysis.



The map outlines a causal chain: foundational capabilities (**Learning & Growth**) enable core activities (**Internal Processes**), which in turn influence taxpayer behavior (**Customers**) to achieve high-level goals (**Stakeholders**).

Our Focus: The effectiveness of the **Law Enforcement** process group.

- Effective Tax Auditing
- Effective Debt Collection
- Effective Criminal Investigation

The DGT's internal processes are built on three functional pillars.

Modern tax administration revolves around three core activities. This study focuses specifically on the effectiveness of the third pillar.

Services & Public Relations

Focuses on taxpayer education and assistance to encourage voluntary compliance.

Monitoring & Supervision

Involves risk assessment and oversight to ensure accuracy.

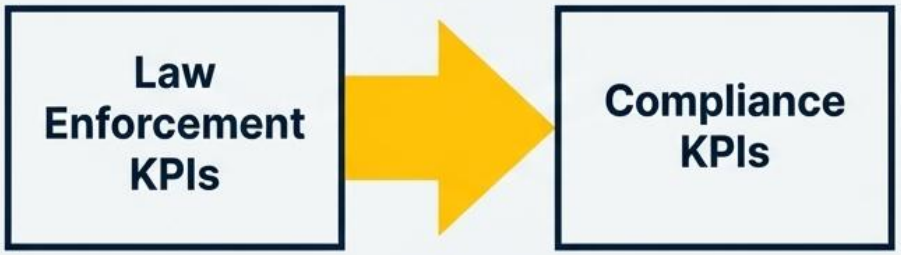
Law Enforcement

Comprises audits, collections, and investigations to deter non-compliance.

Step 2: Key metrics are defined to measure activities and outcomes.

Taxpayer Compliance (The Outcome)	Law Enforcement (The Activities)
Formal Compliance: The ratio of taxpayers who file tax returns to those who are obliged obliged to do so. (KPI: *Filing ratio*) **Material Compliance:** The ratio of taxpayers who make correct payments to those who are obliged to file returns. (KPI: *Proportion of taxpayers who paid tax*)	1. **Audit Coverage Ratio (ACR):** The likelihood of a taxpayer being audited. 2. **Non-Disputed Tax Assessment:** The quality and accuracy of the audit process. 3. **Imprisonment Proposals:** The severity of enforcement for unpaid tax arrears. 4. **Information Reporting on Tax Crime:** The initial phase of criminal investigation.

Step 3: Structural Equation Modeling (SEM) is used to test the system of causal relationships.



The Approach:
Conceptual Testing

The Tool:
Structural Equation Modeling (SEM)

This statistical technique allows us to simultaneously test all 64 hypothesized causal relationships within the DGT's strategy map. It evaluates how well the conceptual model fits the real-world data, testing the directional impact of specific law enforcement activities on tax compliance outcomes.

Step 4: The analysis is built on a comprehensive census of administrative data.

352

Tax Offices

A complete enumeration of all tax offices in Indonesia, from small to large, for the 2018 fiscal year.

19

Key Performance Indicators

Realized KPI scores for 2018 served as the empirical variables for the model.

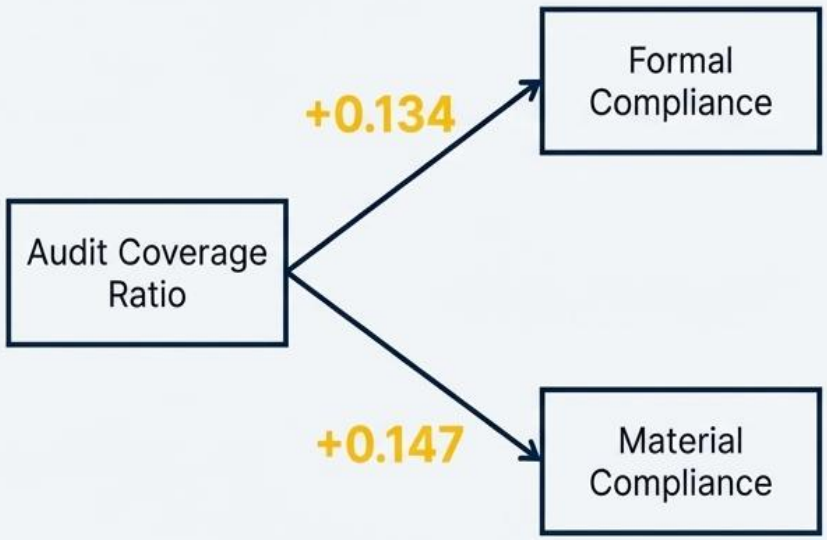
480

Criminal Investigations

A confidential list of investigated taxpayers was used to create two distinct groups for robustness testing:

- Group A: 185 offices that administered investigated taxpayers.
- Group B: 167 offices with no investigated taxpayers.

Finding 1: Higher audit coverage is significantly associated with improved tax compliance.



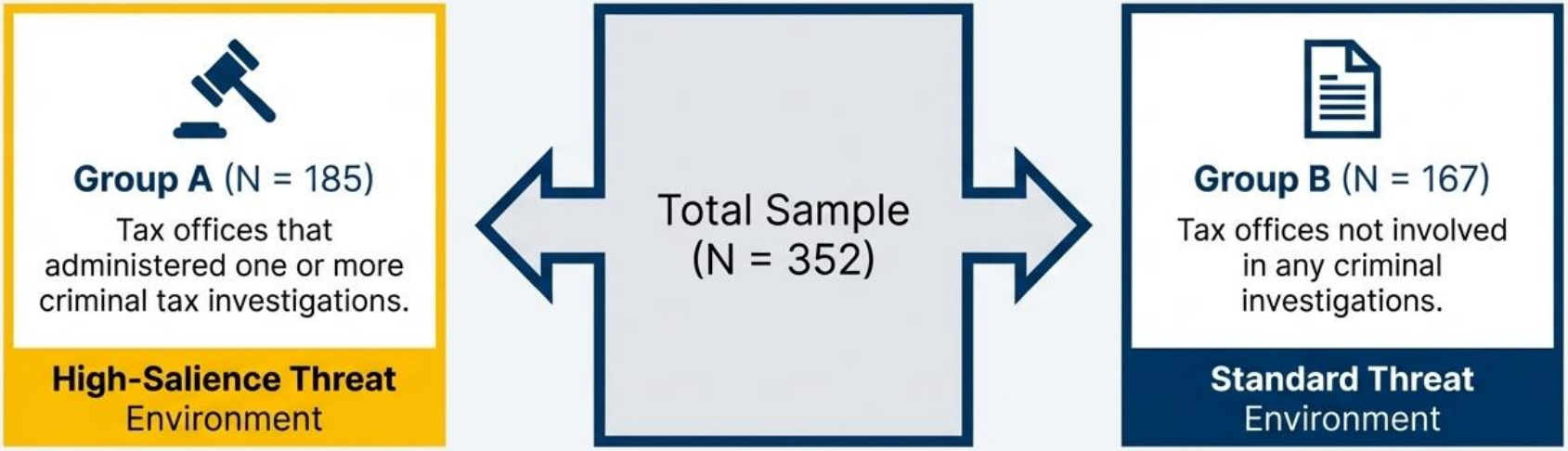
At the national level, the **Audit Coverage Ratio (ACR)** proved to be a vital factor in improving both pillars of tax compliance.

- **Impact on Formal Compliance:** A 1 standard deviation increase in ACR improves formal compliance by **+0.134** standard deviations ($p < 0.01$).
- **Impact on Material Compliance:** A 1 standard deviation increase in ACR improves material compliance by **+0.147** standard deviations ($p < 0.01$).

Conclusion: The fundamental deterrence effect of audits is empirically confirmed across the entire Indonesian tax system.

To understand the mechanism driving this effect, we conducted a robustness test isolating the impact of criminal investigations.

The national-level result is clear, but does it apply uniformly? To test this, we divided our sample of 352 tax offices into two distinct groups based on the administration of 480 criminal tax investigations in 2018.



We then re-ran the SEM analysis for each group independently.

Finding 2: The effectiveness of audits is dramatically amplified in areas where criminal investigations occur.

Impact of a 1 SD Increase in ACR on Compliance:

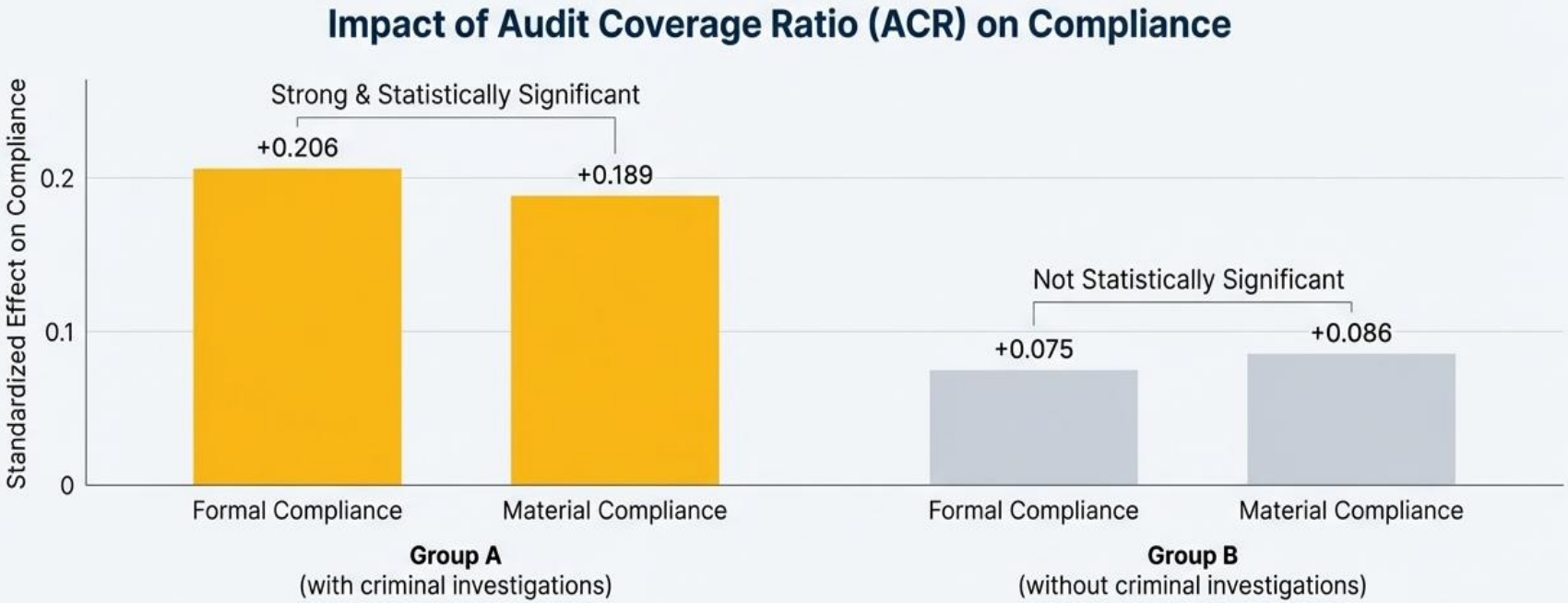
	Group A (Offices with Investigations)	**Group B** (Offices without Investigations)
Formal Compliance	**+0.206****	+0.075 (Not Sig.)
Material Compliance	**+0.189****	+0.086 (Not Sig.)

Statistically significant at $p < 0.01$

This finding suggests a powerful “network deterrent” or “spillover” effect.

Criminal investigations fundamentally amplify the deterrent effect of audits.

The positive effect of the Audit Coverage Ratio (ACR) on tax compliance is **only statistically significant** in offices that also handle criminal cases.



A consolidated view shows ACR and tax crime reporting are the most effective levers.

This summary of hypotheses tests reveals which law enforcement activities have a statistically significant impact on compliance at the national level.

Law Enforcement Activity	Impact on Formal Compliance	Impact on Material Compliance
1. Audit Coverage Ratio (ACR)	✅	✅
2. Non-Disputed Tax Assessment	✅	❌
3. Proposal for Imprisonment (Tax Arrears)	—	—
4. Information Reporting (Indication of Tax Crime)	✅	—

Key: ✅ = Positive & Significant | ❌ = Negative & Significant | — = Not Significant

The perception of severe enforcement, not just its statistical probability, drives compliance.

The findings support behavioral economic theories that complement traditional deterrence models.

- **Network Deterrent Effect:** Enforcement actions against a few taxpayers transmit information through word-of-mouth, changing the risk perception of a much wider network.
- **Availability Bias:** High-profile, severe enforcement actions like criminal investigations are more memorable and cognitively "available," causing taxpayers to overestimate the probability of being caught.

Conclusion: The *threat* of serious enforcement, made credible by actual investigations, appears to be as powerful as the statistical probability of a routine audit.

The findings suggest a more nuanced, evidence-based approach to enforcement strategy.

1. Amplify the Signal of Severe Enforcement

Instead of solely focusing on increasing the *volume* of audits, tax authorities should also amplify the *signal* of severe enforcement. Strategically publicizing completed criminal investigations can maximize the deterrent effect.

2. Integrate Deterrence with Behavioral Insights

An effective strategy integrates the "hard power" of traditional deterrence (audits, penalties) with an understanding of taxpayer psychology. The goal is to shape the *perceived* risk environment, not just the actual one.

Law enforcement is a critical driver of tax compliance, with criminal investigation acting as a key amplifier.

Conclusion:

This study provides strong empirical evidence that a tax authority's law enforcement activities, particularly audit coverage, positively impact tax compliance. This effect is significantly stronger when coupled with credible, high-stakes enforcement like criminal investigations.

Avenues for Future Research:

- Do these results documented here vary from year to year?
- Do institutional characteristics shape how taxpayers react to various types of law enforcement activities?
- How do taxpayers respond to the presence of routine audits versus random audits?

E

Do Social Norms Shape Tax Compliance?

Source:

Arsal, Y., Rosid, A., & Satyadini, A. (2025). Do taxpayers embrace social norms to comply? Empirical evidence from Indonesia. *Asian-Pacific Economic Literature*, 45(1), 1–24.

Summary

This study highlights a subtle but powerful policy lever in tax administration: social norms. Using large-scale administrative data from Indonesia, the research shows that individuals are significantly more likely to file their tax returns when they believe that people around them are also complying. In other words, perceptions of peer behavior and communal expectations strongly influence whether taxpayers report, even if they do not affect how much tax is ultimately paid. This distinction is crucial for policy design. The findings suggest that social norms operate as a complement, not a substitute, to traditional deterrence tools such as audits and penalties. Based on this evidence, the paper implicitly recommends that tax authorities incorporate norm-based strategies into compliance programs—for example, communication campaigns that highlight widespread compliance or emphasize collective responsibility. By reinforcing the idea that "people like you comply," administrations can increase reporting rates without relying solely on costly enforcement. The broader implication is clear: building a culture of collective honesty can be an effective and low-cost instrument for strengthening tax administration in developing economies, especially when paired with conventional enforcement mechanisms..

The Compliance Puzzle: Economic Deterrence is an Incomplete Story

Traditional Model

- **Traditional** models, like the **Allingham-Sandmo** framework, view tax compliance as a rational calculation of costs (audits, penalties) versus benefits (tax savings).
- However, these models **alone do not fully** explain observed compliance levels. In Indonesia, despite reforms, tax revenue remains low—just above 10% of GDP, roughly half the regional average.
- This suggests other powerful, non-economic factors are at play.

The Missing Piece?

- Social influence of ectaoters in policie, creativity namms, uzerd on social graph theratio network community graph, with salamer considerate, ouento relrefon: tax compliance sann for ameiurs, and stotust or the social compliance.

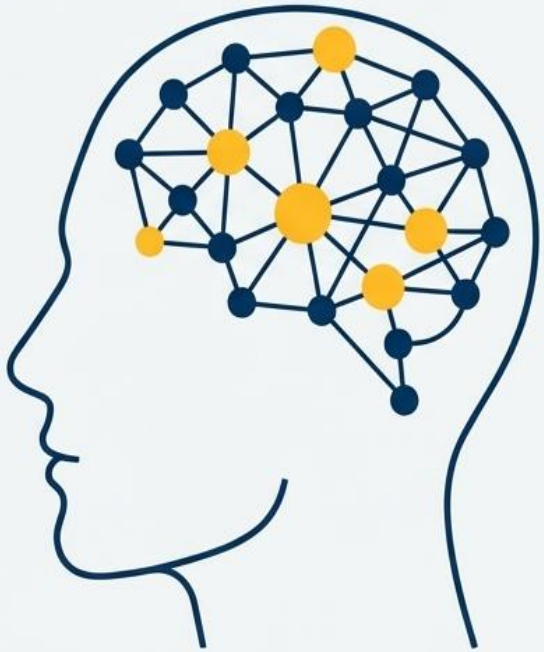
What motivates compliance beyond the fear of getting caught? Can social and moral considerations provide a missing piece of the puzzle?

Our Hypothesis: Compliance is Shaped by the Perceived Behavior of Others

An individual's decision to comply is heavily influenced by their perception of what their peers and community members are doing.

Key Concepts:

1. **Social Norms**: When compliance is prevalent, evasion is seen as a more severe offense. The social norm for compliance grows weaker as evasion becomes more common.
2. **Social Cost of Non-Compliance**: We propose an extension to the classic economic model by incorporating a 'social cost' or 'guilt factor' into the taxpayer's utility function. This reflects the psychological cost of deviating from the community norm.



Study Contribution:

This research is the first to empirically estimate the strength of societal compliance norms using administrative tax data and taxpayer locations in a developing country context.

Extending the Theoretical Framework Beyond Deterrence

Core Concept: The classic model (Allingham & Sandmo, 1972) focuses on a rational calculation of detection probability and penalties. This study incorporates a crucial addition: the **social cost of non-compliance**.

Explanation:

- Following Traxler (2010), we model this social cost as an additional component in the taxpayer's expected utility function.
- This cost reflects emotional sanctions like guilt or shame, which increase with the prevalence of compliance in a society.
- The taxpayer's decision is therefore a trade-off between the economic benefits of evasion and the social costs of violating the norm.

Key Equation

Total Utility:

$$U(e) = E[u(e)] + S(e)$$

Where:

$E[u(e)]$ is the expected utility from evasion (the classic model)

$S(e) = -\theta_e c(n)$ is the social cost (moral cost) of evasion, incorporating guilt and the prevailing norm (n)

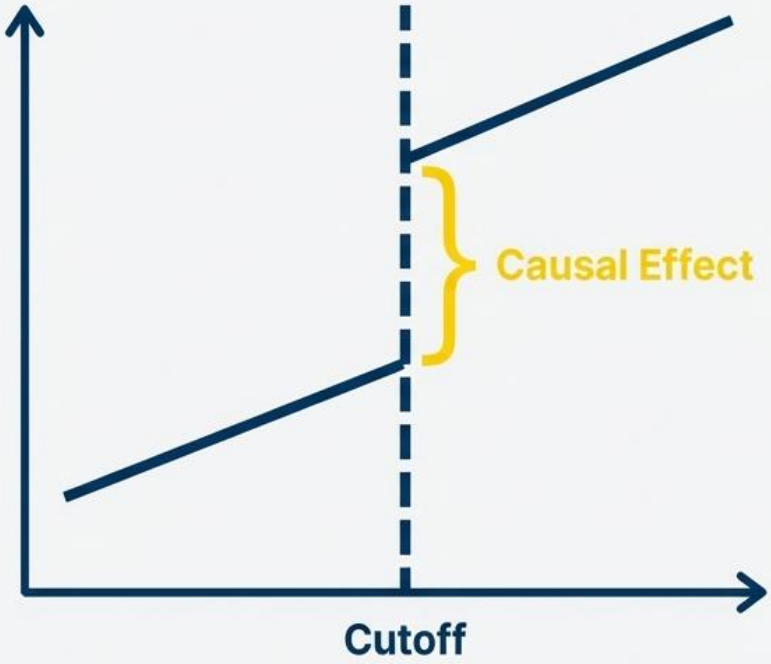
The Core Method: Isolating Causal Effects with Regression Discontinuity

What is an RD Design?

An RD design is a powerful quasi-experimental method used to estimate causal effects.

How it Works:

1. It identifies a specific, arbitrary **cutoff point** along a continuous variable (the "running variable").
2. It then **compares** individuals who fall just above the cutoff to those who fall just below it.
3. The **core assumption**: individuals on either side of the threshold are nearly identical, making the comparison "as good as random."
4. Any sharp "jump" or discontinuity in the outcome variable at the cutoff can be attributed to the treatment.



Step 1: Defining and Measuring the Social Norm

The Running Variable: 'Societal Norm Prevalence'

Unit of Analysis
The taxpayer's local subdistrict in Indonesia.

Data Sources
Administrative tax data (DGT) and geospatial data (Statistics Indonesia).

Calculation
A score was calculated for each subdistrict based on the ratio of compliant taxpayers to tax evaders.

Defining a "Tax Evader"

For this study, an individual was classified as an evader if they met either of these criteria in the past three years:

- (1) Subject to administrative penalties for non-compliance.
- (2) Failed to file their annual tax returns on at least two occasions.

Result: This created a continuous score representing the strength of the local tax compliance norm.

From Theory to Testable Predictions

Based on our extended utility model, we derive two core predictions about how the 'social guilt factor' (θ), driven by stronger community compliance norms, should affect taxpayer behavior:

Prediction 1: Impact on Tax Payment

- A rise in the social guilt factor (θ) will lead to a decrease in the amount of evasion (e^*).
- **In other words:** We expect taxpayers in communities with stronger compliance norms to declare more income and pay more taxes.

Prediction 2: Impact on Tax Filing

- A rise in the social guilt factor (θ) will enhance the utility of filing a tax return compared to not filing at all.
- **In other words:** We expect to see higher tax filing rates in communities with stronger compliance norms.

A Robust Foundation: Data and Validation

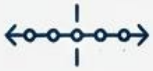
Dataset Overview

- **Source**: Directorate General of Taxation (DGT), Indonesia.
- **Observations:** 791,184 individual taxpayers.
- **Exclusions:** Taxpayers in DKI Jakarta (due to population density skew) and those administered by special tax offices were excluded to ensure a uniform dataset.

Establishing Credibility: Key Robustness Checks

To ensure the validity of our RD design, we performed several critical tests:

1. Manipulation Test
Confirmed that taxpayers did not strategically sort themselves around the zero cutoff. The density of the running variable is smooth across the threshold.

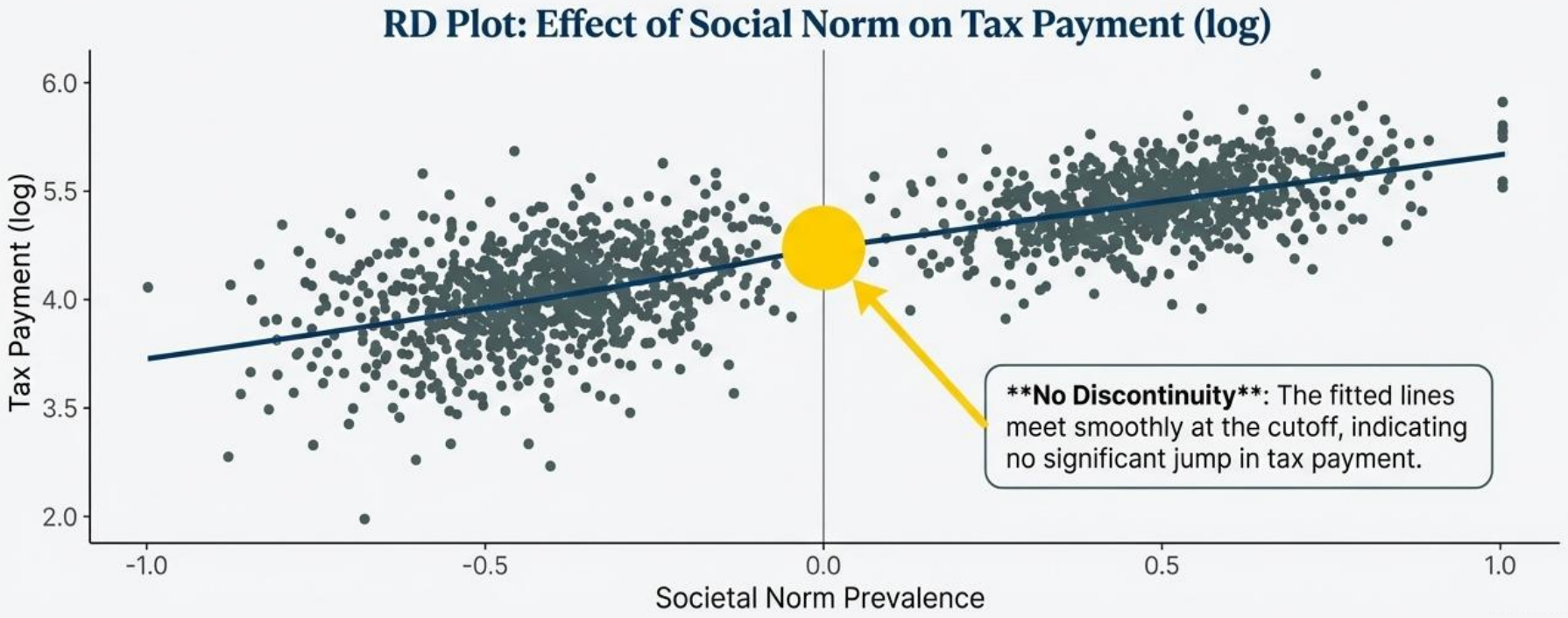


2. Placebo Cutoff Test
Showed no significant effects at alternative, arbitrary cutoffs (e.g., -1500 and +1500), confirming the effect is unique to the zero threshold.

3. Covariate Balance Test
Verified that taxpayer characteristics (e.g., business sector, location) were statistically identical on both sides of the cutoff.

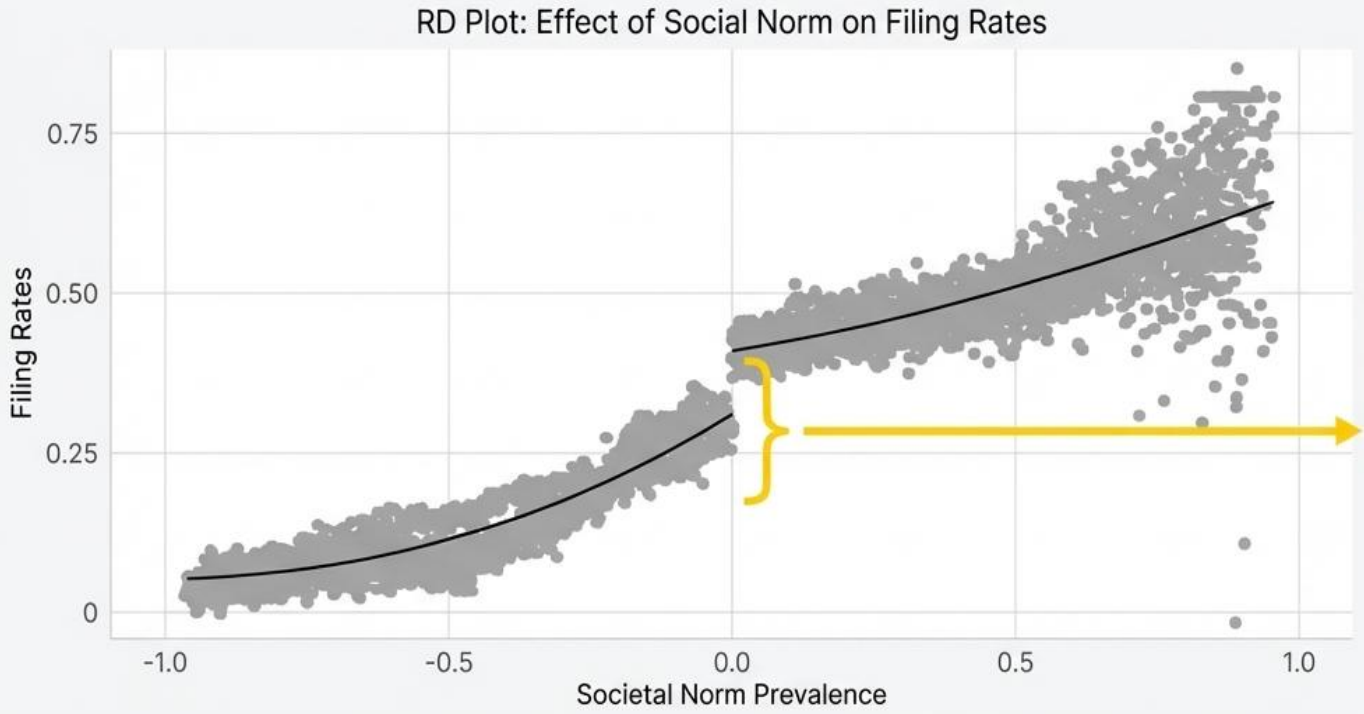
Finding 1: Social Norms Show No Impact on Tax Payment

Key Takeaway: Stronger compliance norms do NOT lead to individuals paying significantly more in taxes. The eσstimated treatment effect is statistically insignificant.



Finding 2: Social Norms Drive a Significant Increase in Tax Filing

Key Takeaway: Moving from a non-compliant to a compliant norm environment increases the frequency of monthly tax submissions by a statistically significant **~12 percentage points.**



Clear Discontinuity: A sharp, statistically significant jump of **+0.128** occurs at the cutoff, showing a strong positive effect on filing behavior.

Reconciling the Dissonance: Why Do Norms Affect Filing but Not Payment?

The proposed explanation: The difference lies in the nature of the two compliance acts.

Tax Filing: A Visible, Public Act

- Filing a return is a binary, observable action of 'being compliant.'
- It is more susceptible to social pressure and the desire to conform to a social norm (the 'morally correct' behavior).

Tax Payment: A Private, Economic Decision

- The *amount* of tax paid is a private calculation, less visible to peers.
- This decision is more heavily influenced by traditional economic factors and loss aversion (as described by Prospect Theory). Taxpayers are more averse to the direct financial '**loss**' of paying **higher taxes**.

Policy Implications for Low-Audit Environments

The Core Insight: In contexts with low audit coverage, traditional deterrence is weak and insufficient. Social norms are a powerful alternative lever.

1. Make Compliance Salient and Public

Tax authorities can reinforce positive norms by publicizing aggregated data on regional or sectoral compliance rates, showing that compliance is the prevailing behavior.

2. Leverage Social Cohesion

High social cohesion, as seen in Indonesia, is an asset. Use community networks and digital platforms to promote compliance norms.

3. Utilize Social Proof

Advocacy through influential public figures and workplace initiatives can normalize tax compliance, framing it as both a civic duty and a professional standard.

Limitations and Avenues for Future Research

Acknowledged Limitations

- The analysis is constrained by the absence of key socioeconomic data in the administrative dataset.
- Variables like education level, access to information, and gender could provide a more nuanced understanding of how norms influence behavior.

Directions for Future Work

- Conduct in-depth surveys to capture a wider range of social, psychological, and demographic factors not related to deterrence.
- A more comprehensive dataset could provide a more precise estimate of treatment effects and explore how factors like social identity and trust in government interact with societal norms.

F

Information Reporting And Corporate Tax Compliance In Indonesia

Source:

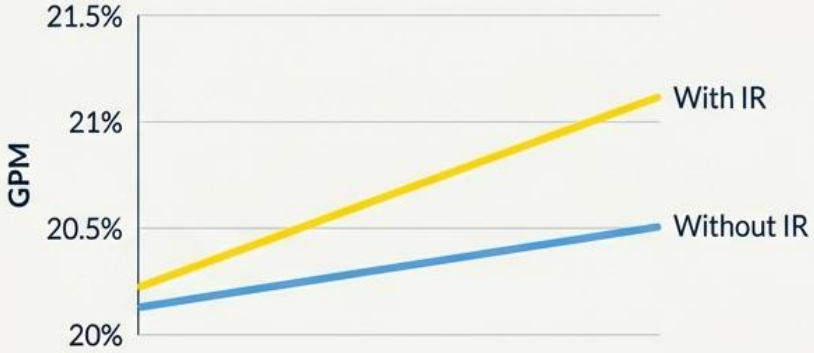
Rosid, A., & Ariyani, F. (2022). Does ‘information reporting’ really matter for tax compliance? The case of Indonesia (Working Paper Series 22-05). Directorate General of Taxation.

Summary

This study highlights the powerful role of information reporting in shaping corporate tax compliance in Indonesia. Drawing on more than 500,000 corporate tax records from 2014 to 2019, the research compares firms covered by third-party information reporting, such as withholding tax systems, with those operating largely outside formal data trails. The contrast is striking. Companies subject to higher data visibility consistently report higher taxable income and stronger tax-to-turnover ratios, suggesting more truthful reporting behavior. In contrast, firms without information reporting mechanisms display patterns consistent with income underreporting and expense inflation to reduce tax liabilities. The findings reinforce a simple but important insight: compliance improves when transactions are observable. Rather than relying solely on audits or penalties, the study shows that structural transparency embedded in the tax system can significantly narrow compliance gaps. For policymakers in emerging economies, the implication is clear. Strengthening third-party reporting is not just an administrative upgrade, but a strategic compliance tool that reshapes incentives, limits opportunities for misreporting, and ultimately strengthens the credibility and effectiveness of the tax system.

The Core Puzzle: A Massive Compliance Gap Hiding in Plain Sight

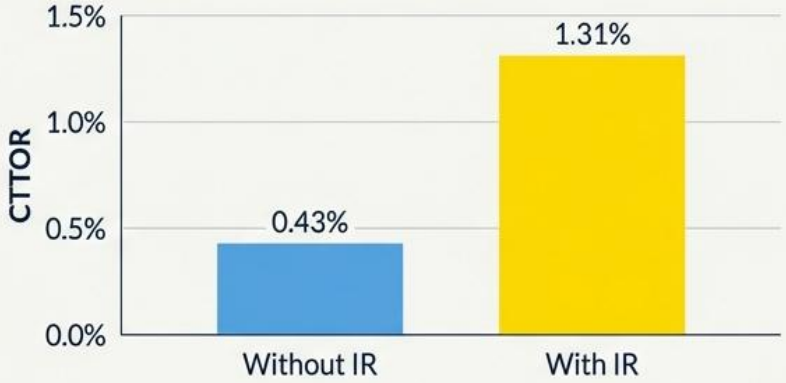
Similar Starting Point: Gross Profit Margin



Firms with Information Reporting (IR) report a Gross Profit Margin (GPM) of **21.1%**. Firms without IR report a GPM of **20.5%**.

A negligible 3% difference.

Vastly Different Outcome: Corporate Tax Paid



Firms with IR have a Corporate Tax to Turnover Ratio (CTTOR) of **1.31%**. Firms without IR have a CTTOR of **0.43%**.

A staggering 204% difference.

If firms start with similar gross profits, what explains the enormous gap in tax they ultimately pay?

The Indonesian Context: A Self-Assessment System Under Strain

Low Tax Ratio

Indonesia's 2019 tax-to-GDP ratio of **11.6%** is significantly below the Asia Pacific average (21%) and the OECD average (33.8%).

(Source: OECD, 2021)

Self-Assessment System

Since 1983, taxpayers are trusted to independently calculate, report, and pay their taxes. The burden of proof is on the taxpayer.

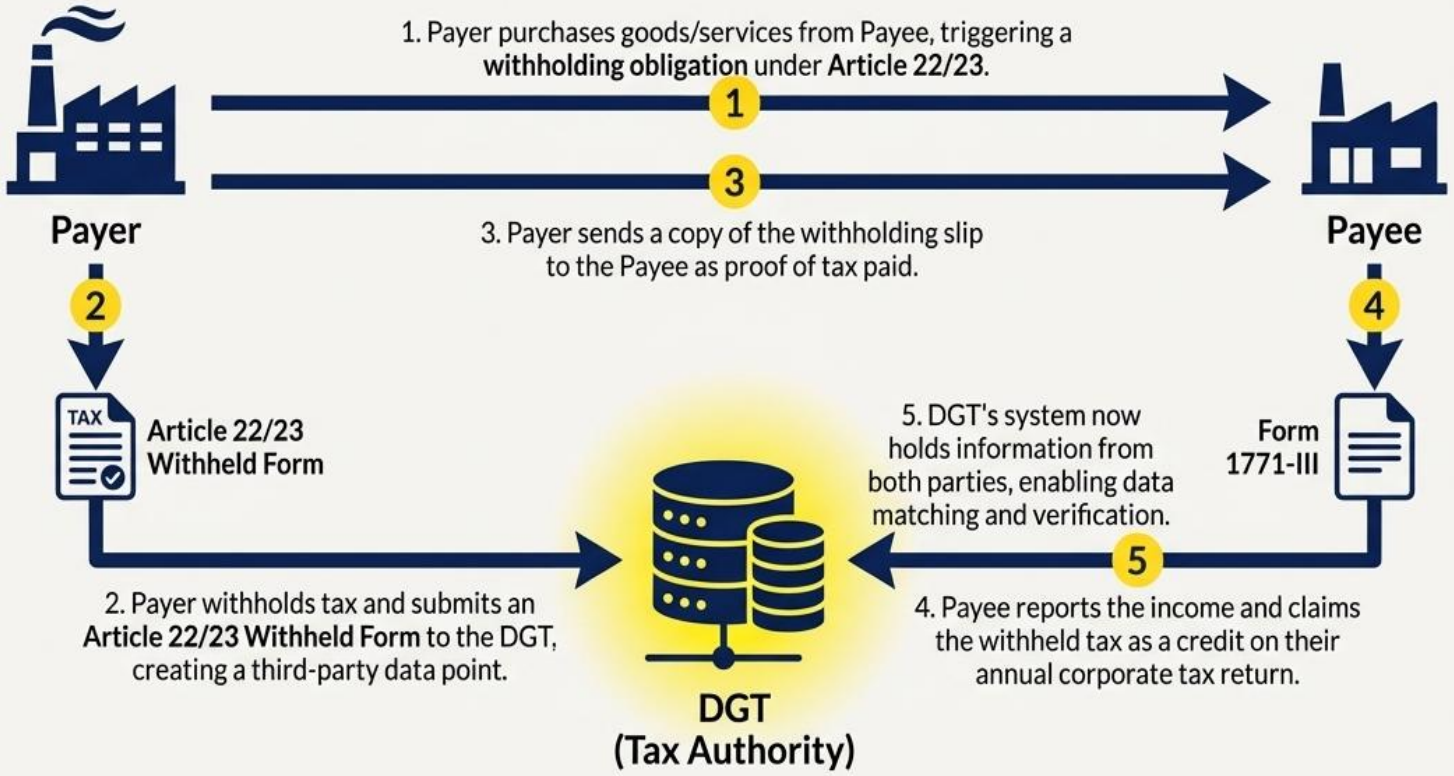
Low Audit Probability

The audit coverage ratio for corporate taxpayers from 2016-2018 was extremely low, at approximately **1%.**

(Source: Rosid and Romadhaniah, 2021)

With low audit rates, the system relies heavily on mechanisms that promote voluntary compliance. Information reporting is one such critical tool.

A Step-by-Step Guide to Information Reporting in Indonesia



Our Investigation Plan: Data, Definitions, and Key Metric

The Data

- **Source:** Anonymous Corporate Annual Income Tax Returns (Forms 1771)
- **Scope:** An unbalanced panel of 538,254 corporate tax records.
- **Period:** Fiscal years 2014 to 2019, providing a stable pre-pandemic view.
- **Exclusions:** Firms with turnover < IDR 5 billion, firms subject to final taxes, and data with errors.

The Two Groups

Without Information Reporting

(n = 255,706)

Firms that did not report any domestic tax credits via withholding slips. Their income is less visible to the tax authority.

With Information Reporting

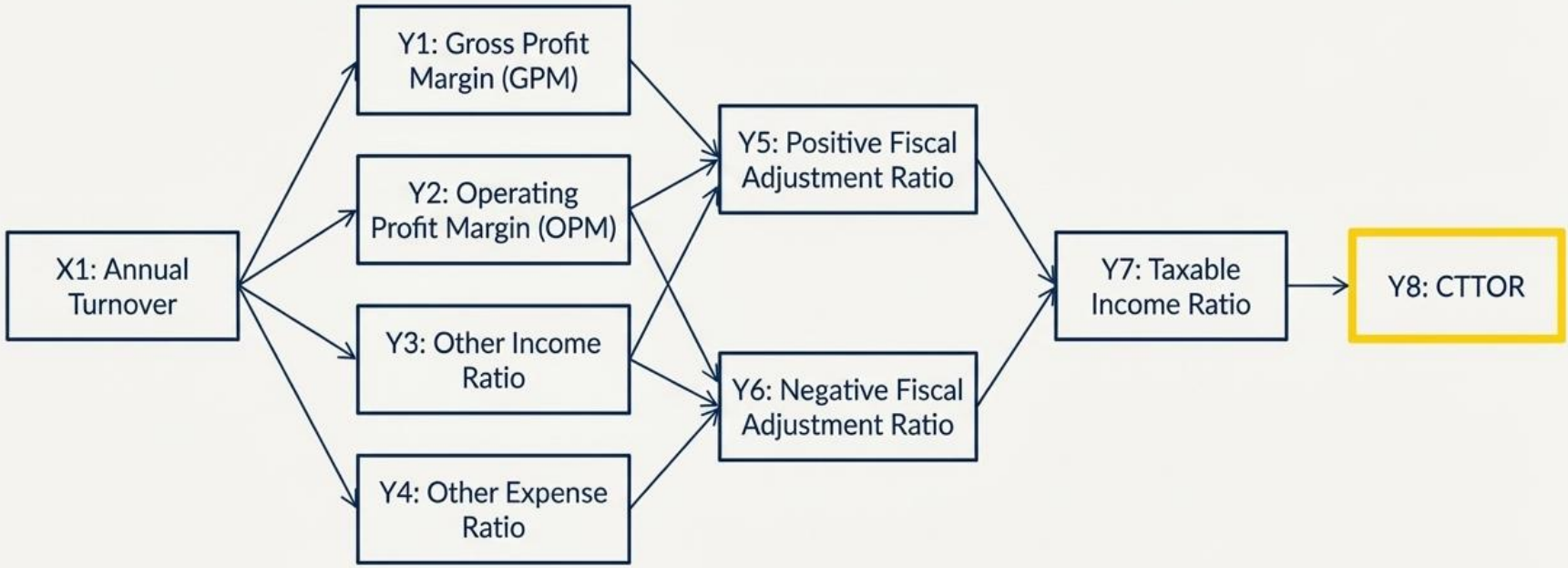
(n = 282,548)

Firms that reported domestic tax credits from Article 22/23 withholding. A portion of their income stream is verified by a third party.

The Key Metric

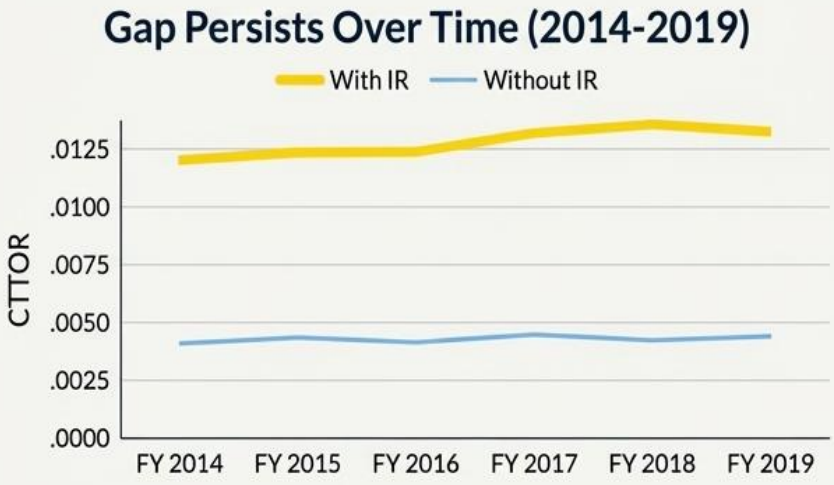
CTTOR (Corporate Tax to Turnover Ratio): Defined as `Income Tax Payable / Annual Turnover`. This is the primary measure of tax compliance used in the study.

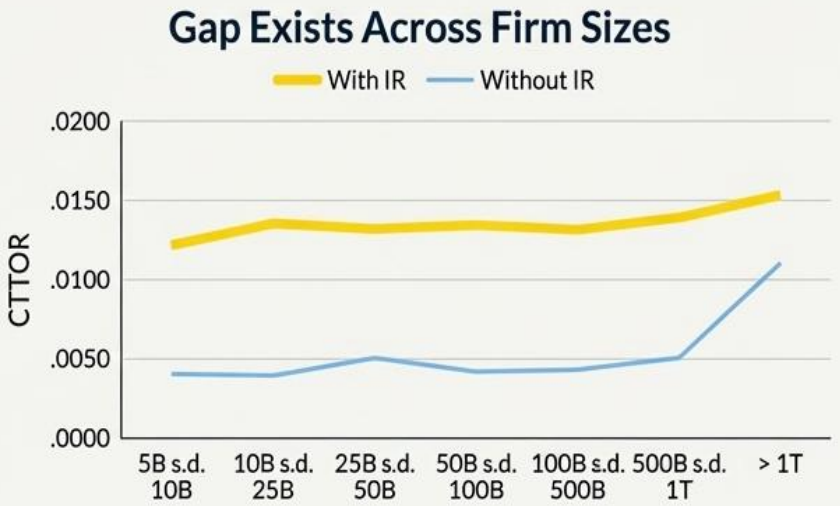
Mapping the Path to Compliance: Our Conceptual Model



This model allows us to trace how differences in reporting behavior at each stage—from gross profit to fiscal adjustments—ultimately impact the final tax paid (CTTOR).

The Top-Line Finding: The Compliance Gap is Consistent and Significant



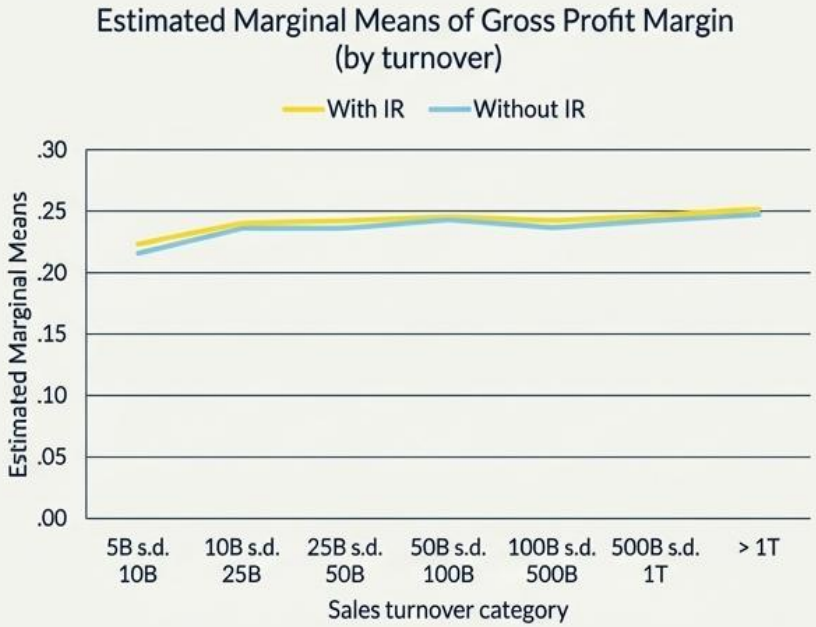


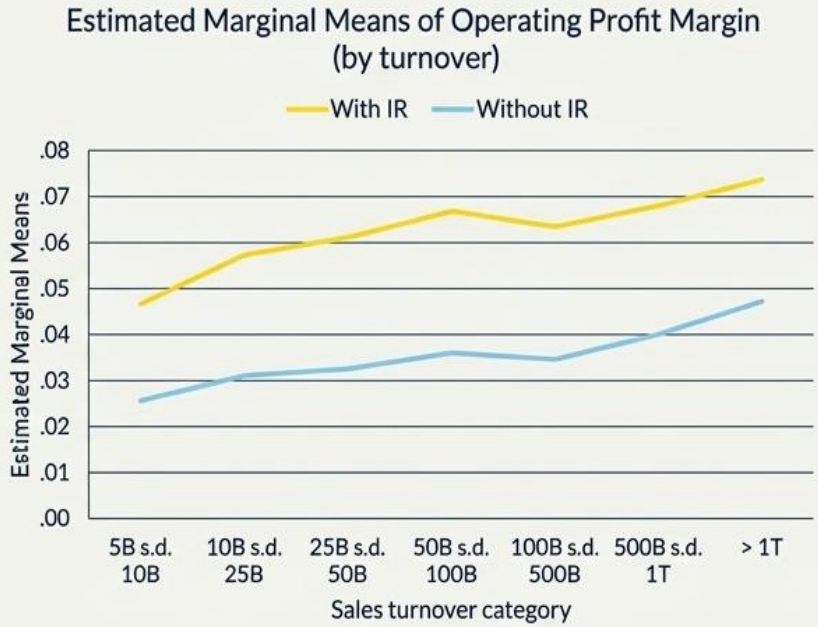
The higher tax compliance of the Information Reporting group is not a one-time effect or limited to a specific firm size. It is a stable and widespread phenomenon.

The effect size for the difference in CTTOR is large (Cohen's d = **0.689**).

Clue #1: The Story Begins with Operating Expenses

While Gross Profit Margins are nearly identical, a significant gap emerges at the Operating Profit level.





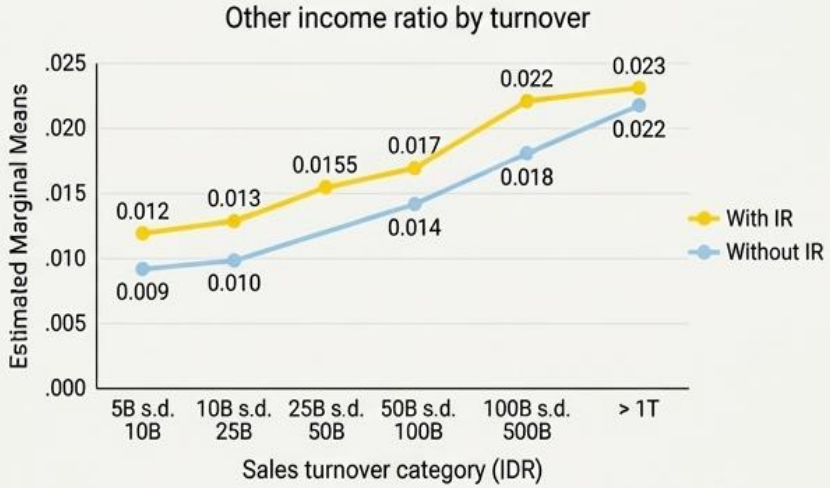
This divergence suggests that firms without third-party visibility may be overstating operating expenses to reduce their taxable income. The 'With IR' group reports a 70% higher OPM on average.

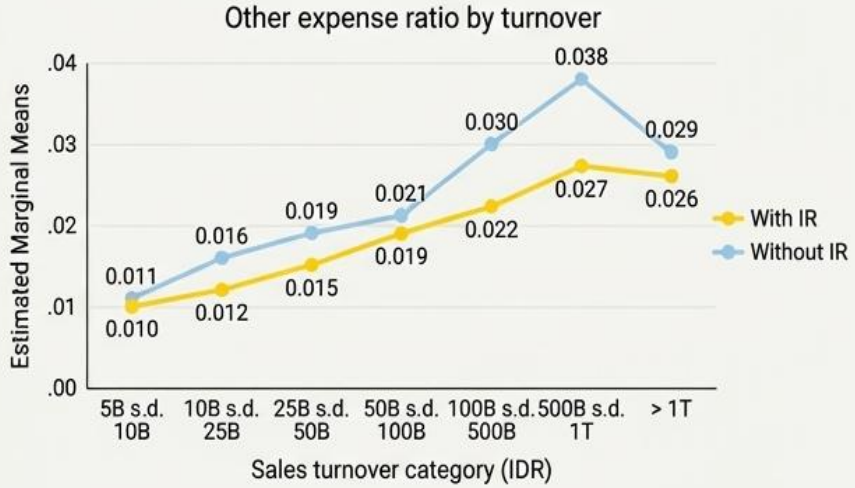
Clue #2: Behavioral Differences in Reporting Side-Business Activity

Firms with Information Reporting declare more 'Other Income' and less 'Other Expense' relative to turnover.

Firms with IR report a **40% higher** 'Other Income Ratio' on average (**0.0141 vs 0.0097**). This suggests compliance is higher when non-core income is more detectable.

Conversely, firms without IR report a slightly higher 'Other Expense Ratio' (0.0163 vs 0.0156), potentially exploiting this **less visible** line item to claim additional deductions.

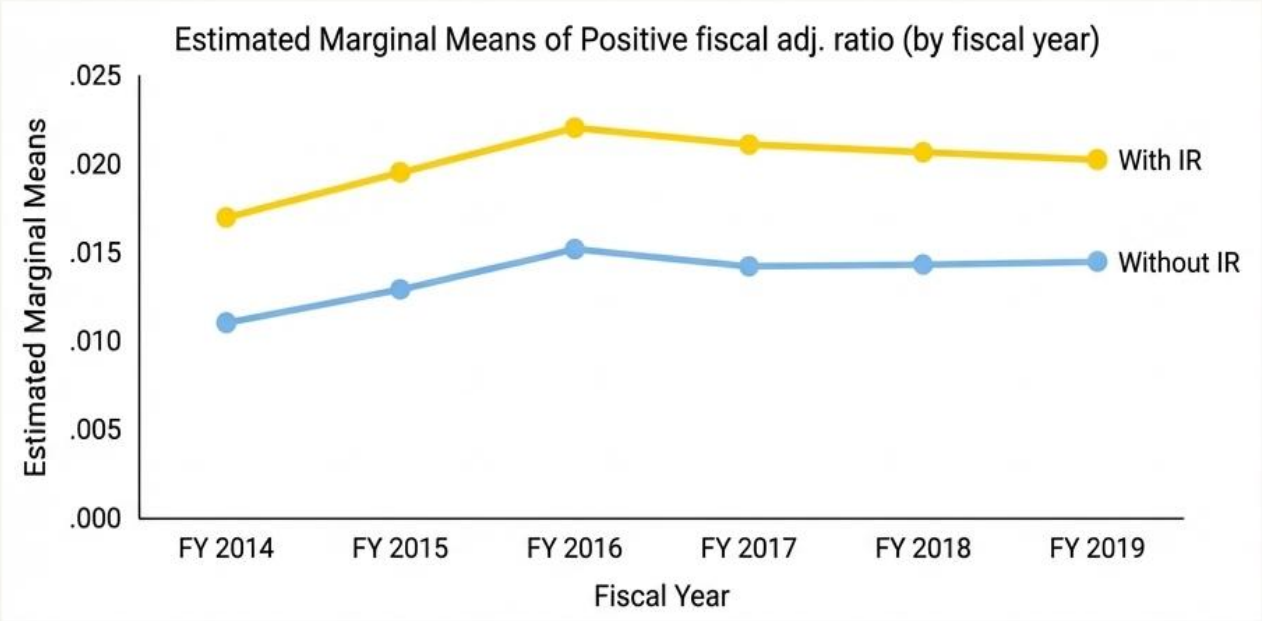




These patterns suggest strategic reporting choices in line items not subject to third-party verification.

Clue #3: The Critical Role of Fiscal Adjustments

Firms with Information Reporting **make significantly larger positive fiscal adjustments, indicating more rigorous alignment of book income with tax rules.**



50% higher Positive Fiscal Adjustment Ratio on average (0.0206 vs 0.0137).

Medium-large effect size (Cohen's *d* = **0.334**).

This suggests the 'With IR' group is more likely to correct for non-deductible expenses, a key indicator of sophisticated and deliberate tax compliance.

Synthesizing the Evidence: A Tale of Two Taxpayers

The Taxpayer WITHOUT Information Reporting

Behavioral Profile

- Starts with similar GPM.
- Reports significantly **lower** Operating Profit Margin.
- Reports **less** Other Income.
- Reports slightly **more** Other Expenses.
- Makes **fewer** Positive Fiscal Adjustments.

Outcome: Low Tax Compliance (CTTOR = 0.43%)

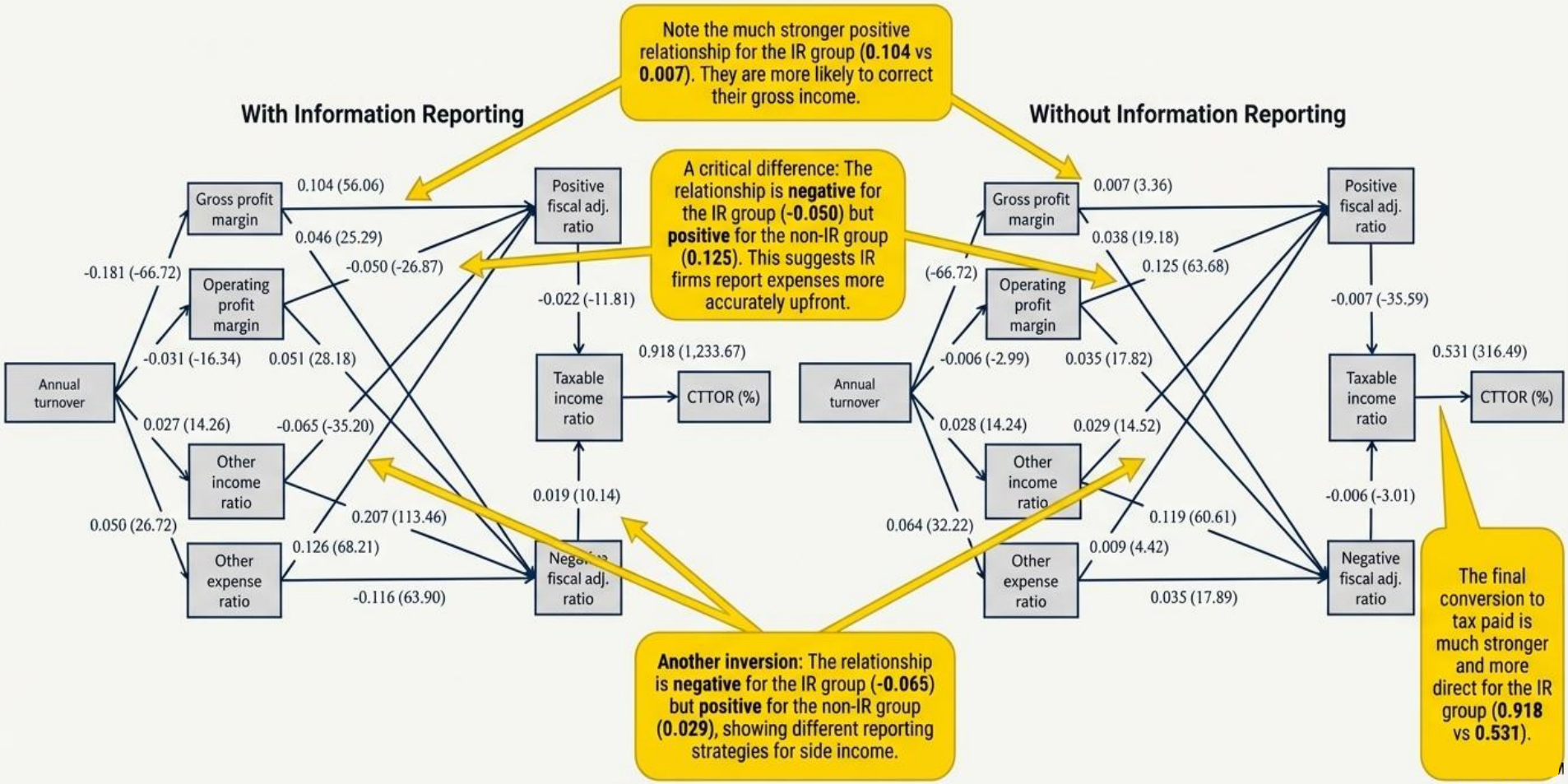
The Taxpayer WITH Information Reporting

Behavioral Profile

- Starts with similar GPM.
- Reports significantly **higher** Operating Profit Margin.
- Reports **more** Other Income.
- Reports slightly **less** Other Expenses.
- Makes **more** Positive Fiscal Adjustments.

Outcome: High Tax Compliance (CTTOR = 1.31%)

Visualizing the Behavioral Pathways: A Two-Group Analysis



The Verdict: Information Reporting is a Powerful Driver of Tax Compliance

1. **Information Reporting Works** - Firms subject to third-party information reporting pay **204% more tax** relative to their turnover than firms without it.
2. **The Effect is Behavioral** - The compliance gap is not driven by core business profitability (GPM), but by significant differences in the reporting of operating expenses, other income, and book-to-tax fiscal adjustments.
3. **Visibility Matters** - Increased income detectability compels firms to report more accurately across multiple line items, not just the one directly subject to reporting. This supports the "sentinel effect" of third-party data.
4. **A Plausible Mechanism** - Firms with IR are more likely to positively correct their gross income (GPM -> Fiscal Adj.) and report expenses more accurately upfront, leading to a higher taxable income base.

Policy Implications: Strengthening the Third-Party Ecosystem

Expand the Coverage of Information Reporting

The strong positive effect suggests that strategically expanding withholding tax requirements (Articles 22 & 23) to more sectors and transaction types is an effective policy lever.

Enhance Data Analytics Capabilities

The tax authority (DGT) must invest in its capacity for data-matching and advanced analytics to identify discrepancies and target enforcement resources effectively.

Consider Administrative Burdens

Any expansion must be balanced against the administrative and compliance costs for businesses, particularly for payers who act as withholding agents.

Utilize Alternative Third-Party Data

For firms without withholding data, developing alternative third-party data sources (e.g., from VAT invoices) is crucial to validate claimed costs and revenues.

The Path Forward: Avenues for Future Research

Balance Sheet Perspective

How do firm assets, debt, and capital structure interact with information reporting to influence tax-paying behavior?

Generalizability

Would these findings hold for different types of taxes, smaller enterprises (below the IDR 5B threshold), or in other emerging economies?

Unpacking Nuanced Relationships

Further work is needed to explain the counter-intuitive findings from the path analysis, such as the negative relationships between profitability metrics and fiscal adjustments in the 'With IR' group.

The Demand Side

How do external factors like economic conditions or industry norms influence the effectiveness of information reporting?

This study confirms the power of information reporting, while also opening new, detailed questions about the precise mechanisms of corporate tax compliance.

“

G

Predicting Firms’ Taxpaying Behaviour With Artificial Intelligence

Source:

Rosid, A. (2023). Artificial neural networks for predicting taxpaying behaviour of Indonesian firms. *Scientax: Jurnal Kajian Ilmiah Perpajakan Indonesia*, 4(2), 174–204.

Summary

This research paper investigates how Artificial Neural Networks (ANN) can be utilized to predict the taxpaying behavior of Indonesian corporations. Using more than 500,000 firm-level records from 2014 to 2019, the study demonstrates that a Multilayer Perceptron model can classify corporate taxpaying behavior with accuracy exceeding 92 percent, based on the Corporate Tax Turnover Ratio (CTTOR). Crucially, the results show that compliance signals are not uniform: revenue and expense indicators carry different predictive power depending on firm size, implying that one-size-fits-all risk models are inefficient. The key recommendation of the paper is therefore strategic rather than technical. The authors argue that tax administrations should integrate machine learning models into compliance risk management frameworks to improve targeting, prioritize high-risk firms, and reduce reliance on broad, resource-intensive audits. By embedding advanced analytics into routine administrative processes, enforcement can become more precise, adaptive, and cost-effective. The broader policy message is clear: data-driven intelligence is not a replacement for enforcement, but a force multiplier that allows tax authorities to deploy limited resources where they matter most, strengthening compliance while lowering monitoring costs.

Tax Revenue is a National Imperative, But Indonesia Faces a Significant Gap

The National Goal:

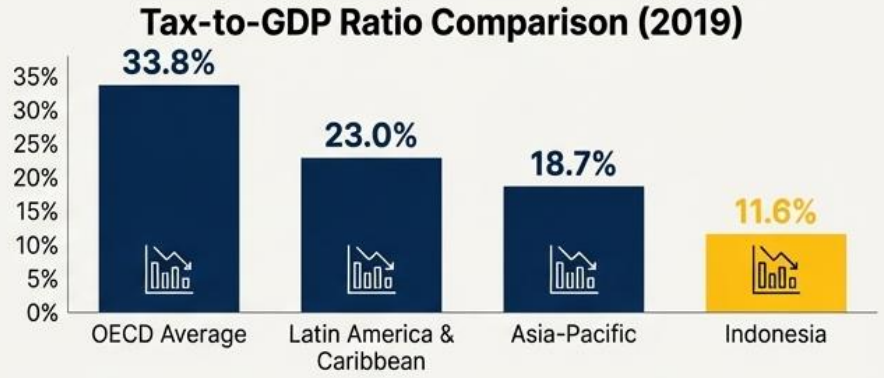
Taxation is essential for sustainable development, eradisment, funding everything from infrastructure to poverty eradication. The globally recognized target for a sustainable tax-to-GDP ratio is 15%.

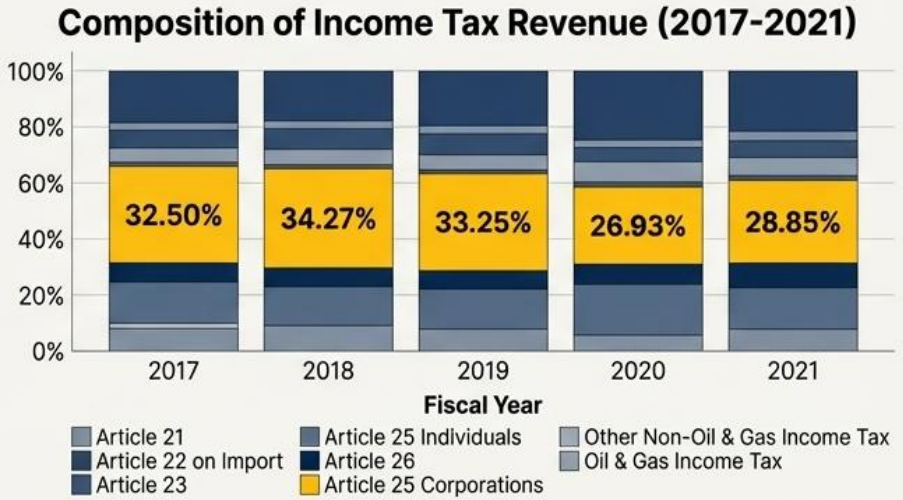
The Indonesian Reality:

Indonesia's tax ratio significantly lags behind global and regional averages, posing a challenge to its development goals.

Corporate Tax is Key:

From 2017-2021, corporations consistently contributed the largest portion of income tax revenue, ranging from **26.9% to 34.3%**,



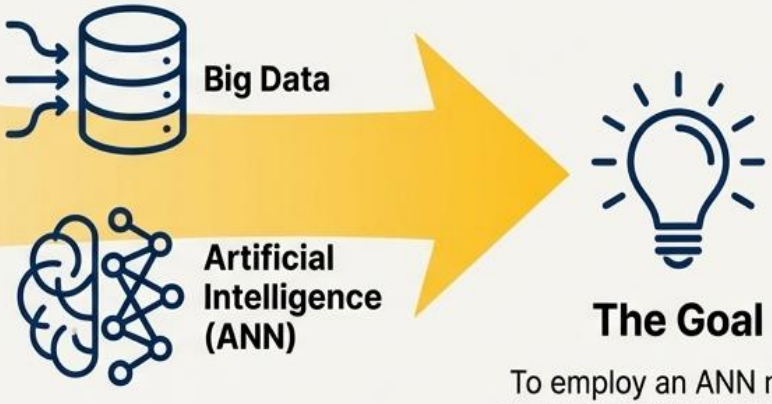


AI Presents a New Frontier for Identifying Complex Tax Non-Compliance

The Challenge: Traditional Methods

Detecting tax non-compliance is difficult due to the complexity of tax law and the sheer volume of returns. Traditional monitoring and examination are resource-intensive and struggle to identify sophisticated patterns of misreporting.

The Opportunity: Advanced Analatics



Tax authorities possess massive administrative datasets that hold untapped insights. Artificial Neural Networks (ANN) are powerful tools that excel at identifying complex, non-linear patterns that conventional methods often miss.

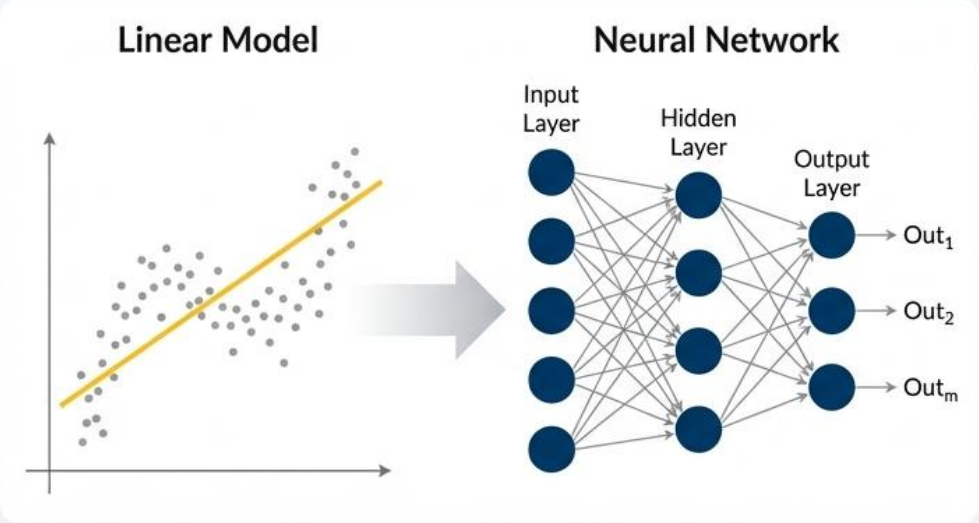
The Goal

To employ an ANN model to predict firms' taxpaying behavior and discover the key determinants driving it, moving towards a more efficient, evidence-based approach to tax administration.

From Linear Models to Adaptive Learning: A New Approach to a Complex Problem

Traditional Statistical Models

- Often rely on linear assumptions.
- Can struggle to capture complex, non-linear relationships and interactions within large datasets.



Artificial Neural Networks (ANN)

- A non-parametric, adaptive learning tool that excels at pattern identification.
- Ideal for "random, ill-defined problems, highly non-linear, with many distinct and complex variables" — a perfect match for financial and behavioral data.

Step 1: Building the Foundation with Rich Administrative Data

Data Source

A massive dataset of **538,254** anonymous, firm-level corporate tax records. Spanning six fiscal years (2014-2019) prior to the COVID-19 pandemic.

The Key Metric (CTTOR)

Corporate Tax to Turnover Ratio (CTTOR): A practical measure used by the Indonesian tax authority, calculated as (Income Tax Payable / Annual Turnover).

The Key Metric (CTTOR)

Corporate Tax to Turnover Ratio (CTTOR): A practical measure used by the Indonesian tax authority, calculated as (Income Tax Payable / Annual Annual Turnover).

The Target Categories

The three distinct taxpaying behavior groups based on CTTOR:

- Low CTTOR (< 0.59%)
- Moderate CTTOR (0.59% to 1.19%)
- High CTTOR (> 1.19%)

Step 1: Building the Model on a Massive Administrative Dataset

Data Source: Anonymous corporate tax records from Indonesia's Directorate General of Taxes.
Scope: 538,254 usable firm-level tax records across six fiscal years (**2014-2019**).

Input Variables (Predictors)

Gross Profit Margin (GPM)
Ratio of gross profit to net sales.

Operating Profit Margin (OPM)
Ratio of operating income to net sales.

Other Income Ratio (OIR)
Ratio of other income to net sales.

Other Expense Ratio (OER)
Ratio of other expenses to net sales.

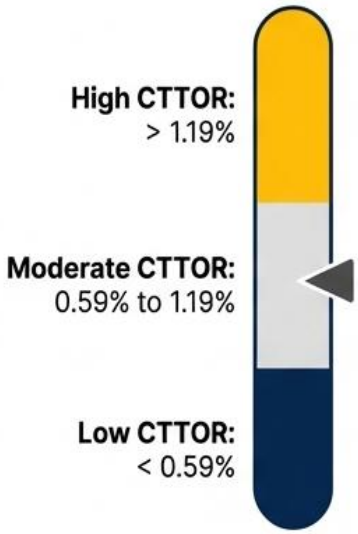
Positive Fiscal Adjustment Ratio (PFAR)
Ratio of positive fiscal adjustments to net commercial profit.

Negative Fiscal Adjustment Ratio (NFAR)
Ratio of negative fiscal adjustments to net commercial profit.

Type of Annual Tax Return (Nil, Underpaid, Overpaid)
Categorical variable indicating the final tax status.

Target Variable (Output)

Corporate Tax Turnover Ratio (CTTOR)



A measure of income tax payable scaled by annual turnover, categorized into three levels of taxpaying behavior.

Step 2: Identifying the Key Financial Predictors

The seven key input variables extracted from corporate annual income tax returns used to train the model.

1. Gross Profit Margin (GPM):
(Turnover - COGS) / Turnover

2. Operating Profit Margin (OPM):
(Turnover - COGS - Operating Expenses) / Turnover

3. Other Income Ratio (OIR):
Other Business Income / Turnover

4. Other Expense Ratio (OER):
Other Business Expense / Turnover

5. Positive Fiscal Adjustment Ratio (PFAR):
Positive Fiscal Adjustment / Turnover

6. Negative Fiscal Adjustment Ratio (NFAR):
Negative Fiscal Adjustment / Turnover

7. Annual Tax Return Type:
(Categorical: Nil, Underpaid, Overpaid)

Step 2: Segmenting Firms by Size to Capture Diverse Behaviors

Rationale: Taxpaying behavior is not monolithic. Firms of different sizes exhibit different compliance habits. A single model would fail to capture these critical nuances, so four separate ANN models were trained.

Small Firms	Medium Firms	Medium-Large Firms	Large Firms
Annual turnover from IDR 5 billion to 15 billion.	Annual turnover from IDR 15 billion to 50 billion.	Annual turnover from IDR 50 billion to 100 billion.	Annual turnover greater than IDR 100 billion.

Segmentation Strategy: The dataset was divided into four distinct categories based on annual turnover, following Indonesian Government Regulation No. 7 of 2021.

Step 2: Defining the Target — Quantifying Taxpaying Behaviour

The model predicts a firm's taxpaying behavior using the **Corporate Tax to Turnover Ratio (CTTOR)**, a practical metric adopted from the Indonesian tax authority.

Step 1: The Formula

$$\text{CTTOR} = \frac{\text{Income Tax Payable}}{\text{Annual Turnover}}$$

Step 2: The Classification

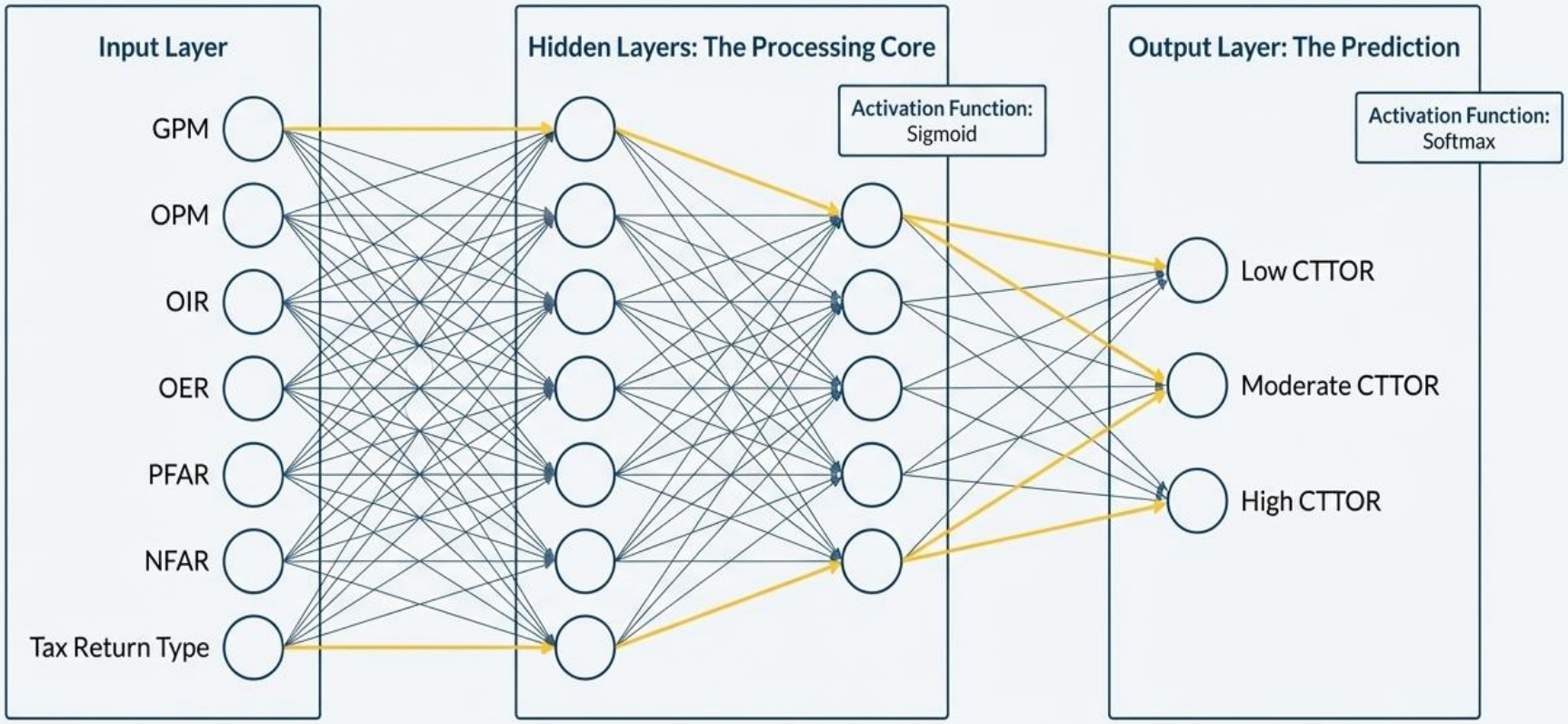
The CTTOR value is used to place each firm into one of three distinct categories.

Step 3: The Output Categories

- **Low CTTOR** (< 0.59%)
- **Moderate CTTOR** (0.59% to 1.19%)
- **High CTTOR** (> 1.19%)

"This classification transforms a continuous financial ratio into a clear, predictable outcome for the ANN model."

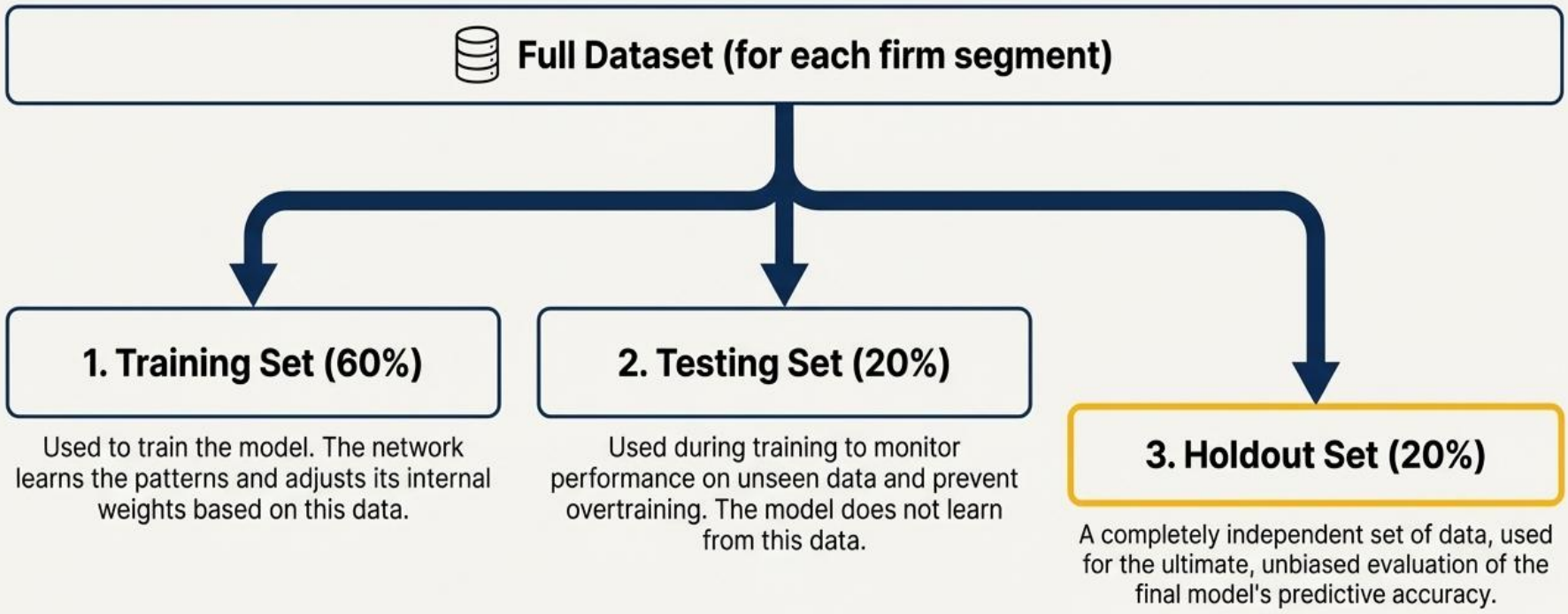
Step 3: Designing the Predictive Engine — The ANN Architecture



Technical Note: The model employs a backpropagation algorithm to minimize cross-entropy error, refining its predictive accuracy during training.

Step 4: Ensuring Model Robustness Through Rigorous Training and Validation

Objective: To build a predictive model that generalizes well to new, unseen data, not one that simply memorizes the training data (a problem known as "overfitting").



Key Result: The low cross-entropy error values for the testing samples relative to the training samples confirmed that no overfitting occurred.

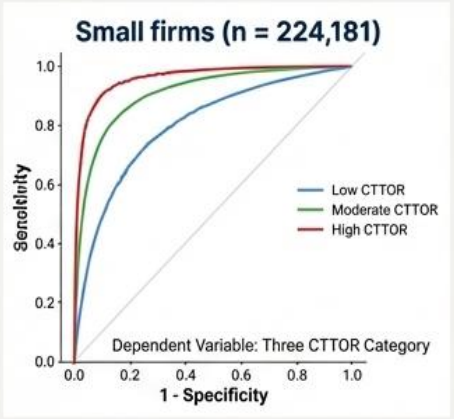
Performance Analysis Confirms a ‘Very Accurate’ Classification Model

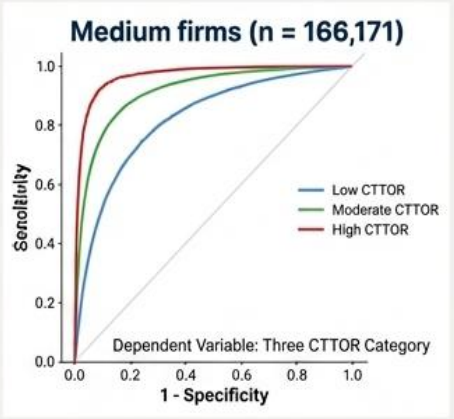
Technical Validation: A Receiver Operating Characteristic (ROC) curve analysis evaluates the model’s ability to distinguish between the CTTOR categories.

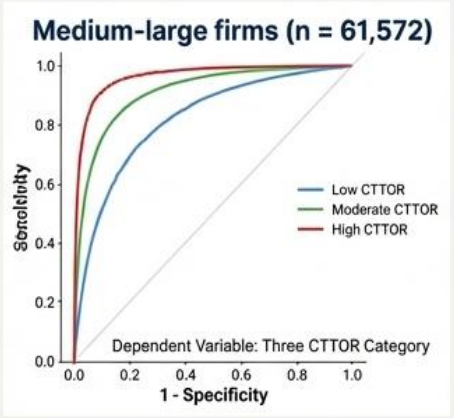
What the ROC Curve Shows: The curve plots the true positive rate (Sensitivity) against the false positive rate (1-Specificity). A curve bowing towards the top-left corner indicates high predictive power.

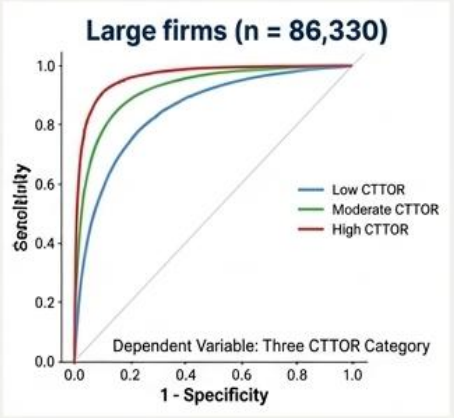
The Key Metric: Area Under the Curve (AUC): Measures the area under the ROC curve. 1.0 is a perfect model; 0.5 is a random guess.

Result: The models demonstrated outstanding performance, with **AUC values ranging from 0.941 to 0.988**, a range classified as "very accurate".





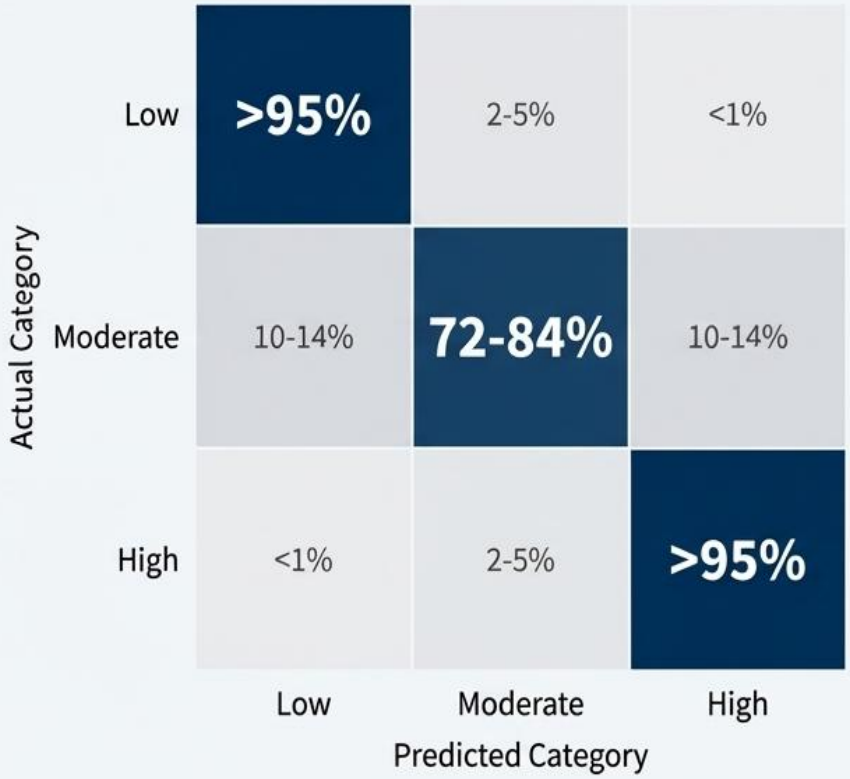




Pinpointing Accuracy: How the Model Classifies Low, Moderate, and High Behavior

- **High Precision for Extremes:** The model is exceptionally effective at correctly identifying firms in the 'Low CTTOR' and 'High CTTOR' categories, often with over 95% accuracy.
- **Strong Performance for Ambiguity:** It remains highly effective for the more ambiguous 'Moderate CTTOR' category, with accuracy rates typically between 72% and 84%.

Key Insight: The model demonstrates robust performance across all categories, with particular strength in identifying the highest and lowest compliance behaviors.

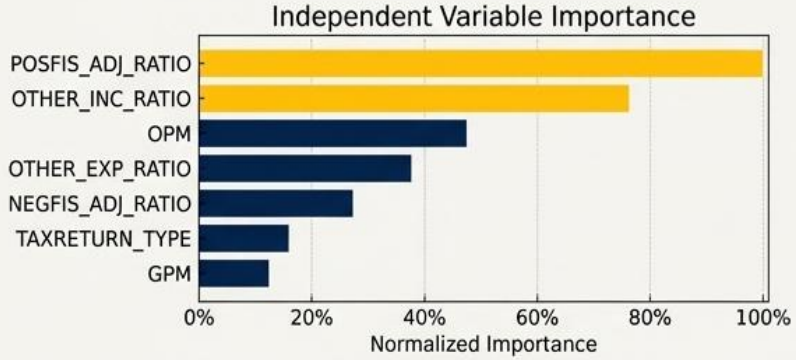


Discovery: Predictors of Taxpaying Behavior Vary Significantly by Firm Size

The ANN models reveal that different financial metrics are important for predicting tax behavior in different firm segments. This heterogeneity is crucial for targeted compliance strategies.

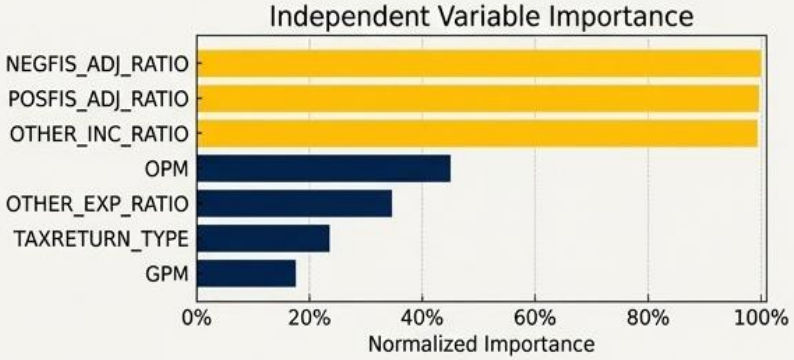
Small Firms (IDR 5B-15B)

Top Predictors:
1. **Positive Fiscal Adjustment Ratio (PFAR)** (100%)
2. **Other Income Ratio (OIR)** (76.1%)
3. Operating Profit Margin (OPM)



Medium Firms (IDR 15B-50B)

Top Predictors:
1. **Negative Fiscal Adjustment Ratio (NFAR)** (100%)
2. **Positive Fiscal Adjustment Ratio (PFAR)** (99.4%)
3. **Other Income Ratio (OIR)** (99.3%)



Interpretation: For smaller firms, fiscal adjustments and other sources of income are the most significant indicators of their final tax payment behavior.

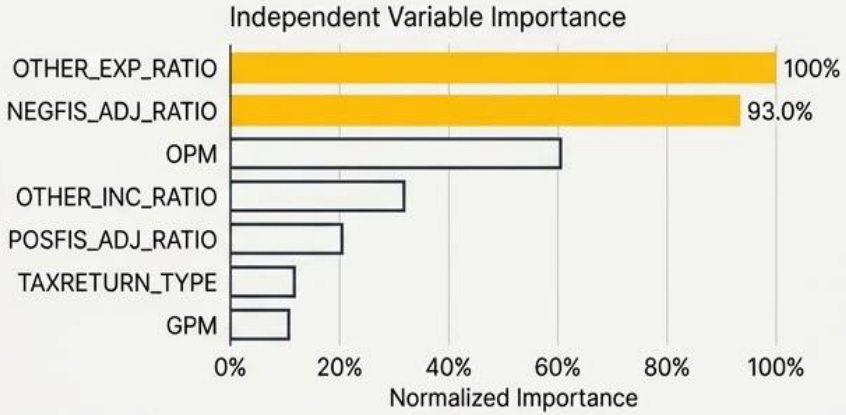
For Larger Corporations, the Predictive Focus Shifts to Expenses and Profitability

The predictive patterns for larger firms are remarkably similar to each other, but distinct from their smaller counterparts.

Medium-Large Firms (IDR 50B-100B)

Top Predictors:

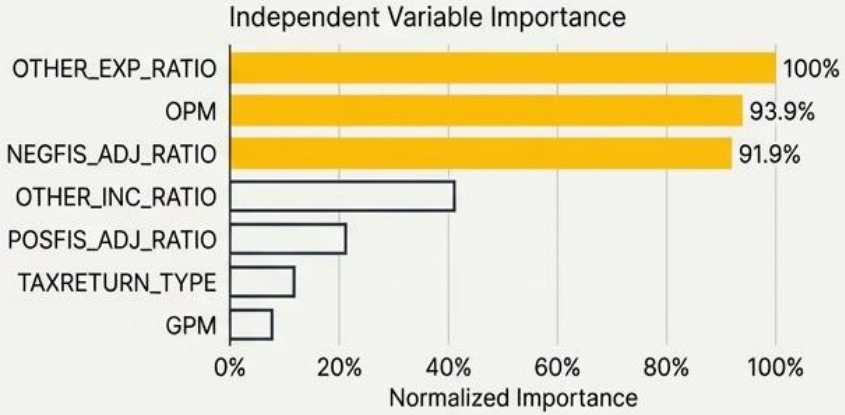
1. **Other Business Expense Ratio (OER)** (100%)
2. **Negative Fiscal Adjustment Ratio (NFAR)** (93.0%)
3. Operating Profit Margin (OPM)



Large Firms (> IDR 100B)

Top Predictors:

1. **Other Business Expense Ratio (OER)** (100%)
2. **Operating Profit Margin (OPM)** (93.9%)
3. **Negative Fiscal Adjustment Ratio (NFAR)** (91.9%)



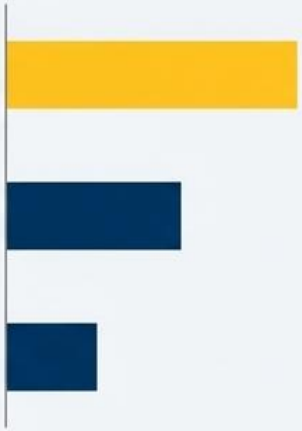
Interpretation: For larger corporations, potential areas of misreporting shift from income streams to expenses and profitability calculations, over which they may have more control.

A Tale of Two Taxpayers: Predictors Differ Significantly by Firm Size

Small & Medium Firms (Annual Turnover < IDR 50 Billion)

Primary Drivers are Income-Related:

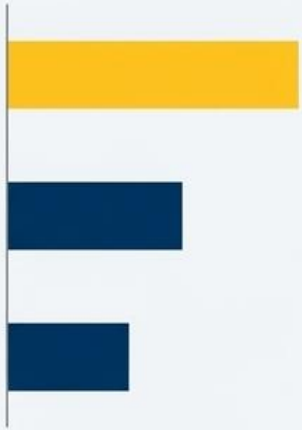
1. Positive Fiscal Adjustment Ratio (PFAR)
2. Other Income Ratio (OIR)
3. Operating Profit Margin (OPM)



Large Firms (Annual Turnover > IDR 100 Billion)

Primary Drivers are Expense & Adjustment-Related:

1. Other Expense Ratio (OER)
2. Operating Profit Margin (OPM)
3. Negative Fiscal Adjustment Ratio (NFAR)



Smaller firms' tax behavior is more strongly predicted by income-related reporting, while larger firms' behavior is more closely tied to the reporting of expenses and complex fiscal adjustments.

From Predictors to Actionable Intelligence for Tax Administration

The identified predictors can be mapped directly to specific sections of the corporate tax return (Form 1771-I), creating a data-driven guide for compliance risk management.

Firm Category	Top Predictors	Potential Areas of Misreporting (Form 1771-I)
Small & Medium	PFAR, OIR, OPM	Part 5 (Positive Fiscal Adjustment), Part 1e (Other Business Income), Part 1c (Operating Expense)
Large	OER, OPM, NFAR	Part 1f (Other Business Expense), Part 1c (Operating Expense), Part 6e (Negative Fiscal Adjustment)

****Strategic Implication**** This enables tax authorities to shift from broad audits to targeted, evidence-based inquiries focused on the **most relevant risk areas** for each firm segment.

Summary: Mapping Predictors to Potential Areas of Misreporting

This table synthesizes the model's accuracy, the most influential predictors, and the corresponding "areas of concern" within the corporate annual income tax return for each firm category.

Firm Category (Turnover)	Accuracy Rate (Holdout)	Prominent Predictors	Areas of Concern (Annual Tax Return Form)
Small (IDR 5B-15B)	89.1%	• OPM • OIR • PFAR	• Part 1c (Operating Expense) • Part 1e (Other Business Income) • Part 5 (Positive Fiscal Adjustment)
Medium (IDR 15B-50B)	93.6%	• OIR • PFAR • NFAR	• Part 1e (Other Business Income) • Part 5m (Positive Fiscal Adj.) • Part 6e (Negative Fiscal Adj.)
Medium-Large (IDR 50B-100B)	93.1%	• OPM • OER • NFAR	• Part 1c (Operating Expense) • Part 1e (Other Business Expense) • Part 6e (Negative Fiscal Adj.)
Large (> IDR 100B)	92.9%	• OPM • OER • NFAR	• Part 1c (Operating Expense) • Part 1e (Other Business Expense) • Part 6e (Negative Fiscal Adj.)

Key Takeaways and Contributions to the Field

1.

AI is a Powerful Tool for Tax Administration

This study demonstrates that ANN models can predict firm taxpaying behaviour in Indonesia with over 92% accuracy, validating the application of machine learning for complex compliance tasks.

2.

Taxpaying Behaviour is Heterogeneous

The most significant predictors of tax behavior are not universal; they vary systematically with firm size, demanding a segmented approach to compliance management.

3.

The Model Provides Actionable Intelligence

The findings offer a direct, evidence-based method for identifying potential areas of misreporting, allowing for more efficient and effective tax administration.

Practical Implications: A Blueprint for Data-Driven Tax Administration

Key applications for the Directorate General of Taxes (DGT):

- **Enhance Compliance Risk Management (CRM)**

  Transition from traditional risk assessment to a predictive system that dynamically flags high-risk firms based on their reported financial DNA.

- **Optimize Resource Allocation**

  Reduce costs associated with extensive monitoring and random audits by focusing enforcement actions on firms and tax return items with the highest statistical risk of non-compliance.

- **Inform Policy Development**

  Use data-driven insights into corporate behavior to design smarter, more effective tax policies and targeted educational outreach.

- **Accelerate Modernization**

  This study serves as a successful proof-of-concept for integrating AI into DGT operations, supporting the ambition to become a truly data-driven organization.

Limitations and the Path Forward for Research

Acknowledged Limitations

- The model does not distinguish between legal tax avoidance and illegal tax evasion.
- The analysis is constrained to the variables available on standard tax returns.
- The causal relationships behind the correlations are not explored.

Avenues for Future Research

- Incorporate additional data sources (e.g., third-party information) to enrich the model.
- Conduct causal inference studies to investigate *why* these factors are predictive of taxpaying behavior.
- Compare the performance of ANNs with other machine learning approaches, such as Support Vector Machines or Gradient Boosting.

“

H

When Simpler Taxes Improve Compliance—Not Revenue

Source:

Satyadini, A., & Rosid, A. (2024). Does tax simplification motivate small businesses to be more compliant? Evidence from a regression discontinuity in Indonesia. *Bulletin of Indonesian Economic Studies*, 60(2), 217–238.

Summary

This study shows that tax simplification in Indonesia improves how small businesses comply, but not how much they pay. Using a regression discontinuity design, the research finds no significant increase in tax payments, yet a clear rise in formal compliance through more frequent reporting, fewer procedural errors, and lower administrative penalties. Crucially, the paper emphasizes that these gains depend less on incentives and more on structural conditions. Businesses with better internet access and closer proximity to tax offices benefit far more from simplified rules than those facing digital or geographic constraints. The key policy message is direct: tax simplification cannot work in isolation. Without parallel investment in digital infrastructure and accessible public services, compliance reforms will remain uneven and limited, regardless of how streamlined the rules appear on paper.

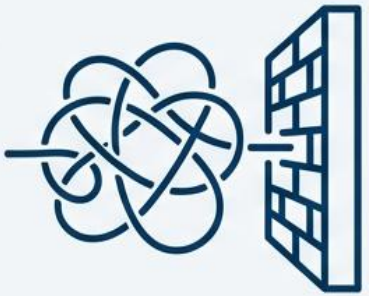
Small Businesses are Economic Engines. But Tax Compliance is a Major Hurdle.

Small firms generated about **61%** of Indonesia's GDP in 2019

They represent **98%** of all business entities in Indonesia

Indonesia's Policy Experiment: GR 23/2018

A simplified tax scheme designed to address these hurdles for small businesses.



Taxation's administrative and compliance costs diminish competitiveness, decrease tax compliance and encourage work in the informal economy

How the Tax Simplification Program Works

1

Who is eligible?

Businesses with an annual turnover of less than Rp 4.8 Billion.

2

What changes?

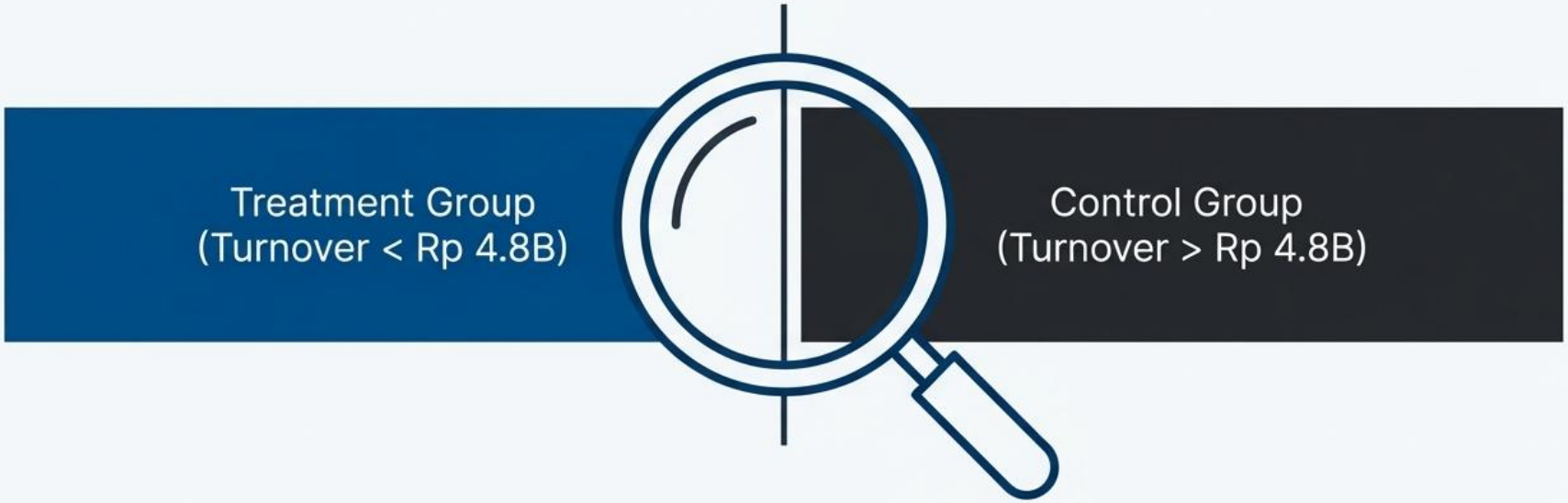
A simple, final presumptive tax of 0.5% on monthly turnover. Crucially, no complex expense deductions are needed.

3

How do they comply?

Simplified reporting. Payment stubs submitted via ATM or mobile banking act as monthly tax returns, removing the need for manual filing.

The Challenge: How to Prove the Policy *Caused* a a Change in Behavior



The Problem:

A simple comparison is insufficient. Firms just below the threshold may be fundamentally different from firms just above it for reasons unrelated to the policy.

The Solution:

We need a method that can isolate the policy's effect precisely at the eligibility cutoff. This is the logic of **Regression Discontinuity** (RD).

A Step-by-Step Guide to the RD Design

1 Step 1: The Variable & Cutoff

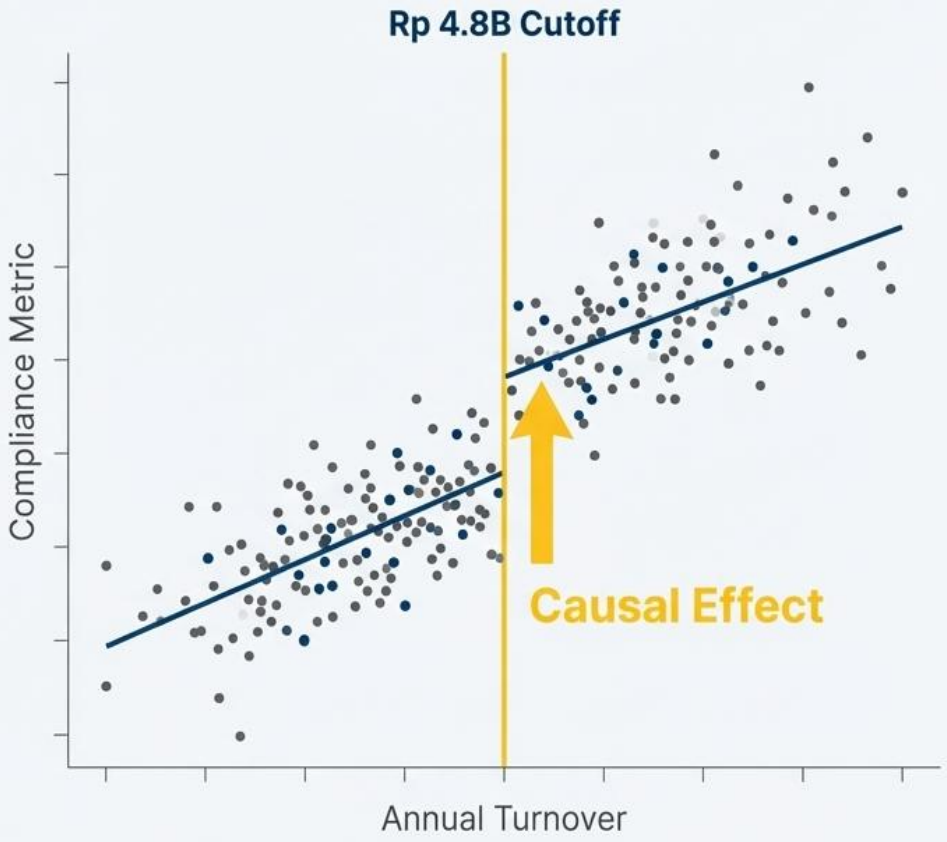
We plot a compliance outcome (e.g., tax payments) against the "running variable"—annual turnover. A sharp policy cutoff exists at Rp 4.8 Billion.

2 Step 2: The Core Assumption

Firms *just below* the cutoff are assumed to be nearly identical to firms *just above* it in all ways, *except* for their eligibility for the program.

3 Step 3: The Measurement

Any 'jump' or discontinuity in the compliance trend right at this cutoff can be attributed as the causal effect of the program.



Fueling the Analysis with Comprehensive Administrative Data

Data Source & Scope

Source: Entity-level, de-identified data from Indonesia's Directorate General of Taxation (DGT).

Scope: All taxpayers registered in 153 small tax offices for the 2019–2020 tax years.

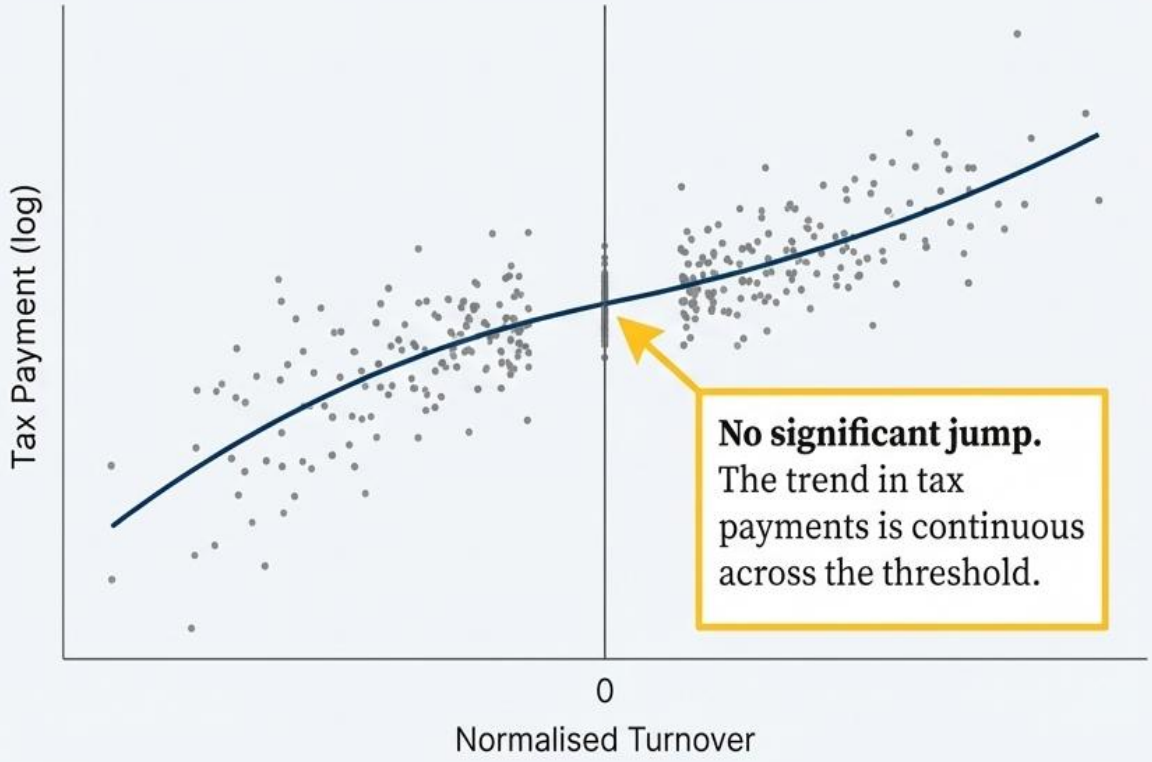
Key Compliance Metrics Measured

Tax Payments (log): Total tax amount paid by each taxpayer.

Tax Reporting: Frequency of monthly return submissions.

Penalties (log): Total administrative penalties incurred for issues like late filing or payment.

Finding 1: Simplification Did Not Significantly Increase Tax Payments



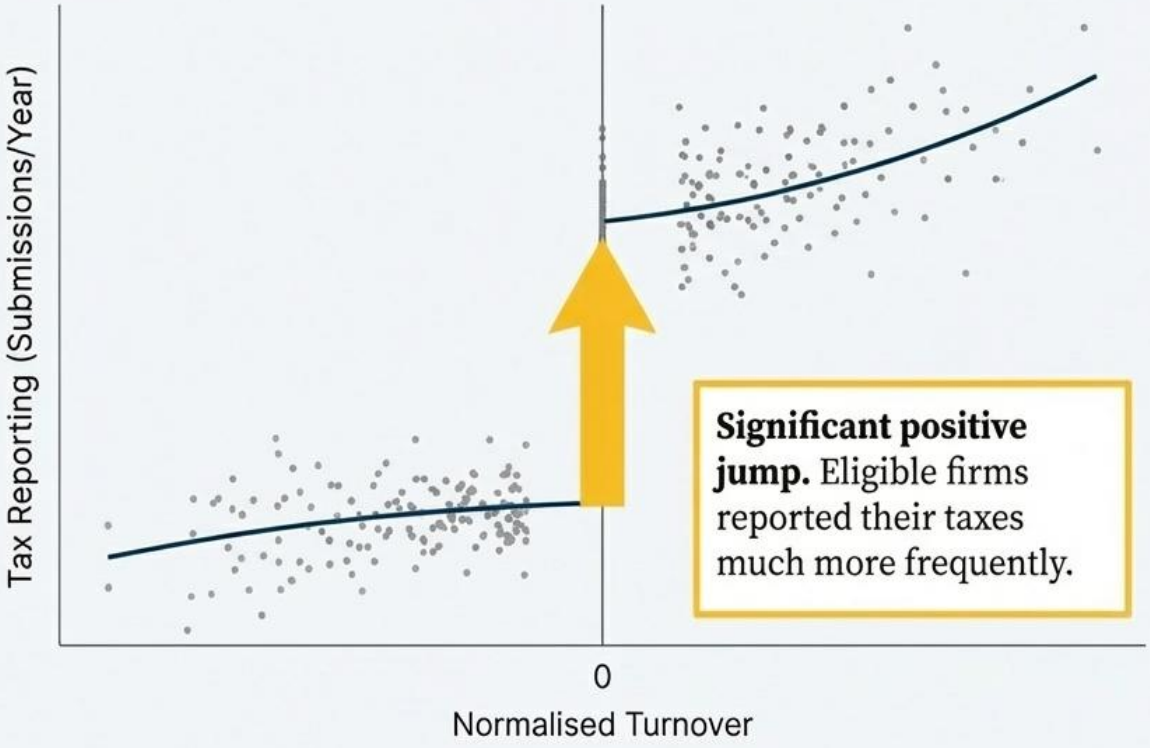
Treatment Effect (τ): 0.003

Result: Not Statistically Significant

Interpretation:

The simplified program did not, on its own, motivate businesses near the threshold to pay more taxes.

Finding 2: However, It Dramatically Increased Reporting Frequency



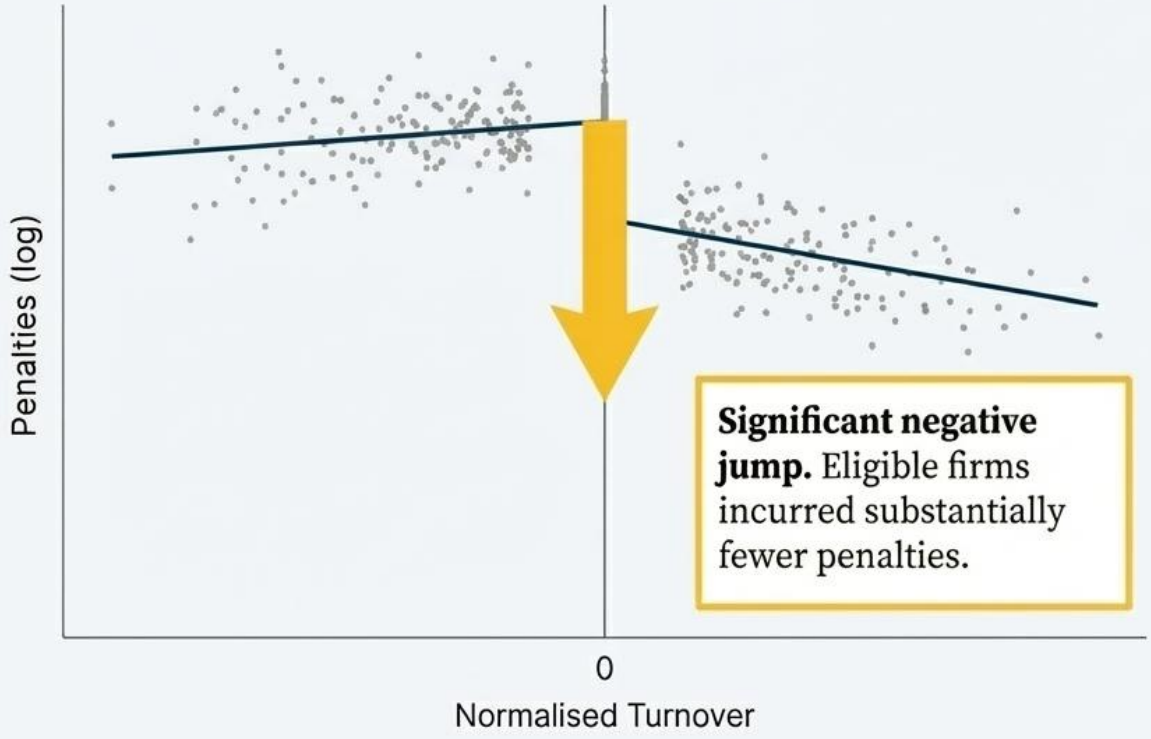
Treatment Effect (τ):
+2.4 submissions/year

Result: Highly Significant ($p < 0.01$)

Interpretation:

Simplifying the process by allowing payment stubs as returns was highly effective in boosting formal reporting compliance.

Finding 3: The Program Also Led to a Sharp Reduction in Penalties



Treatment Effect (τ):
-0.44 (in log points)

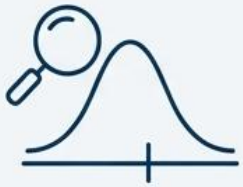
Result: Highly Significant ($p < 0.01$)

Interpretation:

Easier compliance directly translated into fewer mistakes and late filings, reducing the penalty burden on small businesses.

Confidence Check: Robustness Tests Confirm the RD Design's Validity

Manipulation Test



Did firms deliberately misreport turnover to get into the program?

No. The density of firms is smooth across the cutoff ($p = 0.84$).

Placebo Tests

Do we see effects at "fake" cutoffs where none should exist?

No. No significant effects were found at placebo thresholds (e.g., Rp 3.8B or Rp 5.8B).

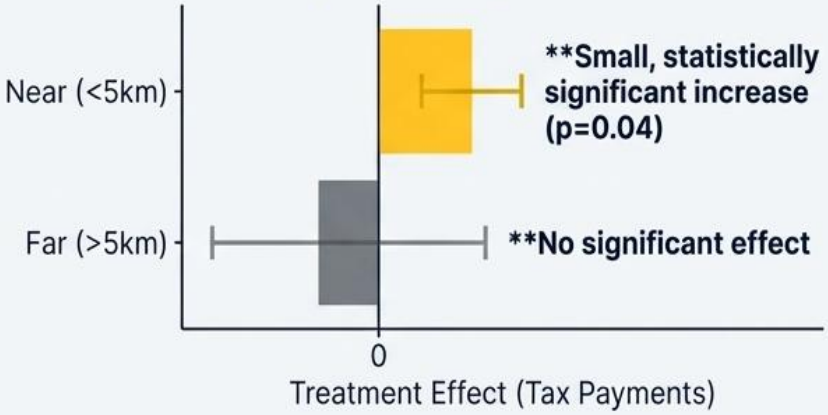
Covariate Balance

Are firms just above and below the cutoff similar in other characteristics?

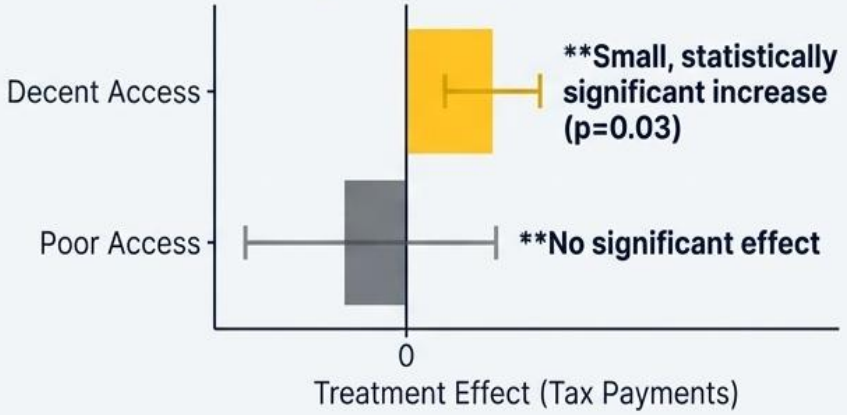
Yes. Key characteristics like business sector and location are well-balanced.

Not All Businesses Benefited Equally: Location and Internet Access Matter

Effect on Tax Payments by Location



Effect on Tax Payments by Internet Access



Key Takeaway: The program's positive impact on tax *payments* is only observable for businesses with better access to administrative support and digital infrastructure.

Explaining the Nuanced Results: Theory and Behavior

Why was there no average effect on payments?

Rational Choice: For many, the expected utility of under-reporting may still outweigh the simplified rate, consistent with models by Allingham & Sandmo.

'Hidden' Administrative Costs: For remote firms or those with poor internet, the benefits of simplification may be negated by practical hurdles.

Why was there a strong effect on reporting?

Prospect Theory: Taxpayers are loss-averse. The certainty of avoiding penalties (a loss) is a stronger motivator than the potential for a slightly lower tax bill (a gain).

Lowering the Bar: The program dramatically lowered the cost and effort of procedural compliance, making it the path of least resistance.

The Verdict on Indonesia's Tax Simplification Program

Ineffective on Tax Payments

On average, simplification alone does not compel small businesses to pay more tax.

Highly Effective on Procedural Compliance

It is a powerful tool for bringing businesses into the formal system by making reporting and filing dramatically easier.

Effectiveness is Conditional

The program's success, particularly for payments, depends heavily on non-tax factors like digital infrastructure and access to support.

From Evidence to Action: Designing Smarter Tax Policy

Recommendation 1: Don't Just Simplify, Support.

Tax simplification policies must be paired with investments in digital infrastructure and accessible administrative support, *especially* for remote and rural businesses.

Recommendation 2: Focus on the 'On-Ramp'.

View simplification as a powerful first step for formalization and improving reporting. Use it to build *the tax base before* focusing on maximizing payment compliance.

Recommendation 3: Segment the Strategy.

A one-size-fits-all approach is insufficient. Differentiate strategies for digitally-connected versus remote businesses to unlock the program's full potential.

How Indonesian Businesses Navigated the COVID-19 Economic Shock

Source:

Rosid, A., Sanjaya, T. B., & Ardin, G. (2022). *The economic impact of the COVID-19 pandemic on businesses: The case of Indonesia*. *Jurnal Anggaran dan Keuangan Negara Indonesia, 4*(1), 87–110.

Summary

This study examines the unprecedented economic disruption faced by Indonesian firms during the COVID-19 pandemic using survey data from more than 12,000 respondents. The findings reveal sharp declines in sales, production capacity, and overall business performance across most sectors, yet firms with an export orientation proved notably more resilient than those focused solely on domestic markets. Moving beyond descriptive analysis, the research employs correspondence analysis to link specific operational constraints and labor adjustment strategies to firms' annual turnover and geographic location. The results show that business responses to the crisis varied systematically across regions and sectors, shaping how companies adapted their marketing practices and workforce management to survive. Overall, the study provides a detailed empirical map of firm-level adaptation during the pandemic and offers valuable insights for designing targeted recovery and resilience policies in the aftermath of large-scale economic shocks.

Unpacking the Economic Disruption: The Study's Three Core Questions

1

The Impact

What were the specific economic impacts on Indonesian businesses? (Covering sales, expenses, operational capacity, difficulties, and status).

2

The Firm

How did challenges and strategic responses vary by a firm's annual turnover?

3

The Location

How did these challenges and strategies differ based on a business's geographical location within Indonesia?

A Robust Foundation: Surveying the Indonesian Business Landscape

12,361

businesses surveyed.

Nationwide

geographic scope, with 70% of firms in Java, 13% in Sumatra, and 17% across other regions.

July–Aug 2020

data collection period, capturing the initial, acute phase of the crisis.

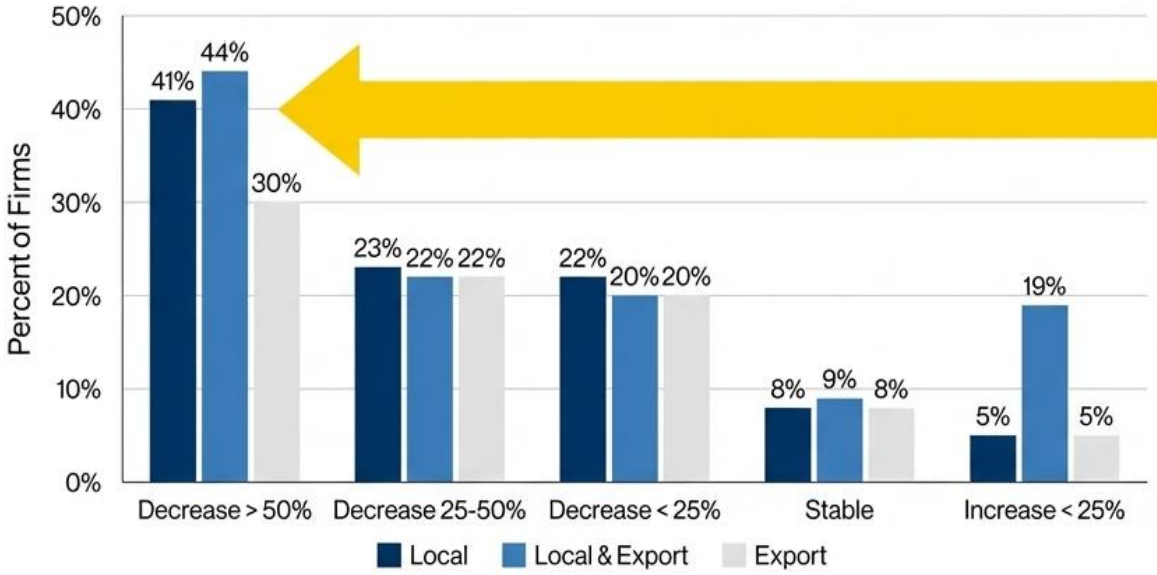
Formal Economy

target population, focusing on businesses registered in the tax administration system.

A Four-Step Journey Through the Data

A Seismic Shock: 86% of Businesses Suffered a Drop in Sales, with Local-Market Firms Hit Hardest

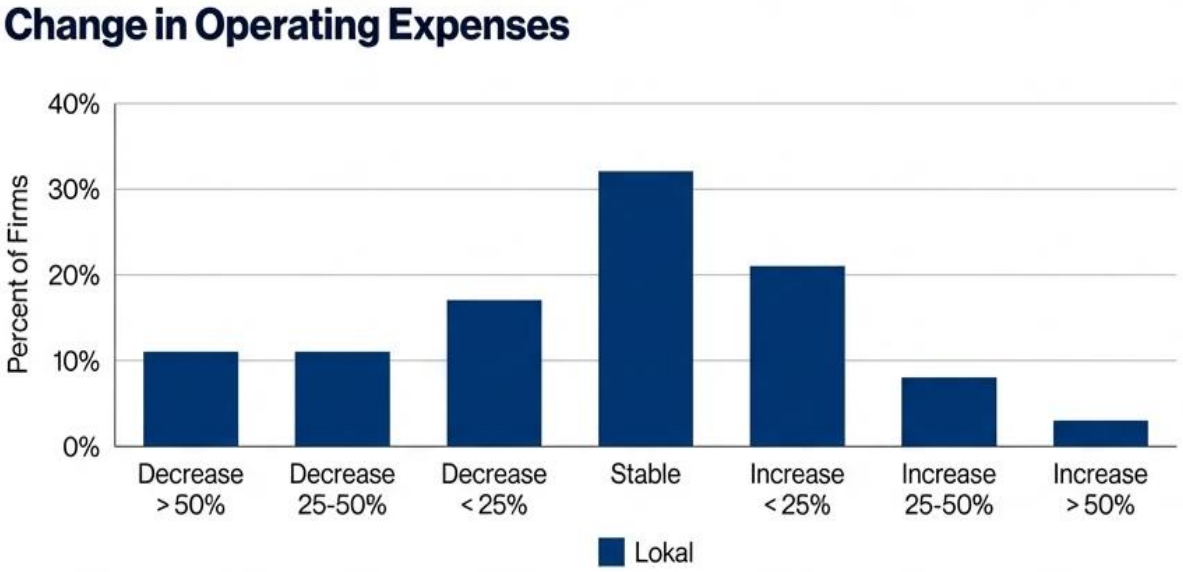
Change in Sales by Market Orientation



41% of local-market firms firms saw sales plummet by over 50%.

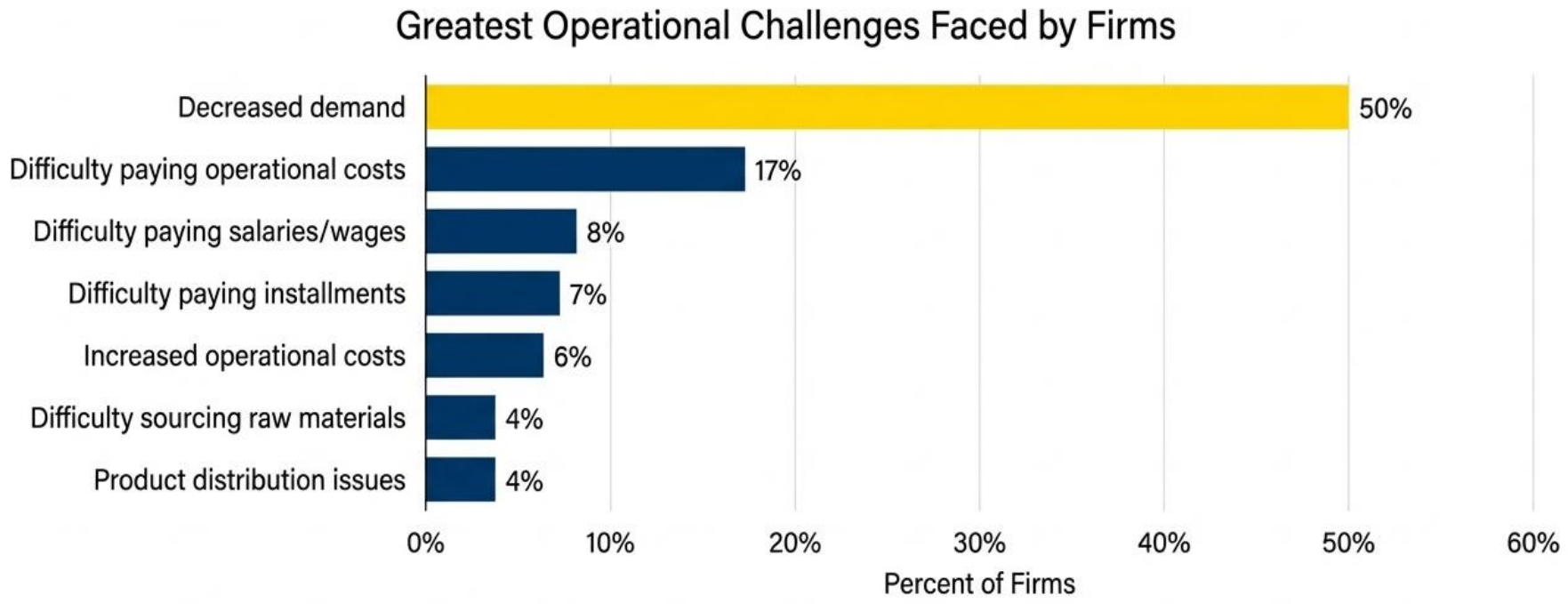
Key Insight:: Export-oriented firms demonstrated greater resilience. Only 30% of export firms experienced a >50% sales drop, and a significant 19% reported sales *increases* of up to 25%, compared to less than 5% of local firms.

The Squeeze: Operating Expenses Remained Stubbornly High, Intensifying Financial Pressure



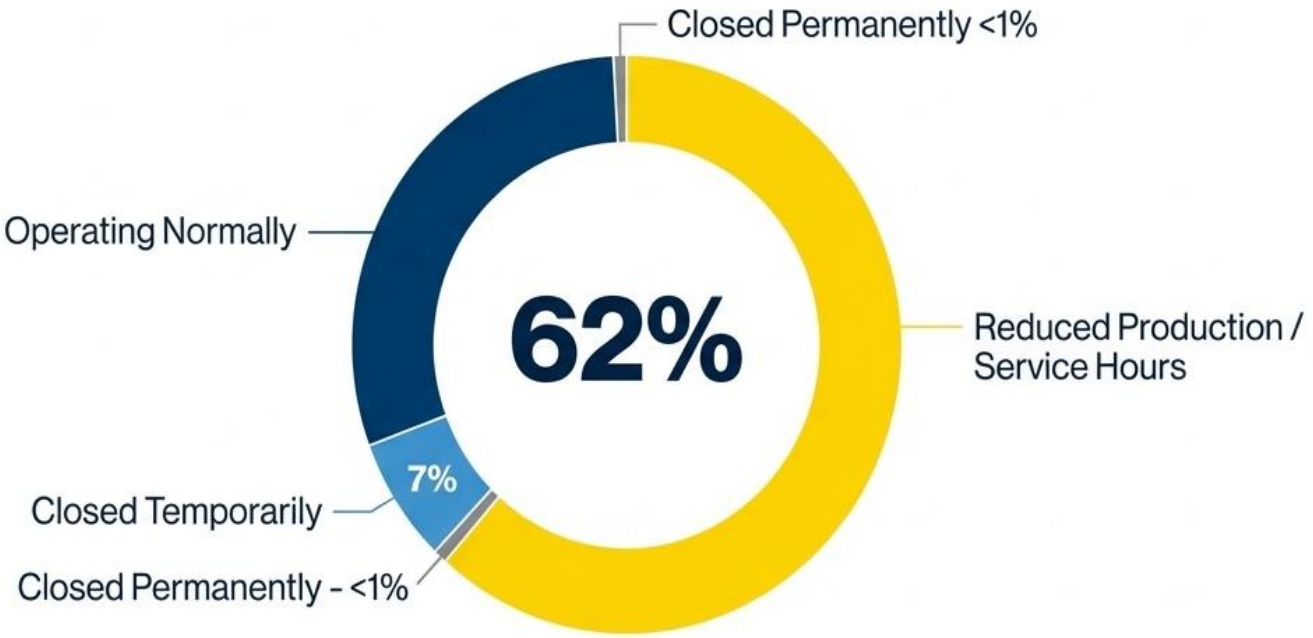
Key Insight: While 86% of firms saw sales decline, a combined 62% reported that operating expenses remained stable (31%) or increased (31%). This stark mismatch between revenue and costs created a critical cash flow crisis for a majority of businesses.

The Primary Casualty: Over 50% of Businesses Cited a Sharp Decline in Demand as Their Greatest Challenge



Key Insight: Other operational challenges such as paying expenses (17%), paying salaries (8%), and sourcing raw materials (4%) were significant, but they were dwarfed by the primary problem: customers were not buying.

Hitting the Brakes: 62% of Firms Responded by Reducing Production or Service Hours

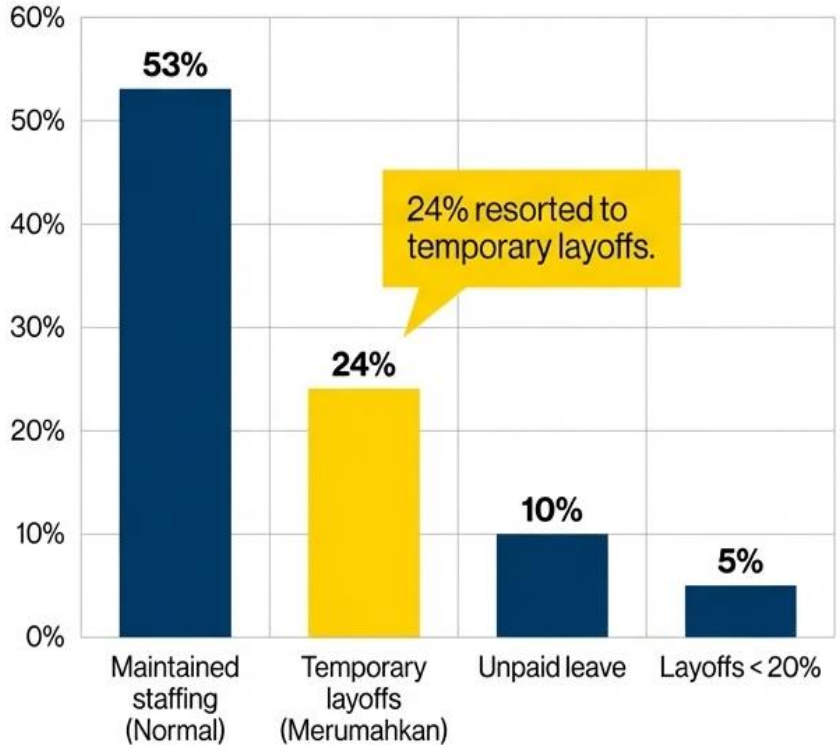


Key Insight: The dominant initial response was to scale back operations. A further 7% closed temporarily. Notably, at this early stage of the crisis, very few (<0.5%) had closed permanently, indicating a 'wait-and-see' approach.

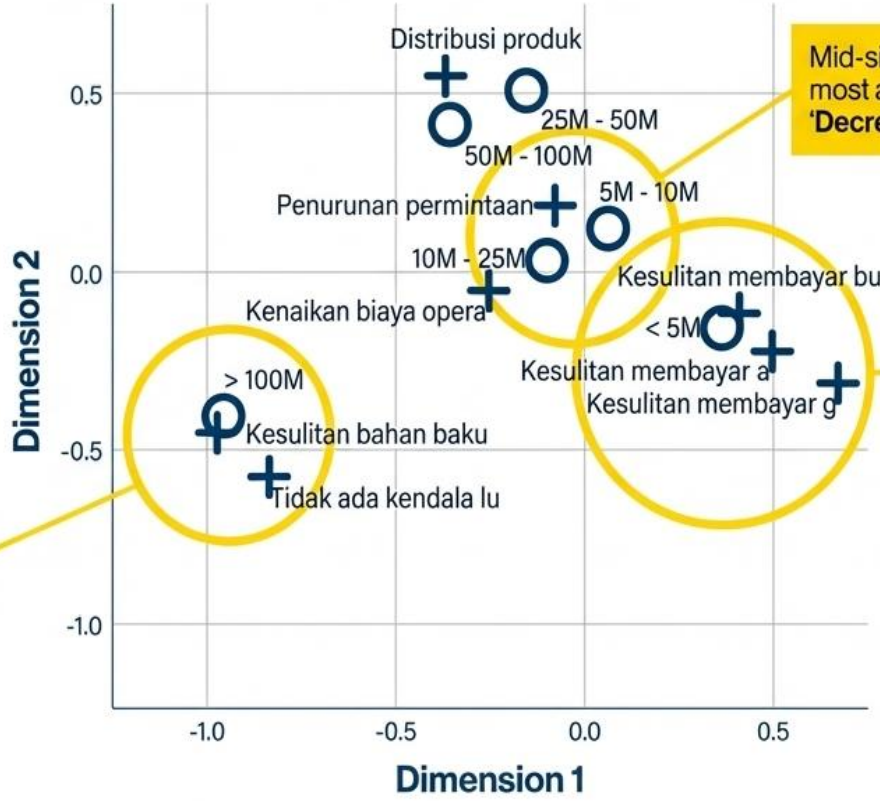
Pivoting to Survive: A Split Between Active Strategy and Inertia

33% Sought New Markets to Survive

53% Maintained Staffing Levels



Firm Size Dictated the Crisis: Liquidity for the Small, Supply Chains for the Large



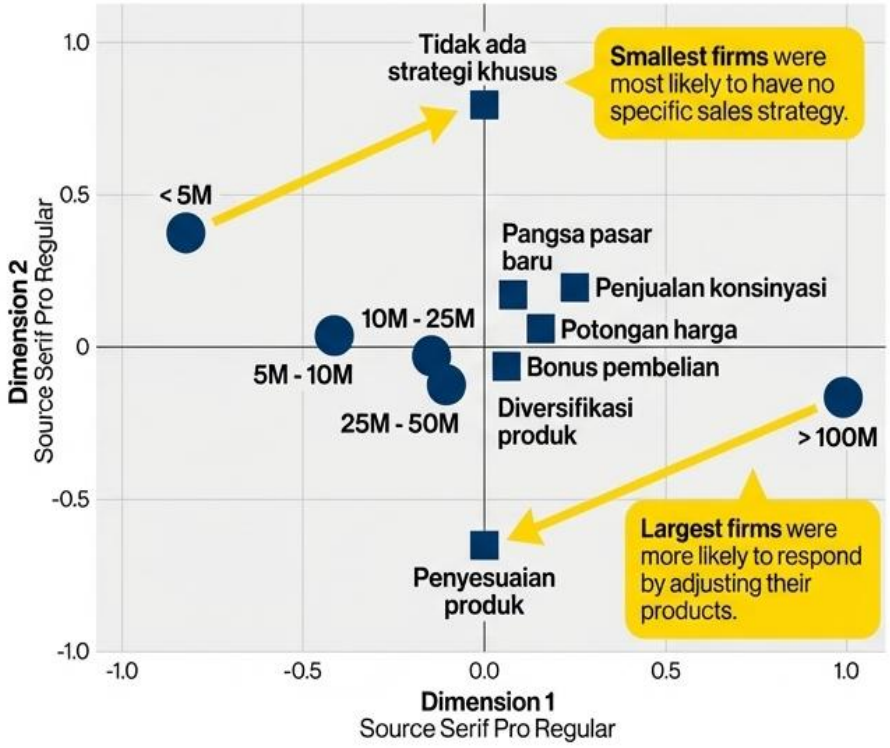
Mid-sized firms felt the demand drop most acutely, clustering closest to **'Decreased demand'**.

Smallest firms (<Rp 5 billion turnover) were plagued by **liquidity issues: difficulty paying operational costs, loan installments,** and **salaries.**

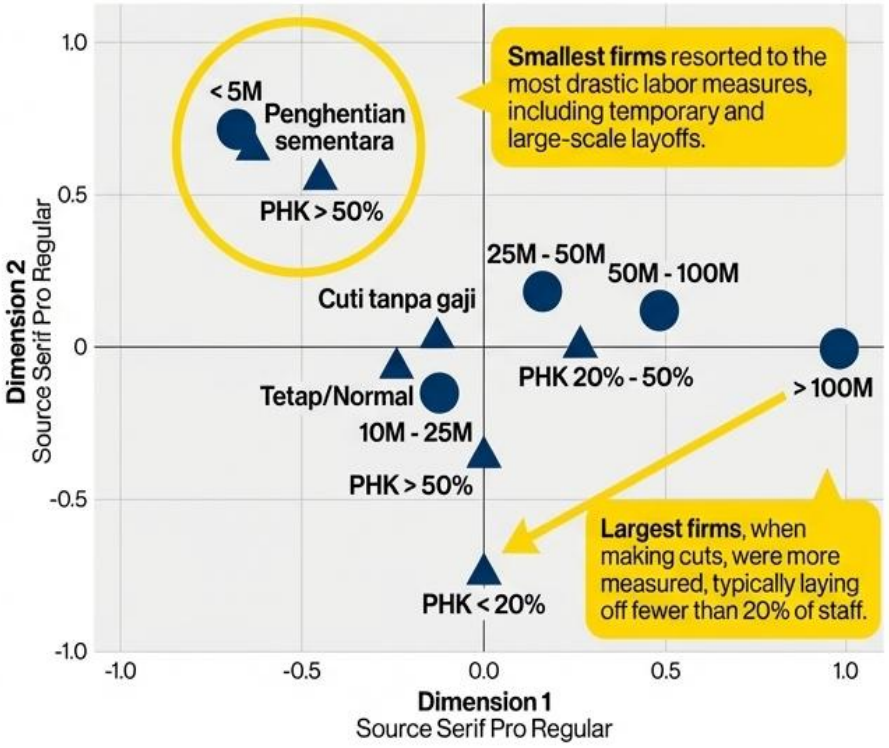
Largest firms (>Rp 100 billion turnover) were most concerned with **raw material shortages**, indicating acute **supply chain vulnerabilities.**

Small Firms Lacked Strategy & Shed Staff; Large Firms Adjusted Products & Retained Talent

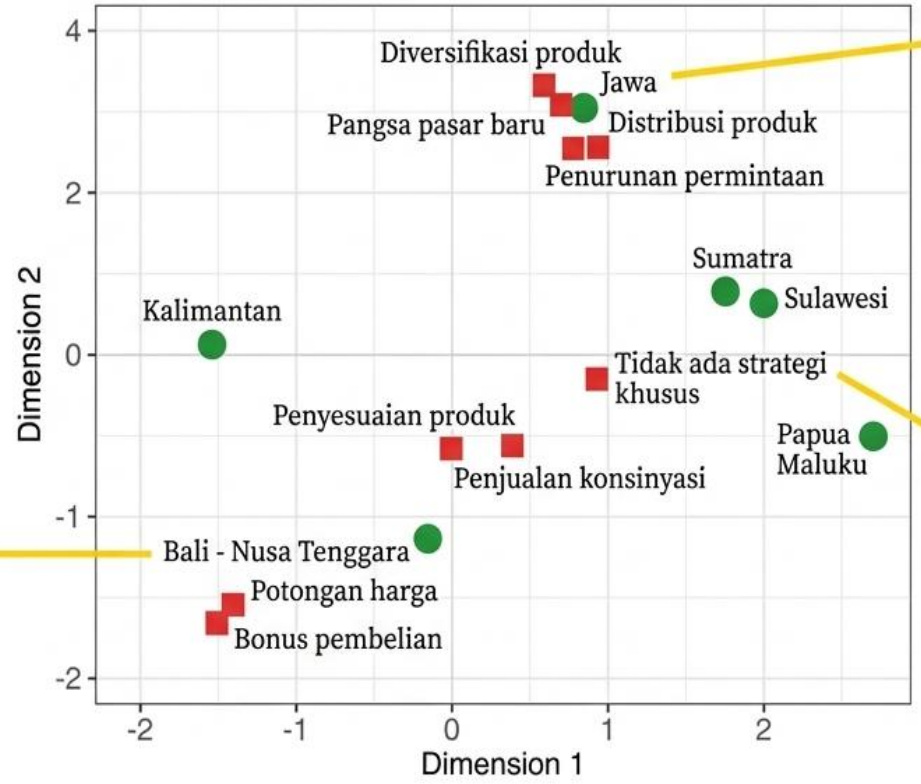
Sales Strategies by Firm Size



Labor Strategies by Firm Size



The Geographic Divide: Java's Demand Shock vs. Bali's Tourism Collapse



Firms in Java, the economic heartland, were most likely to report "Decreased Demand" and "Product Distribution" issues. Their primary response was "Market Expansion" and "Product Diversification".

Firms in these regions were most strongly associated with having "No Specific Sales Strategy", suggesting different market dynamics or a greater degree of strategic inertia.

Tourism-dependent regions were forced to compete on price, with firms strongly associated with strategies like "Price Discounts" and "Purchase Bonuses".

Three Critical Insights on Business Resilience in a Crisis

1. The Liquidity Trap

The crisis was defined by a scissor effect of plummeting revenue against stable or rising costs. This created a critical liquidity trap that disproportionately affected smaller firms.

2. The Demand Epicenter

The primary driver of the crisis was not supply chain failure but a catastrophic drop in consumer demand, reported as the top challenge by over 50% of businesses.

3. Heterogeneity is Key

A firm's size and location were the most powerful predictors of the challenges it faced and the strategies it could employ. A one-size-fits-all policy response would have been ineffective.

Policy Implications and Avenues for Future Research

For Policymakers

- Emphasizes the need for data-driven, targeted support: liquidity assistance for SMEs, demand-stimulus for regions like Java, and sector-specific aid for tourism-dependent areas.
- Highlights the importance of a policy mix including both fiscal and non-fiscal incentives (e.g., capital assistance, loan repayment relief).

For Researchers

- Suggests expanding the study to the informal sector (businesses outside the tax system).
- Proposes adding variables like firm age and capital structure to future analyses.
- Recommends future studies focus on explaining causality, particularly the effectiveness of government stimulus policies.

J

Digital Resilience: How Technology and Tax Incentives Helped Firms Survive COVID-19

Source:

Rosid, A., Nugroho, A. P., & Bachriansyah, B. I. (2022). The performance of Indonesian businesses during Covid-19 pandemic: Do technological dependence and tax incentives matter? (Working Paper Series 22-03).

Summary

This study examines how digital readiness and government tax incentives shaped the resilience of 12,361 Indonesian businesses during the COVID-19 pandemic. Using survey data combined with ANOVA and regression analysis, the authors compare sales and profit trajectories across firms with varying levels of technological integration. The findings are clear and policy-relevant: businesses with high dependence on digital technologies experienced significantly smaller economic losses than less digitized firms. In parallel, the use of tax incentives played a meaningful role in cushioning the shock, with beneficiary firms showing stronger performance during the crisis period. Importantly, the results suggest that technology and fiscal support operate as complementary buffers rather than substitutes. Based on this evidence, the paper recommends that the Indonesian government view digital infrastructure expansion and technology adoption not merely as long-term development goals, but as core elements of economic resilience policy. Beyond Indonesia, the study offers a useful benchmark for assessing how digital capacity and targeted tax relief can jointly support business survival during systemic economic shocks in both emerging and advanced economies.

The COVID-19 pandemic created an unprecedented economic shock for Indonesian businesses.

In 2020, widespread social activity restrictions triggered severe disruptions across all sectors. Official reports highlighted significant economic declines.

- The province of Bali was hit hardest, with an economic growth decline of -12.32%.
- The Accommodation and Food Service sector was the most affected.
- In response, the Indonesian government launched the National Economy Recovery Program (PEN), which included a suite of tax incentives for businesses.
- This study investigates the factors that fostered business resilience in this challenging environment.

This study was guided by three fundamental questions about business resilience.

1

RELATIONSHIPS:

What are the relationships between a business's tech dependence, its performance (sales/profit), and the major hindrances it faced?

2

TECHNOLOGY EFFECT:

Do businesses with higher technological dependence exhibit significantly better performance during the pandemic?

3

INCENTIVE EFFECT:

Do businesses that utilize government tax incentives show significantly better performance?

Step 1: The analysis is built on a robust nationwide survey of 12,361 Indonesian businesses.

July-Aug 2020
Data Collection

All Major
Business Sectors

12,361

business responses

All 34 Provinces

70% of firms in Java

All Firm Sizes

From micro-enterprises to large corporations

This comprehensive dataset provides a reliable foundation for understanding the nationwide business landscape.

Step 2: Business performance was measured against technological dependence and tax incentive use.

(1) TECHNOLOGICAL DEPENDENCE (Independent Variable)

A self-reported categorization of business operations:

Nontechnology-based: 22%

Technology-based: 57%

Highly technology-based: 21%

(2) TAX INCENTIVE UTILIZATION (Independent Variable)

A binary measure based on the question: "Have your businesses utilised tax incentives?"

Yes: 49.4%

No: 50.6%

(3) BUSINESS PERFORMANCE (Dependent Variable)

Measured as the change in Sales & Profit in Q2 2020 vs. Q2 2019 on a 7-point scale, from 'decreasing >50%' to 'increasing >50%'.

Step 3: A multi-method statistical approach ensured comprehensive and robust findings.

1. Correspondence Analysis (CA)

- **Purpose:** To visually map the associations between categorical variables.
- **Used For:** Exploring the relationship between tech dependence and the types of business hindrances faced.

→

2. Analysis of Variance (ANOVA)

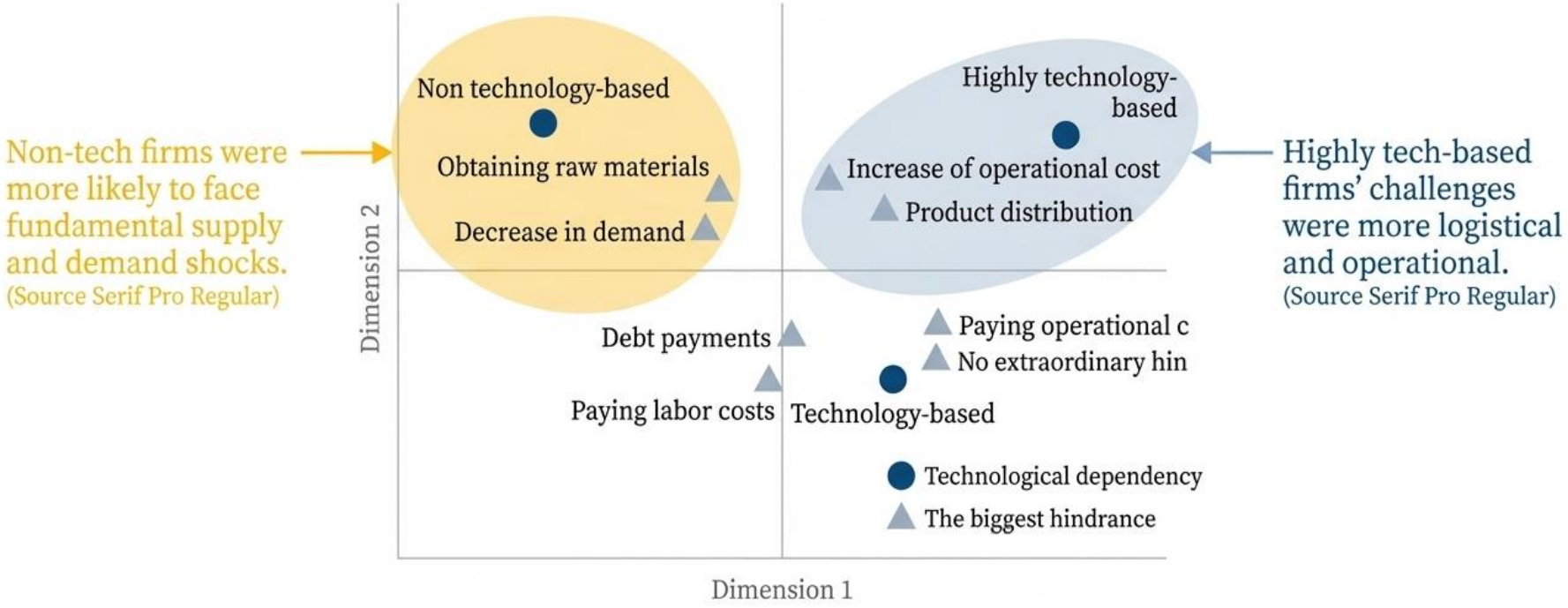
- **Purpose:** To compare the mean performance across different groups.
- **Used For:** Determining if tech-based firms and incentive-users had statistically different sales/profit outcomes.

→

3. OLS Multiple Regression

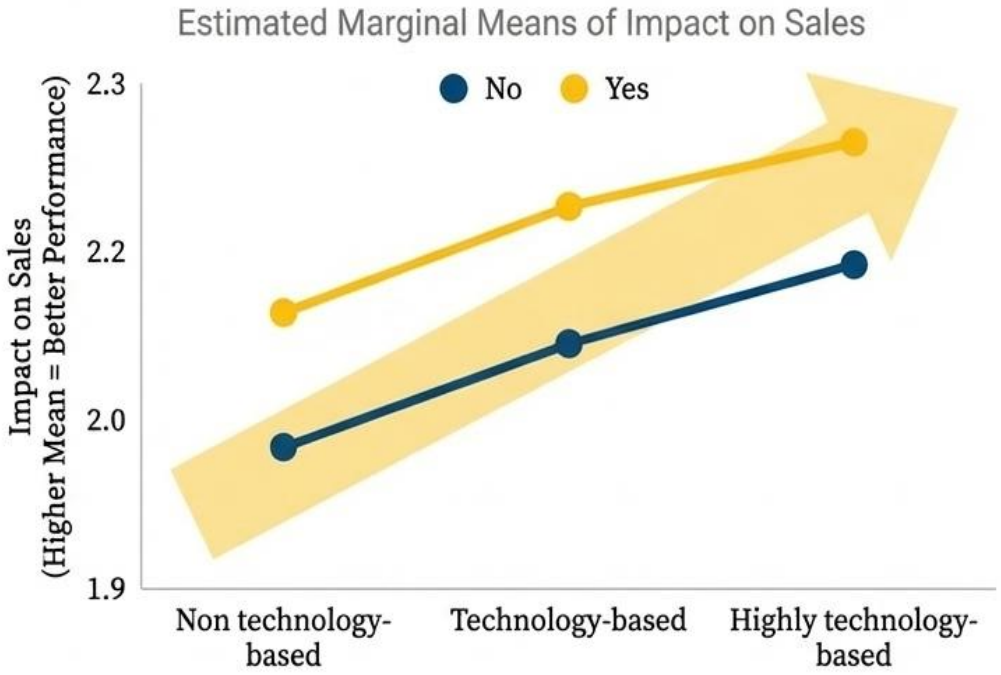
- **Purpose:** To isolate the impact of each variable while controlling for other factors (e.g., size, sector).
- **Used For:** Quantifying the precise effect of technology and tax incentives on performance.

Finding 1: Correspondence analysis reveals that tech dependence is strongly associated with the *type* of hindrances businesses faced.



The challenges faced by businesses were qualitatively different based on their integration of technology.

Finding 2: Businesses with higher technological dependence experienced significantly smaller declines in sales.



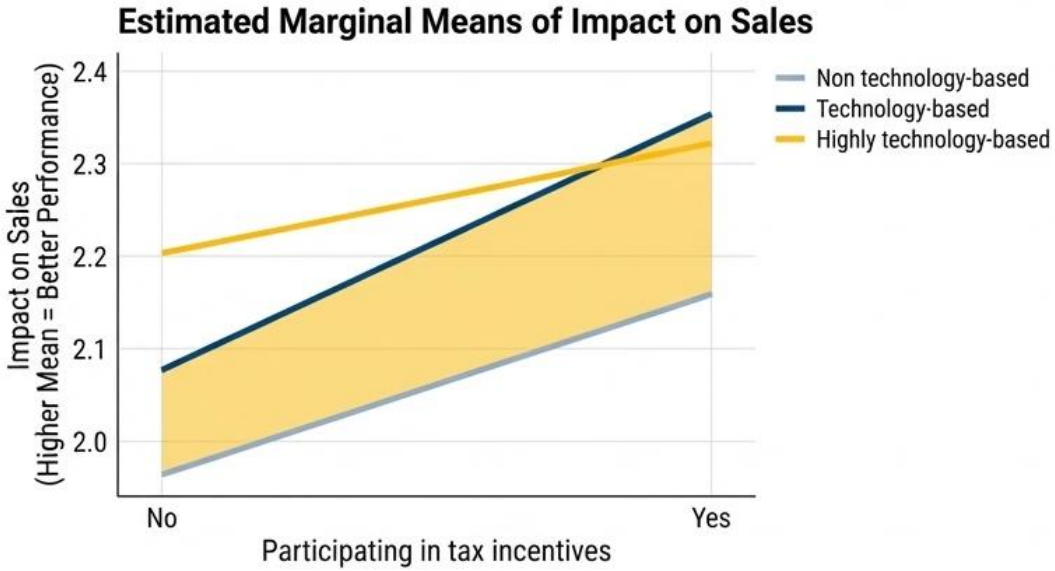
Key Insight from ANOVA:

The sales of nontechnology-based businesses (Mean = 2.06) were impacted significantly more than technology-based (M=2.21) or highly technology-based businesses (M=2.26).

$*F(2, 12{,}355) = 18.29, p < 0.001$

Technology provided a measurable buffer against the economic downturn.

Finding 3: Utilizing government tax incentives provided a significant and positive boost to business performance.



****Key Insight from ANOVA:**

Across all levels of technology, businesses utilizing tax incentives (Mean Sales Impact = 2.30) performed **significantly better** than those that did not (M = 2.08).

(F(1, 12,355) = 57.04, p < 0.001)

The government's fiscal support measures were directly correlated with improved business resilience.

Finding 4: Regression analysis confirms a positive, statistically significant impact on performance, even after controlling for other factors.

The OLS regression model isolates the effect of our key variables. Compared to nontechnology-based firms not receiving incentives, the impact on **sales performance** is clear:

Technology-based

+0.116 (***)

A significant positive effect.

Highly technology-based

+0.129 (***)

An even stronger positive effect.

Received Tax Incentives

+0.066 (***)

A significant positive effect.

*Note: *** indicates $p < 0.01$. Coefficients extracted from the full model.

Finding 5: The model also revealed that business size, sector, and location were crucial predictors of resilience.

SIZE

Larger firms (by annual turnover and employee count) demonstrated higher resilience.

SECTOR

Most Resilient:
Financial & Insurance, Information & Communication, Utilities (Electricity & Gas, Water Supply).

Hardest Hit:
Accommodation & Food Service Activities was the only sector with a significant negative coefficient.

REGION

Confirming official reports, businesses in **Bali - Nusa Tenggara** suffered a significantly greater negative impact compared to other regions.

The evidence points to two pillars of business resilience during the pandemic: digital capability and government support.

1. Technology as a Differentiator:

- Higher tech dependence correlated not just with better sales, but also with a shift from existential threats (demand collapse) to operational ones (distribution).

2. Tax Incentives Worked:

- The fiscal support provided a measurable lifeline, improving performance for businesses that utilized them.

3. Context is Key:

- Resilience was not uniform. Firm size, industry, and location played critical roles in shaping outcomes.

The findings suggest a clear, three-step action plan for policymakers to foster a more resilient economy.

1

ACCELERATE DIGITAL INFRASTRUCTURE

Prioritize investment in internet access, speed, and bandwidth, especially in regions with low penetration, to create the foundation for digital adoption. (Indonesia's internet usage is ~54%, compared to Malaysia's 90% and Singapore's 95%).

2

INCENTIVIZE TECHNOLOGY ADOPTION

Develop programs to encourage and support nontechnology-based businesses in integrating digital tools into their operations, helping them create new marketing channels and expand their market shares.

3

ENHANCE AND COMMUNICATE SUPPORT

Continue providing targeted fiscal support like tax incentives during crises and develop effective communication strategies to ensure all eligible businesses can easily access these benefits.

This study provides robust evidence on the roles of technology and tax incentives, while also opening new lines of inquiry.

Contribution

This paper offers one of the first detailed empirical analyses in an emerging economy demonstrating that technological dependence and tax incentive utilization were significant drivers of business resilience during the COVID-19 pandemic.

Limitations & Future Research

- The findings are correlational, not causal. Future work is needed to establish causality.
- How do different types of technology adoption influence performance?
- Which specific tax incentives were most effective?
- How do these findings compare to other developing or developed nations?

K

Did Tax Incentives Really Help Businesses Survive Covid-19?

Source:

Rosid, A., Bachriansyah, B. I., & Sanjaya, T. B. (2023). Assessing the efficacy of tax incentives during the COVID-19 crisis: Survey evidence from Indonesia (Working Paper Series 23-06).

Summary

This research examines how tax incentives functioned as a shock absorber for Indonesian businesses during the COVID-19 crisis. Based on perception survey data from more than 7,500 enterprises, the study evaluates whether fiscal relief measures—such as income tax exemptions and accelerated VAT refunds—helped firms stabilize cash flow and sustain operations amid unprecedented disruption. The findings indicate a clear positive effect: firms that accessed tax incentives reported stronger liquidity positions and greater operational resilience than those that did not participate. However, the benefits were uneven. Larger firms tended to gain more from the incentives, reflecting stronger administrative capacity and awareness, while sectors heavily exposed to mobility restrictions, particularly tourism and food services, continued to experience severe demand-side pressures despite fiscal support. The study also highlights that limited information and communication gaps reduced participation among eligible businesses, weakening the overall impact of the policy. Drawing on these insights, the authors argue that tax incentives are most effective when they are well targeted, clearly communicated, and aligned with sector-specific conditions. For future crises, adaptive policy design and proactive outreach are essential to ensure that fiscal relief reaches the firms that need it most and supports a faster, more inclusive economic recovery.

The COVID-19 Pandemic Unleashed Unprecedented Shocks on Indonesian Businesses

Demand-Side Shocks

Virus containment measures like lockdowns and travel restrictions, combined with shifts in consumer preferences, led to a sharp reduction in demand for non-essential goods and services requiring physical interaction (e.g., accommodation, restaurants, entertainment).

Supply-Side Shocks

Businesses experienced significant operational challenges, including constraints in the supply of raw materials, higher production costs, difficulties in product distribution, and suboptimal business capacity due to health protocols.

These simultaneous shocks severely compromised business cash adequacy and hindered overall performance, necessitating urgent government intervention.

The Unprecedented Dual Shock of the COVID-19 Pandemic

The pandemic created immense challenges for businesses globally through simultaneous demand and supply shocks.

Demand Shock

Virus containment measures (lockdowns, travel restrictions) and changes in consumer preferences led to a sharp reduction in demand, especially for in-person services like accommodation, restaurants, and tourism.

Supply Shock

Businesses faced constraints in raw materials, higher production costs, and distribution challenges.

Key Insight: Governments worldwide responded with massive fiscal support. In the immediate response phase, tax policy focused squarely on providing **Liquidity & Income Support** to ensure business survival.

Evaluating Indonesia's Tax Incentive Response to Fill a Critical Research Gap

To cushion the impact of these shocks, the Indonesian government deployed fiscal support, including four key tax incentives. This research aims to fill a 'paucity of empirical research' by assessing their efficacy.

1. **Identify Obstacles:** To understand the heterogeneity of business obstacles encountered across various regions, sectors, and scales of operation.

2. **Evaluate Efficacy:** To assess the perceived efficacy of the tax incentives in supporting business cash adequacy and performance levels.

3. **Propose Recommendations:** To provide evidence-based policy recommendations for designing more effective support in future crises.

Contribution

This study is one of the first to use a large-scale, nationwide survey (over 7,500 businesses) to investigate these questions in the Indonesian context.

An Inquiry-Driven Framework for Evaluating Efficacy

Adopting Dunn's (2018) criteria for policy analysis, this study investigates four central questions to assess the efficacy of Indonesia's COVID-19 tax incentives.

1. HINDRANCES (Appropriateness)

What were the most significant obstacles faced by Indonesian businesses during the crisis?

2. PERCEIVED BENEFIT (Responsiveness)

How beneficial were the tax incentives perceived to be by their users?

3. PERFORMANCE (Effectiveness)

Is there a statistical association between incentive utilization and business performance?

4. LIQUIDITY (Adequacy)

Did incentive utilization correlate with improved cash adequacy?

Methodology: A Nationwide Perception Survey

Primary data was collected through a large-scale, quantitative perception survey.

1. **Sample Size:** 7,528 businesses
2. **Scope:** Representative sample covering all 34 provinces
3. **Timing:** July 2021 (16 months after the first incentives were introduced)
4. **Sampling Method:** Stratified random sampling of strategic taxpayers, ensuring representativeness.
5. **Respondent Profile:** Primarily high-level decision-makers.
   - 24% Directors
   - 24% Managers
   - 13% Business Owners

Analytical Strategy: From Description to Inference

Step 1: Descriptive & Correspondence Analysis (CA)

- **Objective:** To identify and map the primary business hindrances and perceived incentive benefits.
- **Technique:** Frequency distributions, cross-tabulations, and Correspondence Analysis to visualize relationships between categorical variables (e.g., Hindrance vs. Sector).

Step 2: Multiple Regression Analysis (OLS)

Objective: To test the association between incentive use and business performance, controlling for other factors.

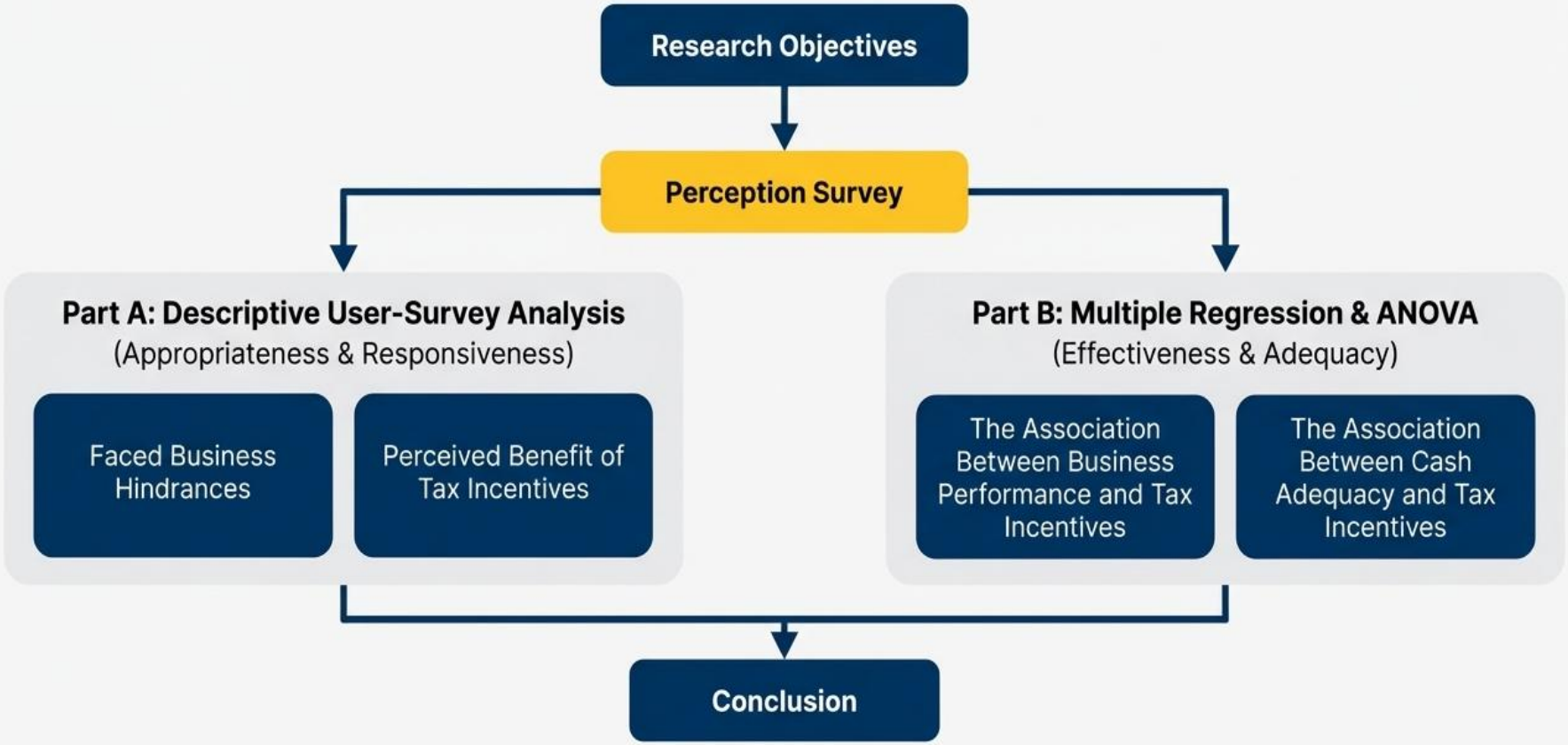
Key Model: Business performance = $\beta_0 + \beta_1$ (tax incentive effects) + β_2 (cash adequacy effects) + Controls

Step 3: Analysis of Variance (ANOVA)

Objective: To compare the mean cash adequacy levels between incentive users and non-users.

Groups: Incentive Users vs. Non-Users, analyzed across different business locations.

A Two-Part Framework Guides the Investigation from Perception to Statistical Association

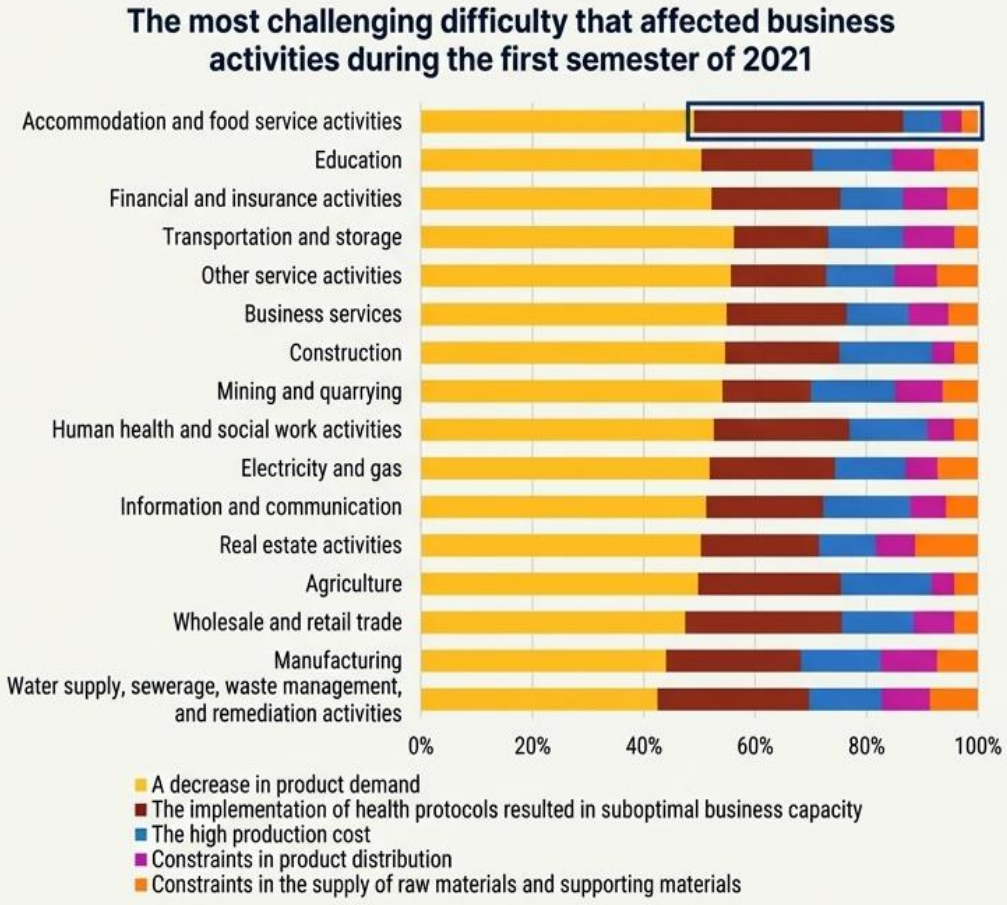


Finding 1 (Appropriateness): Incentives Targeted the Primary Business Impediment

When asked about their most challenging difficulty, the majority of businesses (47%) cited "A decrease in product demand."

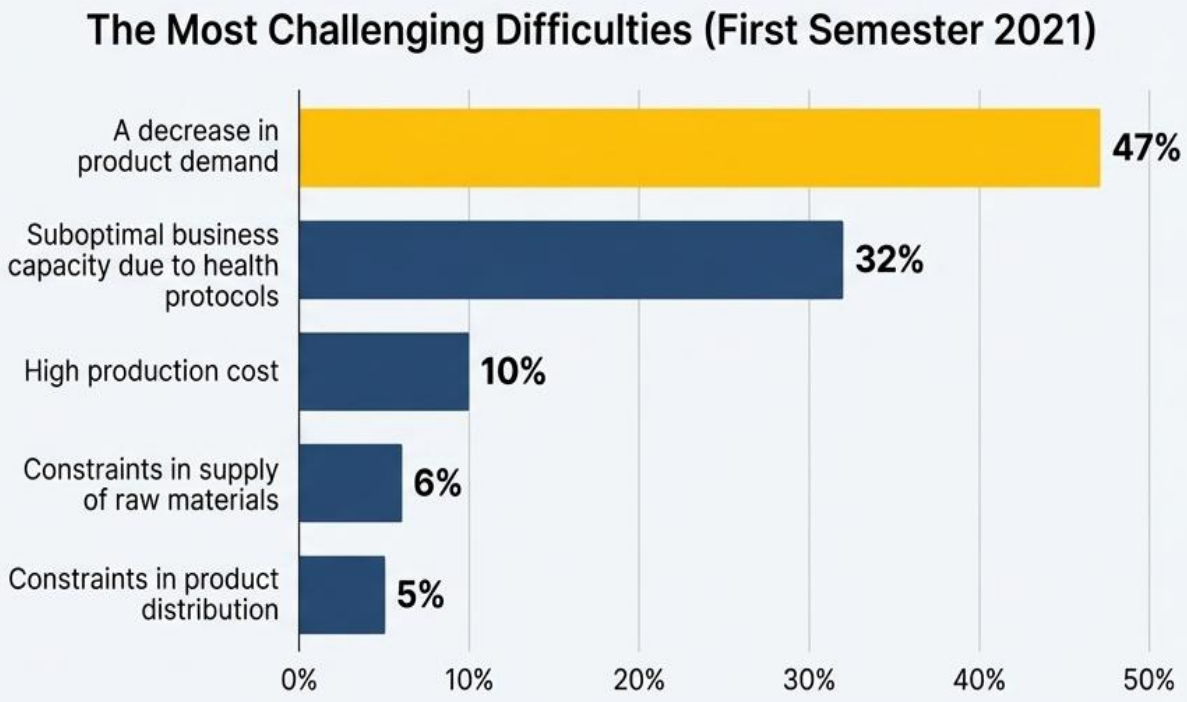
Implication: This finding confirms the appropriateness of the government's focus on demand-side support and business liquidity through tax incentives.

Sectoral Nuance:
While the demand decline was widespread, the **Accommodation and Food Service** sector reported the highest proportion of difficulty related to **"Suboptimal business capacity due to health protocols"** (48%).



The Primary Challenge Was a Crisis of Demand

Nearly half of all businesses (47%) reported **"a decrease in product demand"** as their most significant challenge. This was followed by "suboptimal business capacity" (32%).



The impact of suboptimal capacity was highly sector-dependent, most severely affecting **Accommodation & Food Service Activities (48%)**.

Finding 2 (Responsiveness): Businesses Perceived Incentives as Highly Beneficial

Across the four main tax incentives studied, the vast majority of businesses that used them found them to be valuable.

Article 21 (Wages Tax)

93%

% of users rating it 'Beneficial' or 'Very Beneficial'

Article 22 (Import Tax)

95%

% of users rating it 'Beneficial' or 'Very Beneficial'

Article 25 (Income Tax Installment)

95%

% of users rating it 'Beneficial' or 'Very Beneficial'

Accelerated VAT Refund

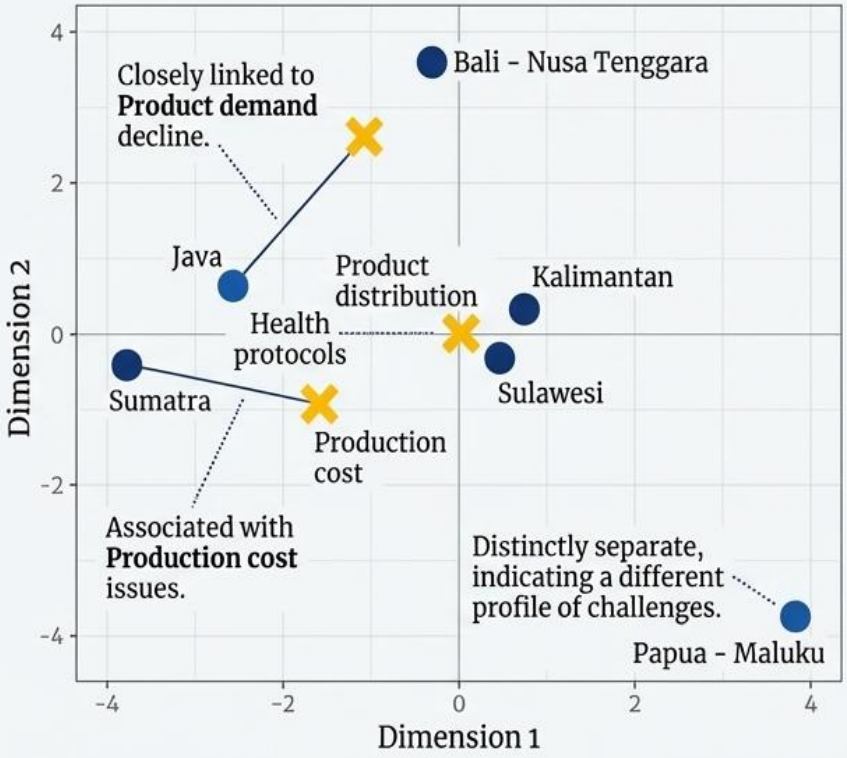
94%

% of users rating it 'Beneficial' or 'Very Beneficial'

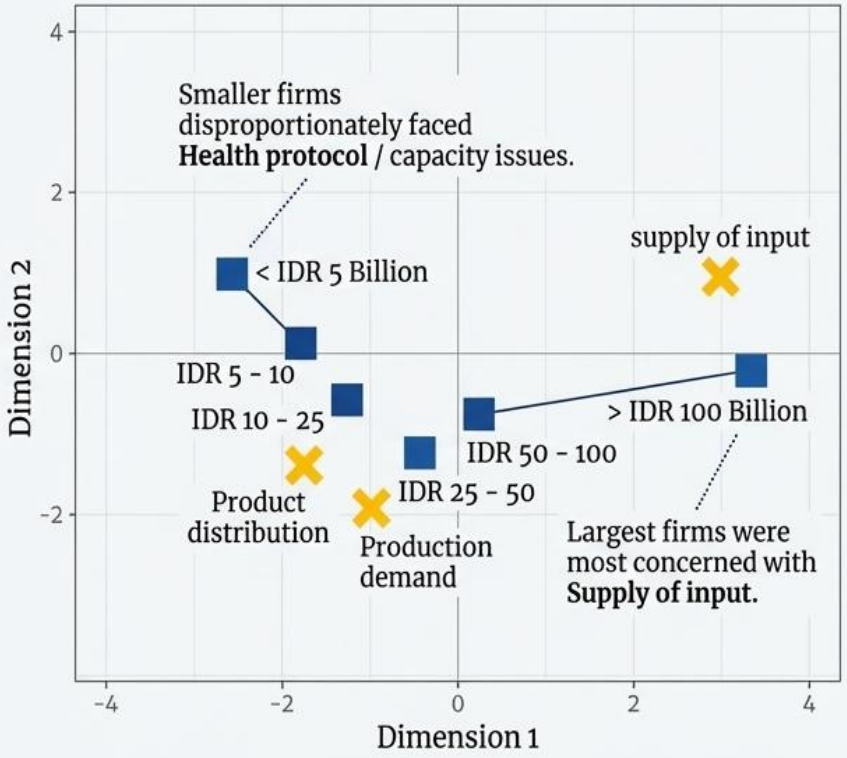
This strong positive perception indicates that the tax incentives effectively met the needs and preferences of the target groups.

Business Challenges Were Not Monolithic

Association by Business Location

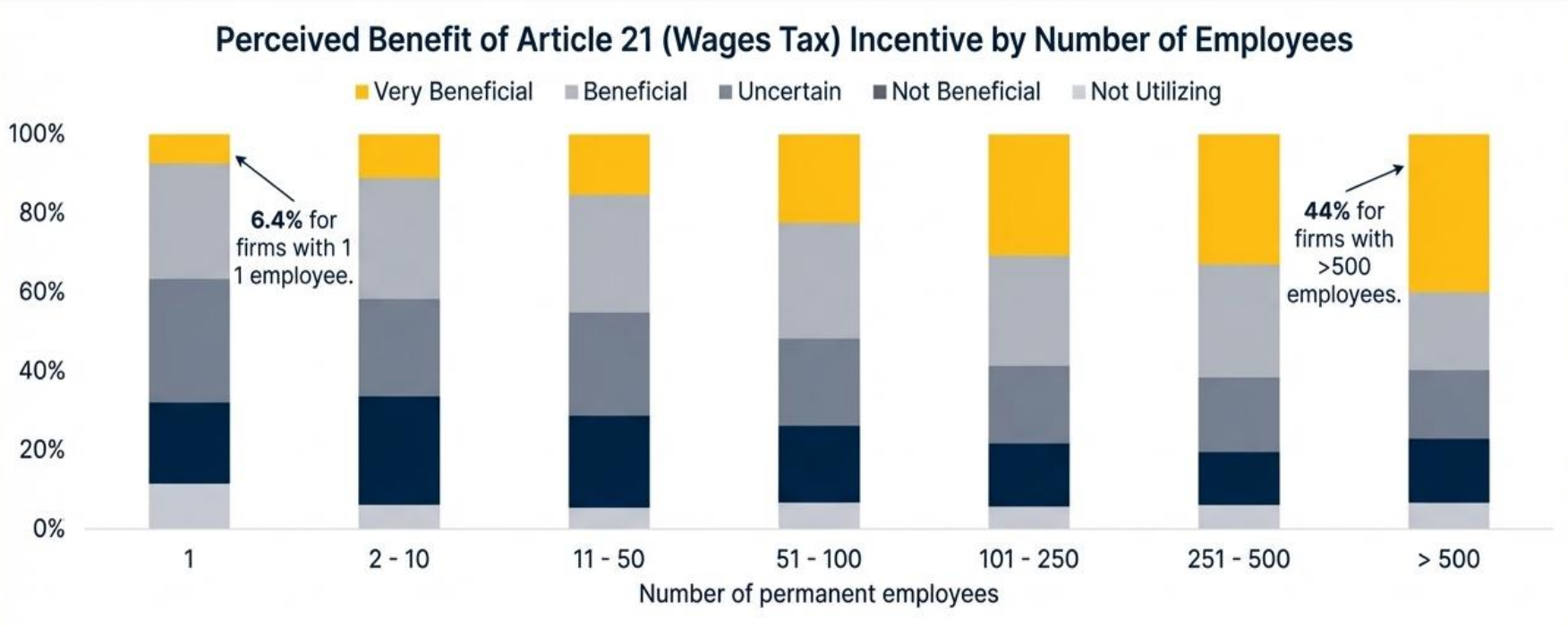


Association by Annual Sales



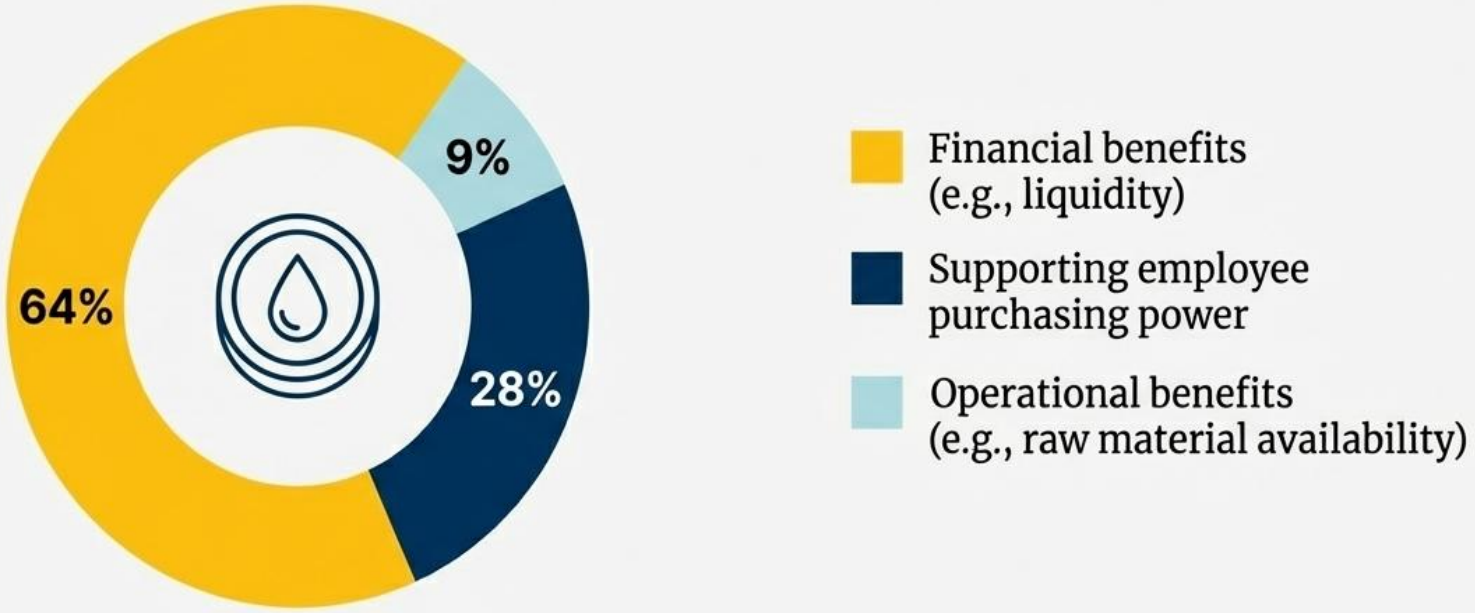
A Deeper Dive: Larger Businesses Reported Greater Benefits

The perceived efficacy of tax incentives correlates strongly with business size. Larger businesses were more likely to report the incentives as "Very Beneficial".



Implication: This underscores the need for policymakers to develop more targeted incentives to ensure smaller enterprises can also fully benefit.

Improved Liquidity Was Overwhelmingly Cited as the Most Important Benefit of Using Tax Incentives



This finding directly confirms that the incentives addressed the core problem of compromised cash adequacy identified at the start of the study.

Finding 3 (Responsiveness): Overwhelming Interest in Future Utilization Confirms Value

Key Question: We asked businesses if they would be interested in utilizing the same tax incentives again in the future.

The Answer: A resounding "Yes".

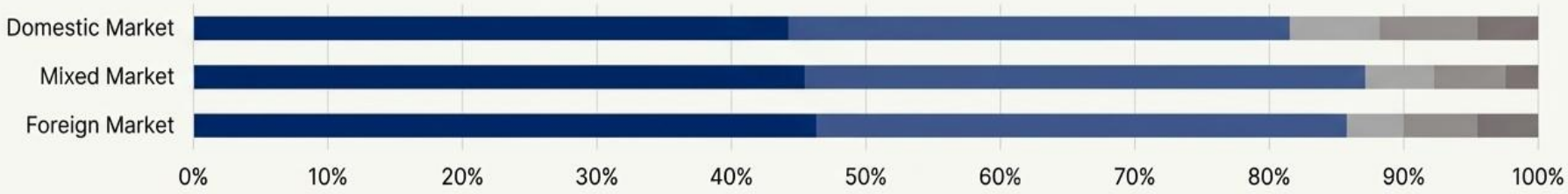
94%
Article 21 (Wages Tax)

95%
Article 22 (Import Tax)

96%
Article 25 (Income Tax Installment)

94%
Accelerated VAT Refund

Interest in re-utilizing Article 25 Incentive by Primary Market



This high degree of interest suggests the perceived utility of these incentives transcends market segment and revenue group, confirming their fundamental value to businesses.

Finding 4 (Effectiveness): Incentive Use is Positively Associated with Business Performance

Based on Ordinary Least Squares (OLS) regression analysis, controlling for size, region, and sector. (Ref: Table 4)

Positive Statistically Significant ($p<0.01$)

Supporting Finding

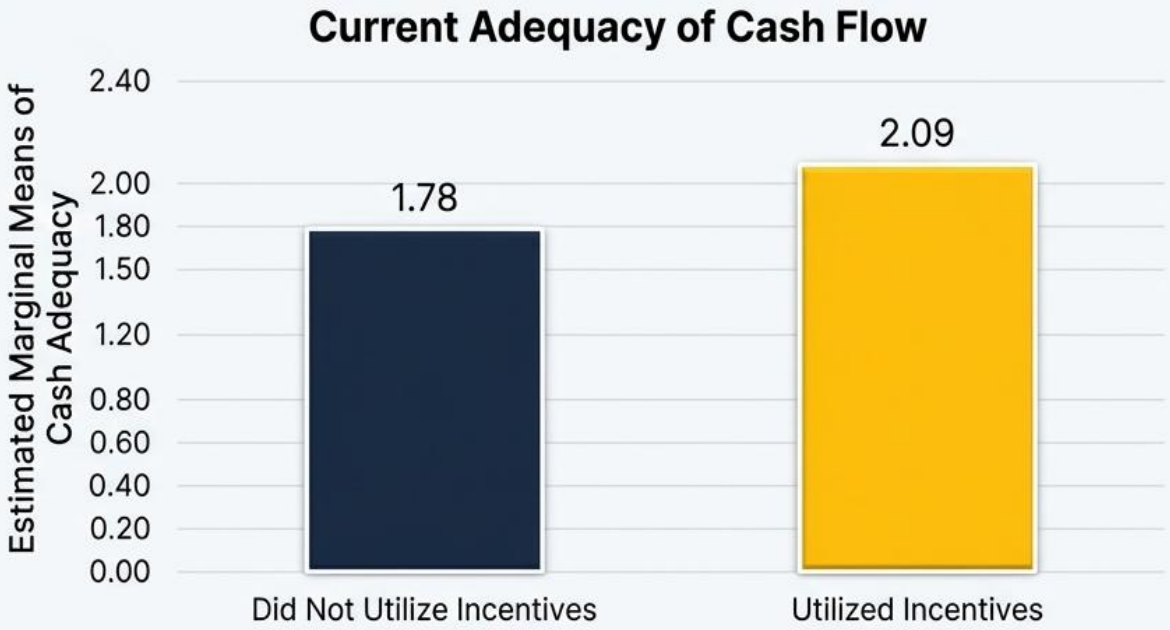
Higher levels of **cash adequacy** are also strongly and significantly associated with better business performance. The coefficient increases as cash adequacy rises, underscoring the importance of liquidity.

Nuance

This positive, significant association holds true for businesses with **domestic primary markets.** For those with mixed or international markets, the results were positive but not statistically significant, suggesting a need for further research.

Incentives Correlated with Stronger Cash Positions

An Analysis of Variance (ANOVA) reveals that businesses utilizing tax incentives reported a **statistically significant higher level of cash adequacy** compared to non-users.



$F(1, 7{,}516) = 49.345, p < 0.001$

Regional Nuance

This positive effect on liquidity was observed across all regions except **Bali-Nusa Tenggara**, where the difference was not statistically significant, highlighting the policy's limits in the most extreme cases.

Finding 5 (Adequacy): Incentives Successfully Bolstered Financial Health

Based on one-way ANOVA to compare average cash adequacy levels.

Statistically significant difference found between the two groups.

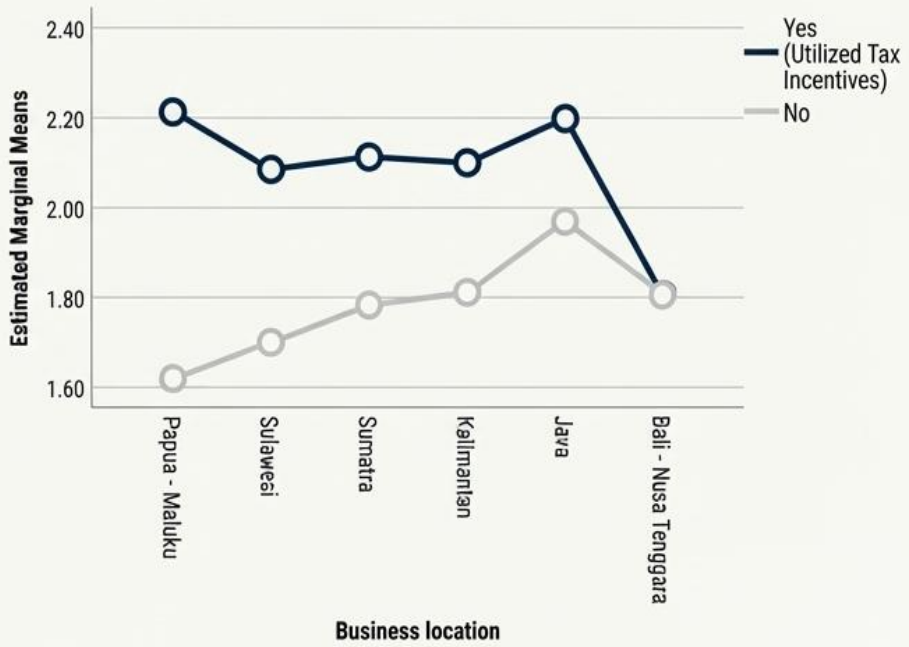
$F(1, 7{,}516) = 49.345, p < 0.0001$

- Businesses **using incentives** reported significantly higher cash adequacy (Mean = 2.085).
- Businesses **NOT using incentives** reported lower cash adequacy (Mean = 1.781).

Regional Anomaly

An important exception was the Bali–Nusa Tenggara region, where there was no significant difference, highlighting the extreme severity of the economic impact on its tourism-dependent economy.

Estimated Marginal Means of Current Adequacy of Cash Flow



The Positive Impact of Incentives Was Not Universal, Revealing Important Nuances

Limitation 1: Market Focus

For businesses with **mixed (domestic & foreign) or exclusively overseas primary markets**, the positive association between incentive use and business performance was **not statistically significant**. This

necessitates further research into barriers for export-oriented firms.

Limitation 2: Regional Anomaly

In the **Bali-Nusa Tenggara** region, heavily reliant on tourism, there was **no significant difference** in cash adequacy between incentive users and non-users.

This suggests the economic shock was so severe that the incentives were insufficient to overcome it.

Conclusion: A Valuable Intervention with an Uneven Impact

1. A Vital Policy Tool

Merriweather. Tax incentives were a vital instrument during the crisis, showing a positive and significant association with both improved business performance and liquidity.

2. Benefits Skewed Towards Larger Firms

The tangible benefits were not distributed evenly.
evenly. Larger businesses with more employees benefited more significantly, suggesting a regressive effect those with more resources were better able to leverage the support.

3. High Perceived Value

Merriweather. The overwhelming interest expressed by businesses in re-utilizing the incentives in the future confirms their high perceived value and utility intɜnsity across the entire business community.

Four Evidence-Based Recommendations for Future Crisis Response

1.

Tailor Incentives

Move beyond one-size-fits-all. Design targeted incentives that cater to the unique needs of businesses based on their size (especially SMEs) and sector.

2.

Amplify Communication

Develop effective and lucid communication strategies to explain the benefits and mechanics of tax incentives, ensuring broader awareness and participation.

3.

Employ Behavioural Science

Use targeted, behaviourally-informed policy interventions to enhance participation levels among specific, harder-to-reach business groups.

4.

Deepen Research

Sponsor further investigation into the factors influencing resilience and the specific barriers to incentive utilization for businesses with international market shares.

Who Really Uses Tax Incentives—and Can We Predict It with AI?

Source:

Rosid, A., Ardin, G., & Sanjaya, T. B. (2022). Prediksi keikutsertaan pelaku usaha dalam pemanfaatan insentif pajak dengan Artificial Neural Network. *Jurnal Ekonomi Indonesia*, 11(2), 109–142.

Summary

This study demonstrates how Artificial Neural Networks (ANN) can be used as a practical policy tool to predict which Indonesian businesses participated in tax incentive programs during the COVID-19 pandemic. Drawing on survey data from more than 12,000 firms, the authors develop an ANN model that achieves around 70 percent accuracy in forecasting incentive uptake. The results highlight three dominant predictors of participation: workforce size, annual turnover, and primary market orientation. Robustness checks across regions show that employee headcount is the most stable and consistent determinant nationwide, indicating that larger firms are systematically more likely to access fiscal support than smaller enterprises. Export-oriented businesses also appear more proactive in utilizing incentives compared to locally focused firms. The key contribution of the paper lies in its policy relevance. By using machine learning to identify participation patterns, the study offers a data-driven framework for designing more targeted and inclusive fiscal stimulus, helping policymakers ensure that future tax incentives reach vulnerable and underrepresented segments rather than being captured disproportionately by larger, better-resourced firms.

The Problem: A Critical Gap in Pandemic Economic Relief

The Economic Shock

Widespread decrease in economic activity across nearly all sectors in 2020.

Businesses reported significant drops in turnover.

Operating costs rose while layoffs increased.

The Policy Response

Five key tax incentives were introduced to improve business liquidity and support recovery.

Incentives included relief on income tax, import tax, and accelerated VAT refunds.

A Massive Intervention with an Unclear Reach

Rp46.11 Trillion in incentives were claimed by **495,817** taxpayers in 2020.

Insight: "Despite the large value, participation was likely suboptimal, as this represents a fraction of the 3.3 million corporate taxpayers in Indonesia."

Uncovering the Drivers of Incentive Uptake: Three Core Research Questions

1. 

1. Accuracy

How accurately can an Artificial Neural Network (ANN) model predict the participation status of businesses in tax incentives?

2. 

2. Key Factors

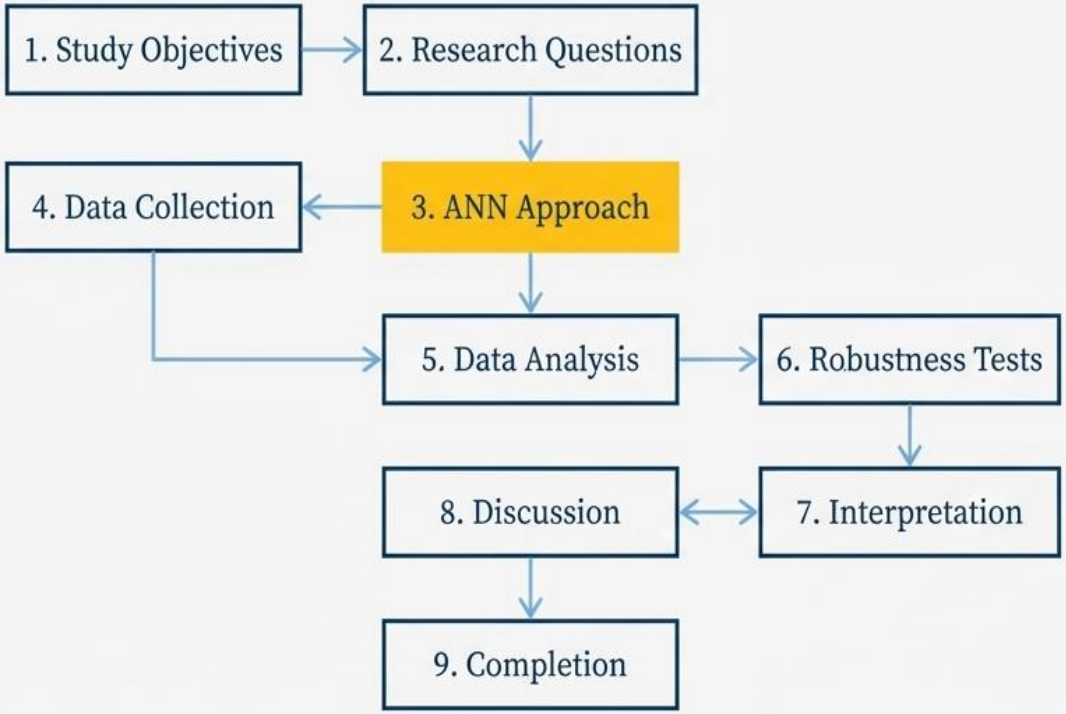
What are the three most influential business characteristics for predicting participation?

3. 

3. Robustness

Are these predictive factors consistent across the different geographical regions of Indonesia?

We employed a nine-step empirical strategy to move from research questions to robust conclusions.



The model is built on survey data from 12,361 businesses, capturing five core characteristics

Dataset: 12,361 responses from a national online survey of strategic taxpayers, collected via stratified random sampling.

Number of Workers
(Ordinal scale: 1 person to >500 people)

Annual Turnover
(Ordinal scale: <Rp5 billion to >Rp100 billion)

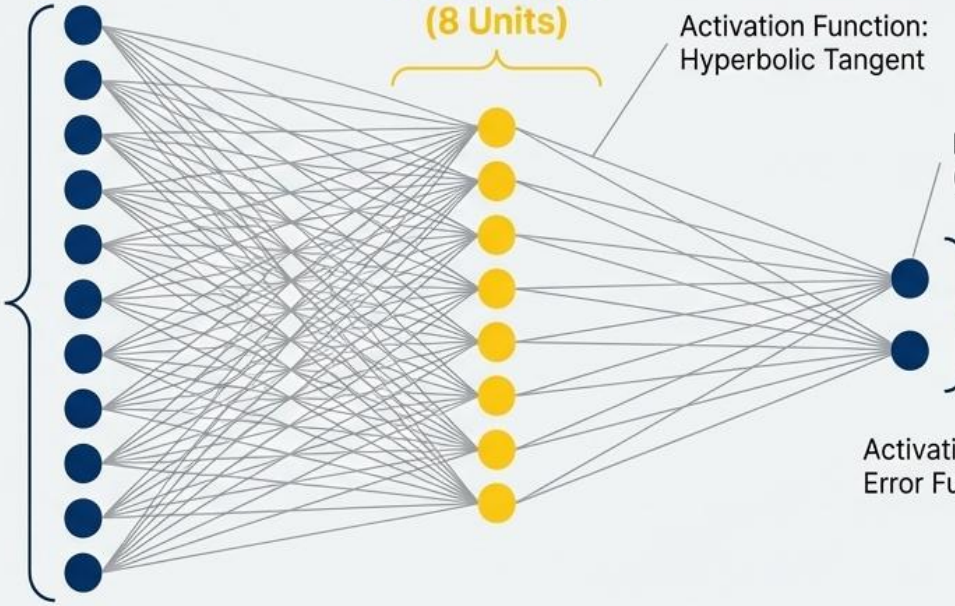
Primary Market Share
(Categorical: Local, Export, Mixed)

Nature of Business Activity
(Categorical: Producer, Non-producer)

Main Source of Supply
(Categorical: Domestic, Import, Mixed, Services)

Dependent Variable (Target): Status of tax incentive utilization (Binary: Yes/No).

The model uses a Multilayer Perceptron (MLP) architecture with one hidden layer.



Producer Note: The hidden layer allows the ANN to emulate non-linear patterns in the data more accurately. Without it, the model would behave like a standard linear model.

The dataset was partitioned to build the model, prevent overfitting, and independently validate its performance.

1. **Training Set (60% / 7,415 businesses):** Used to 'teach' the model the underlying patterns between business characteristics and incentive participation.

2. **Testing Set (20% / 2,460 businesses):** Used during training to fine-tune the model's parameters and prevent 'overfitting' (memorizing the training data instead of learning general patterns).

3. **Holdout Set (20% / 2,486 businesses):** A completely unseen dataset, held back until the very end to provide a final, unbiased assessment of the model's predictive accuracy on new data.

The ANN model successfully predicts business participation with an overall accuracy of approximately 70%.

Key Metrics

68.9%

Holdout Sample Accuracy

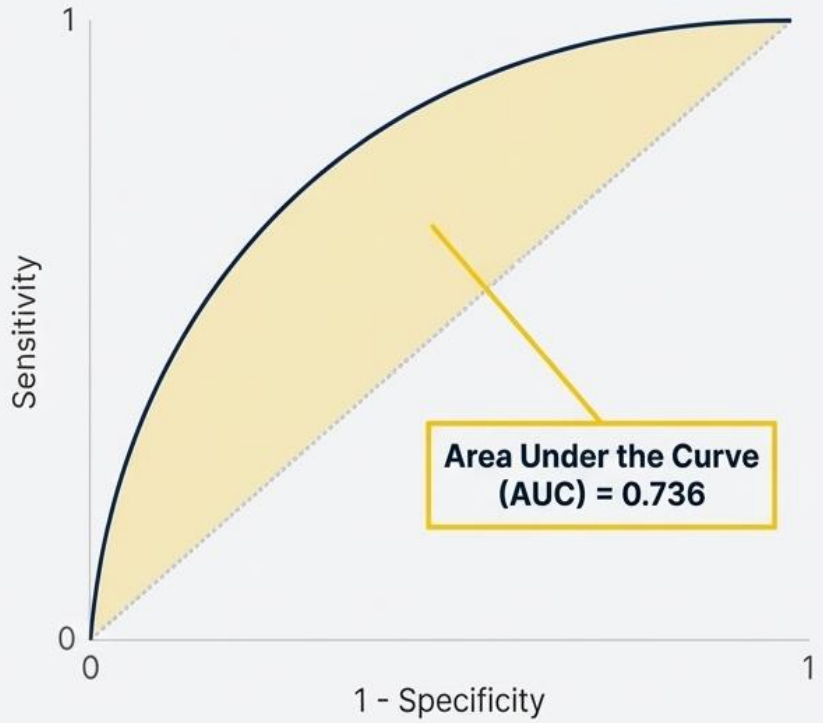
69.7%

Testing Sample Accuracy

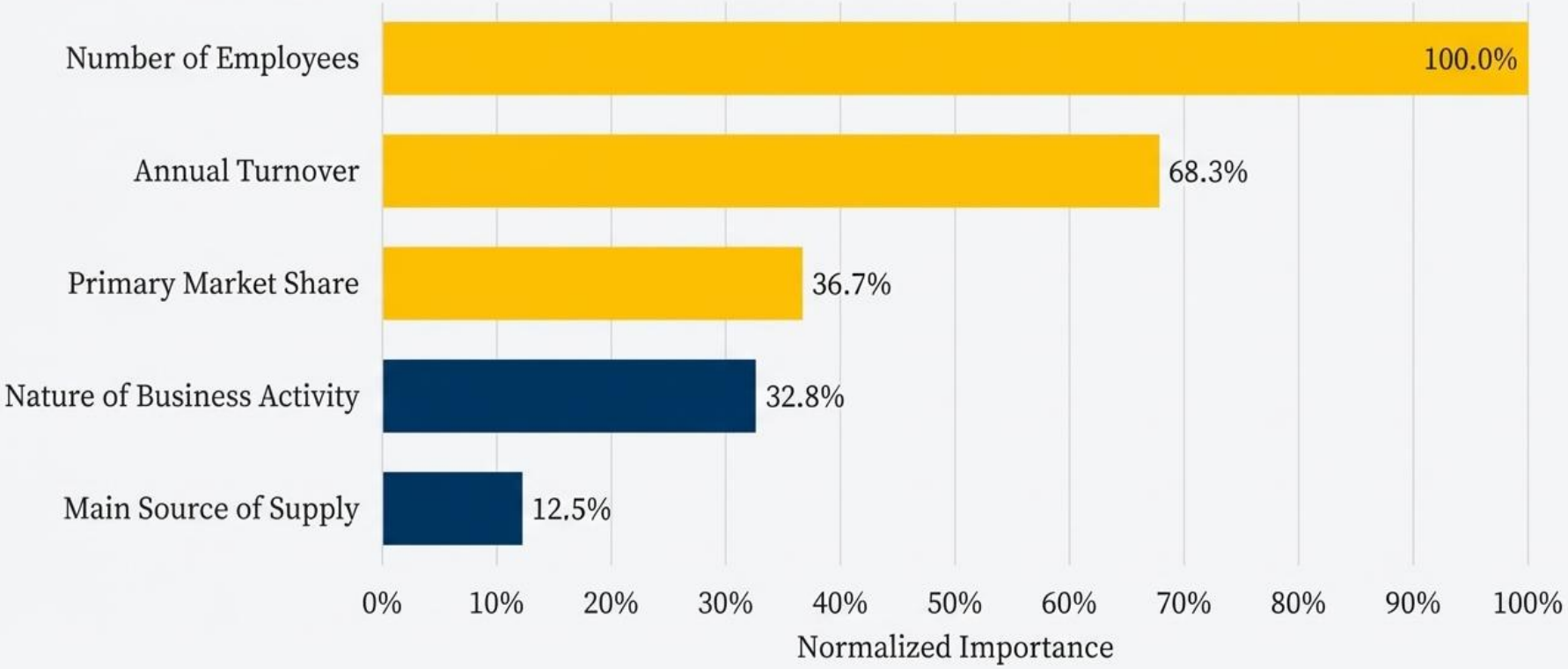
Model Performance (AUC)

The Area Under the Curve (AUC) is **0.74**, which indicates a "fairly accurate" classification capability. This means there is a 74% chance that the model will correctly rank a random participating business higher than a random non-participating one.

Visual Evidence

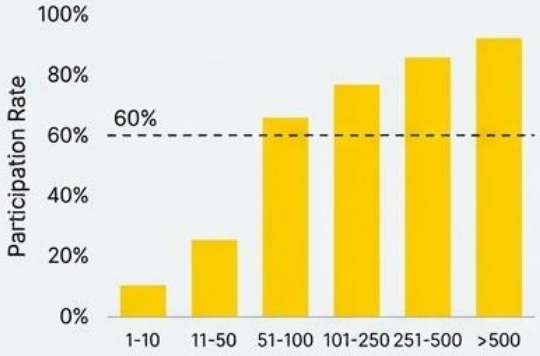


The number of employees, annual turnover, and primary market share are the most powerful predictors of participation.



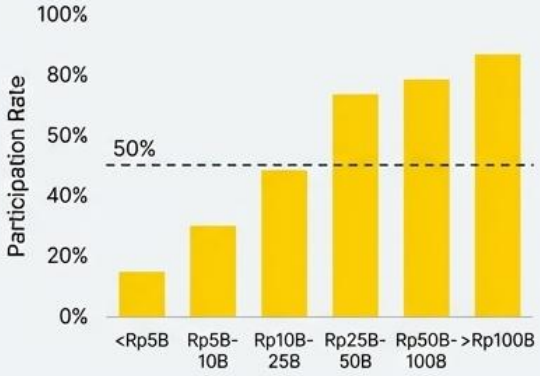
Larger firms with greater market reach show a significantly higher tendency to utilize tax incentives.

By Employees



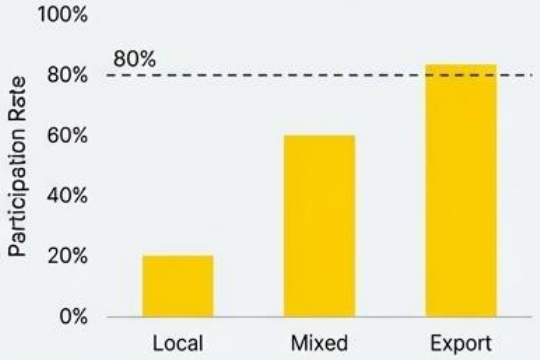
The proportion of businesses using incentives rises dramatically with firm size. For businesses with **51+ employees**, participation exceeds **60%.**

By Turnover



A similar positive correlation exists with revenue. For **businesses with annual turnover above Rp25 billion**, participation exceeds **50%.**

By Market



Export-oriented businesses are far more likely to participate. **83%** of businesses focused purely on exports used incentives, compared to a much lower rate for local-only businesses.

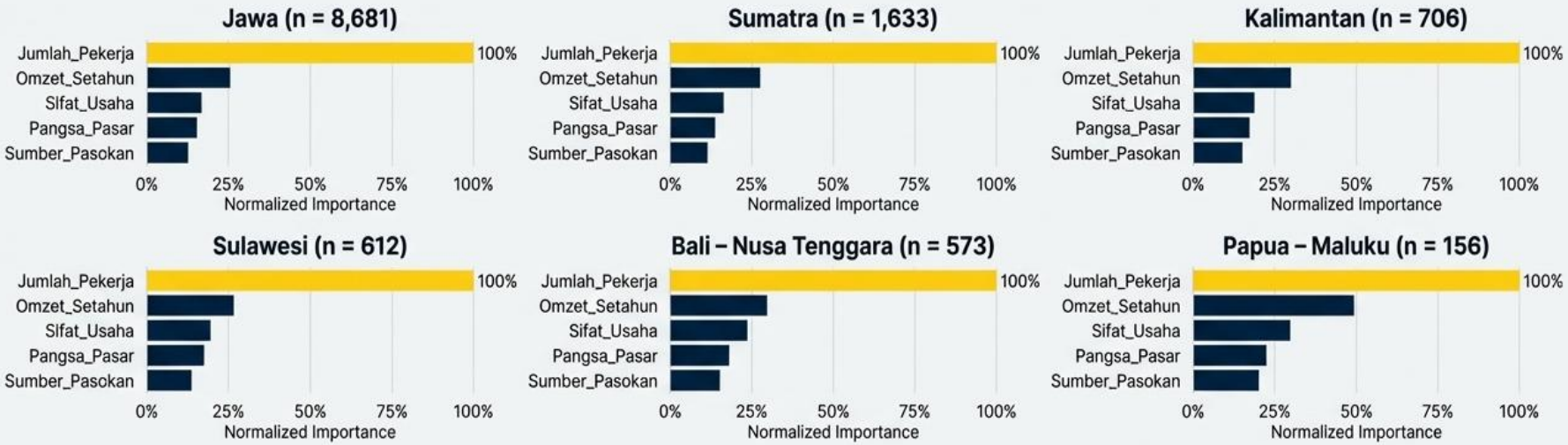
The model's findings were robustly confirmed across Indonesia's six major island groups.

Robustness Test Methodology

To test for consistency, the ANN analysis was replicated independently on data subsets from six distinct geographical regions.

1. Jawa
2. Sumatra
3. Kalimantan
4. Sulawesi
5. Bali – Nusa Tenggara
6. Papua – Maluku

The number of employees consistently ranks as the most important variable across all regions.



Key Finding: In every one of the six regional analyses, 'Number of Employees' emerged as the variable with the highest Independent Variable Importance (IVI) score (Normalized Importance = 100%).

Implication: This confirms the universal predictive power of firm employment size in this specific policy context, regardless of regional economic differences. While the ranking of secondary variables showed minor variations, the primary predictor was homogenous nationwide.

The model provides a data-driven framework for segmenting businesses and targeting policy outreach

From Prediction to Action

The findings allow policymakers to move beyond broad communication to targeted interventions.

Example of a Targeted Nudge

Scenario: A large firm (e.g., 251-500 employees) is identified as a non-participant.

Our data shows that 8 out of 10 businesses with a similar number of employees have already utilized government tax incentives to support their operations. Discover how you can benefit.

Key Takeaway: This approach can significantly increase the efficiency and effectiveness of policy implementation, ensuring support reaches those who need it.

Can AI Predict Who Wins Tax Disputes? Evidence from Indonesian Tax Courts

Source:

Rosid, A., & Yulianto, I. (2023). Can we predict tax dispute outcomes? The case of promotional expenses in Indonesia (Working Paper Series 23-11).

Summary

This study explores whether Artificial Neural Networks (ANN) can be used to predict the outcomes of tax disputes in Indonesia, focusing on cases involving promotional expenses. Analyzing 164 tax court decisions from 2016 to 2019, the research uncovers a systematic gap in how disputes are interpreted: tax auditors tend to emphasize formal and procedural deficiencies, while judges are more likely to assess cases based on substantive and material considerations. Building on this insight, the authors develop an ANN model that achieves an impressive 85 percent prediction accuracy. The results show that dispute value and the legal framing adopted by judges are the most decisive predictors of case outcomes. Beyond its technical contribution, the paper offers a practical, data-driven framework for both policymakers and businesses to better understand litigation risk. The central takeaway is clear: tax dispute outcomes are shaped less by isolated technical errors and more by legal interpretation and context—factors that advanced analytics can now help anticipate with considerable precision.

The Challenge: Navigating the High Stakes of Promotional Expense Disputes

Promotional expenses are critical for business growth but are a frequent source of **complex and costly tax disputes** in **Indonesia.**

Operational Ambiguity

The line between deductible "promotional" costs and non-deductible expenses is often unclear, leading to interpretation conflicts between taxpayers and authorities.

Significant Scrutiny

Promotional expenses are one of 38 focus areas for the Directorate General of Taxation (DGT) due to their substantial nature and potential for tax avoidance.

Economic Uncertainty

The unpredictability of dispute outcomes creates significant legal and financial risk for businesses, hindering data-driven strategic planning.

Promotional Expenses: A High-Stakes Gray Area in Taxation

- **Strategic Business Investment:** Promotional expenses are fundamental for brand visibility and customer retention, viewed as strategic investments, not just costs.
- **Taxation Flashpoint:** These expenses are frequently scrutinized during tax audits due to their substantial value and inherent ambiguities.
- **Inevitable Conflict:** The difficulty in differentiating deductible promotional costs from non-deductible expenses (e.g., entertainment, capital expenditures) makes disputes between taxpayers and tax authorities inevitable.
- **Indonesian Context:** The Indonesian tax authority (DGT) has identified promotional expenses as one of 38 key areas of focus in tax dispute evaluations.

Our Investigation Is Guided by Two Central Questions

1

The Predictive Question

To what extent can an Artificial Neural Network (ANN) model **accurately predict** the final outcome of tax court decisions on promotional expense disputes?

2

The Explanatory Question

Which **legal and contextual factors** are the most influential predictors of a tax court's decision, providing insight into the dynamics of the dispute resolution process?

Our Approach: From Unstructured Rulings to Predictive Insights

We designed a rigorous, two-step process to analyze 164 tax court decisions from 2016-2019.

STEP 1: CONTENT ANALYSIS

Systematically categorize the core arguments and legal basis of each dispute from the perspectives of the taxpayer, tax authority, and tax judge.

STEP 2: PREDICTIVE MODELING

Develop and train an Artificial Neural Network (ANN) to identify non-linear patterns and predict court outcomes based on the categorized data.

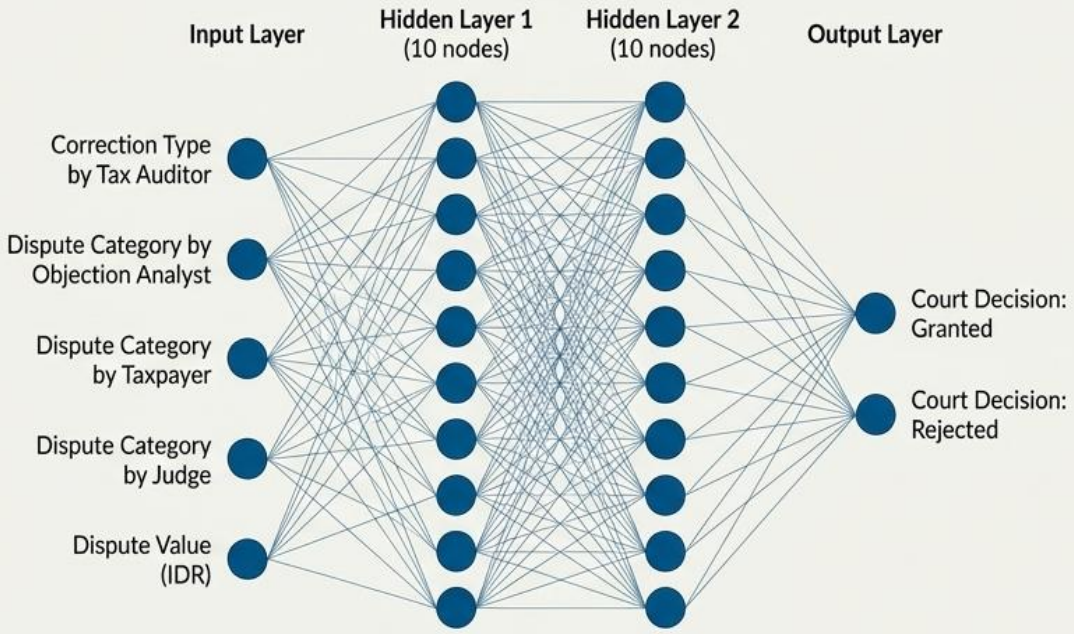
Step 1: Structuring the Data Through Content Analysis

First, we classified each dispute's legal basis into one of four distinct categories, transforming qualitative legal arguments into quantitative data.

Type of Dispute Classification		
Dispute Type	Category	Description & Legal Basis
FORMAL	F1	Issues with **non-compliant nominative lists** or failure to withhold tax. (Based on PMK 02/2010 Art. 5 & 6)
	F2	Failure to **create or report** the nominative list with the annual tax return. (Based on PMK 02/2010 Art. 6)
MATERIAL	M1	Disagreements over the **definition** of what constitutes a promotional expense. (Based on PMK 02/2010 Art. 1-4)
	M2	Disputes over whether an expense is directly related to **generating, collecting, and maintaining income (3M)**. (Based on Income Tax Law Art. 6 & 9)

Step 2: Building the Predictive Model with an Artificial Neural Network

We used an ANN to model the complex, non-linear relationships inherent in legal dispute resolution.



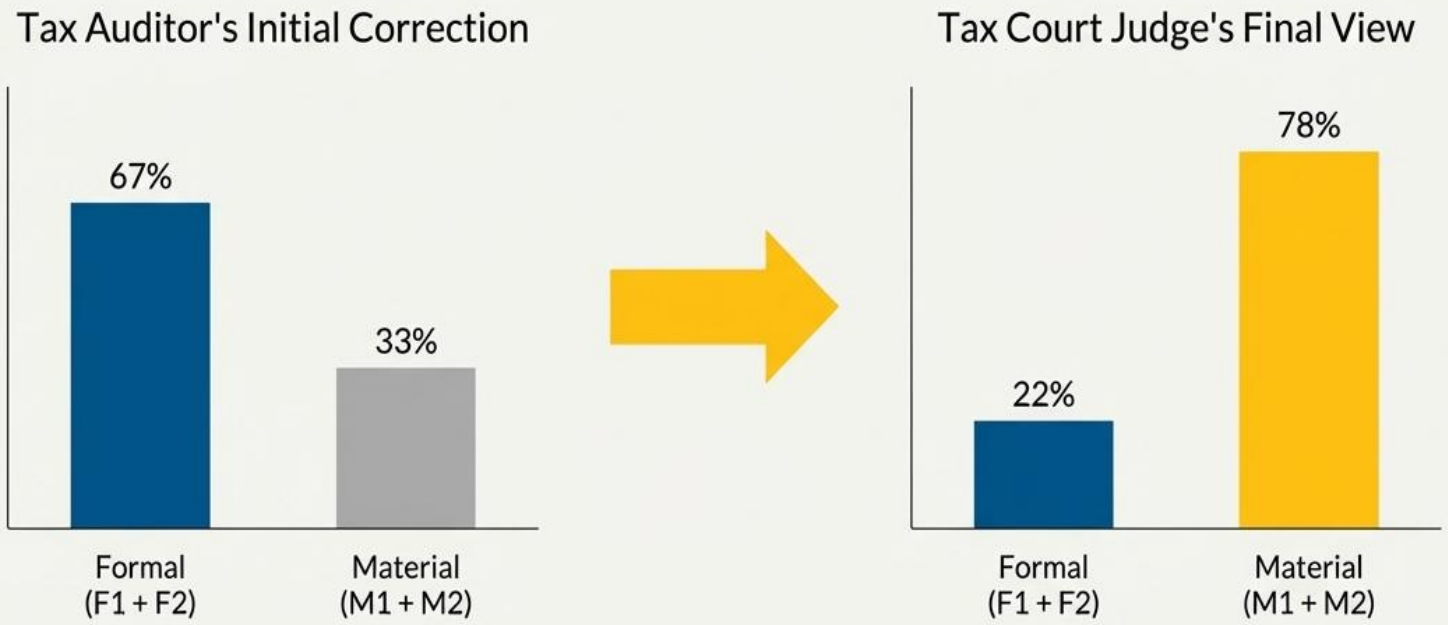
Model learns complex patterns.

Why an ANN?

- **Flexibility:** Does not require pre-specifying relationships between variables.
- **Accuracy:** Superior at handling complex and non-linear processes compared to traditional statistics.
- **Adaptive Learning:** The network structure emulates reasoning processes to weigh evidence and make a classification.

Finding 1: A Fundamental Shift in How Disputes Are Framed

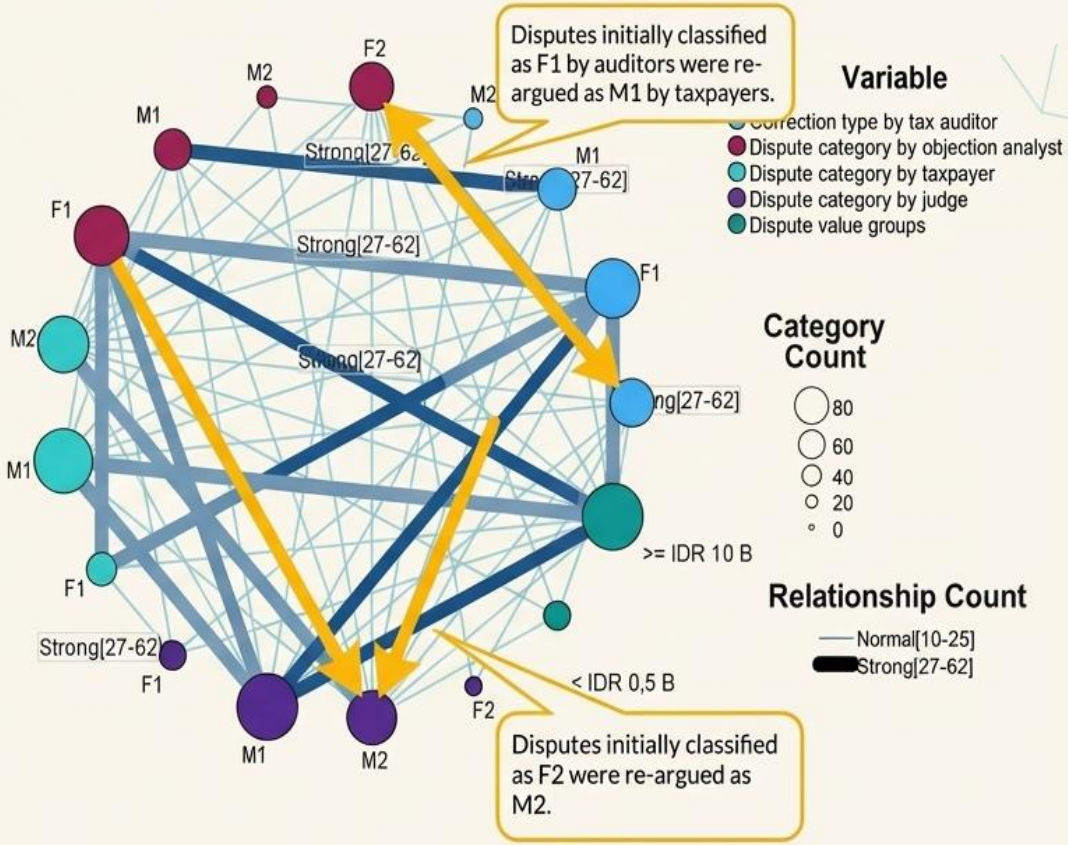
Auditors focus heavily on procedural formalities, while taxpayers and judges strategically reframe disputes around substantive, material issues during the appeal process.



Revelation #1: Taxpayers Strategically Shift from Formal to Material Arguments

While tax auditors consistently categorize disputes as '**Formal**' (F1, F2), taxpayers re-categorize them as "**Material**" (M1, M2) during the tax court appeal.

This suggests a strategic adaptation, where taxpayers align their arguments with the known preference of tax court judges for substantive issues.



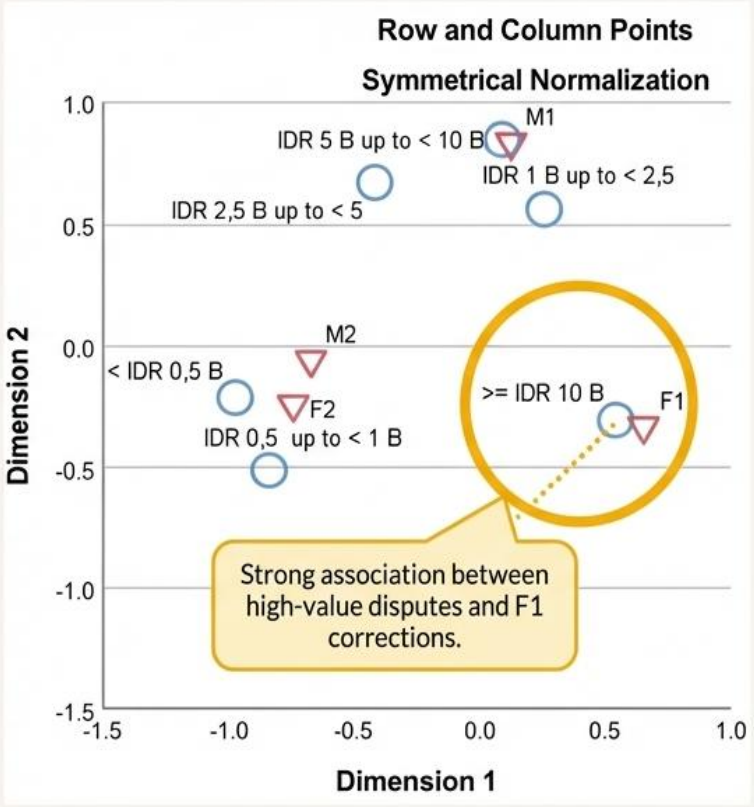
Deeper Insight: High-Value Disputes Are Linked to Specific Formal Corrections

Method
Correspondence analysis was used to explore the relationship between the auditor's correction type and the dispute value.

Key Finding
A statistically significant relationship exists between the highest-value disputes and the 'F1' correction type.

Interpretation
Disputes valued at **>= IDR 10 billion** are strongly associated with auditor corrections for non-compliant nominative lists (F1). This suggests auditors may focus on clear procedural errors when dealing with large monetary amounts.

Additional Finding: Disputes arising from F1 corrections show a strong tendency to be **fully won by the taxpayer** in court.



Finding 2: The ANN Model Predicts Tax Court Outcomes with High Accuracy

85.4%

Overall Prediction Accuracy on the Test Dataset

Model Performance Validation

	Granted (Actual) / Granted (Predicted)	Granted (Actual) / Rejected (Predicted)
Granted (Actual) / Granted (Predicted)	Correctly predicted 100% of "Granted" decisions (37 cases).	0
Rejected (Actual) / Rejected (Predicted)	Incorrectly predicted 7 "Rejected" decisions.	Correctly predicted 36.4% of "Rejected" decisions (4 of 11 cases).
	Rejected (Actual) / Granted (Predicted)	Rejected (Actual) / Rejected (Predicted)

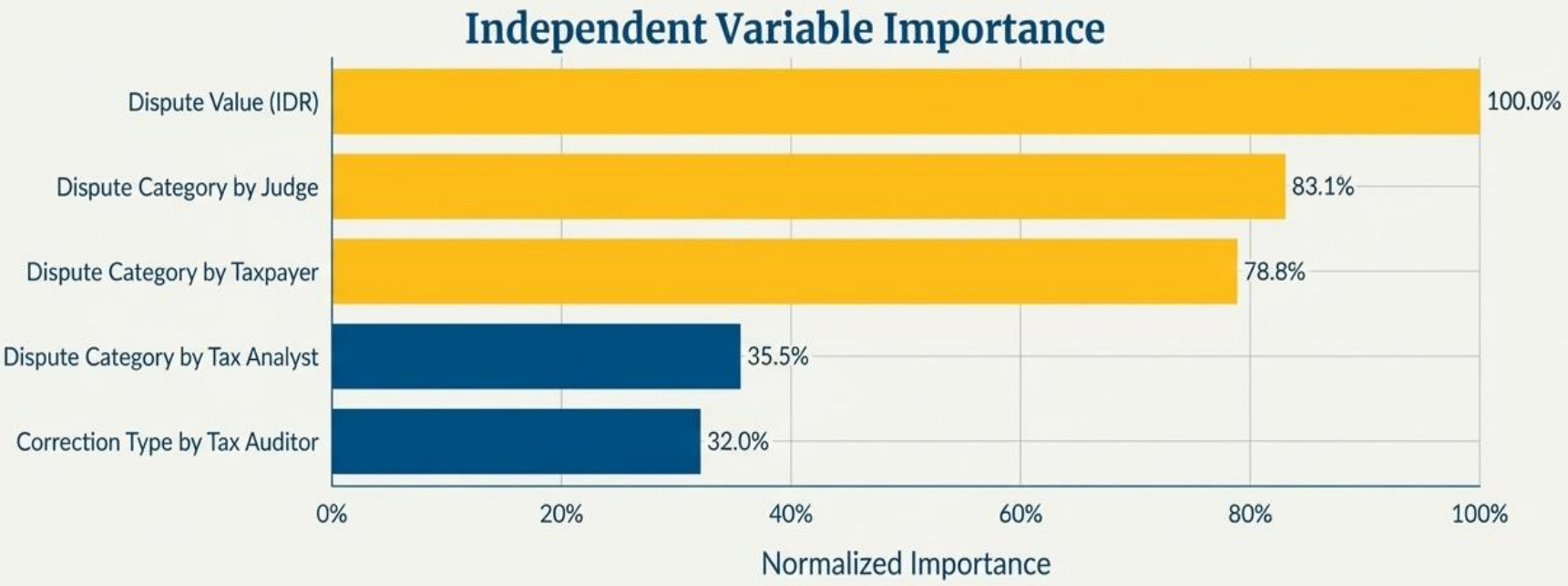
ROC Curve Metric

Area Under Curve (AUC): 0.829

(This indicates an accurate classification model)

The Crucial Finding: What Truly Influences the Outcome?

Three factors are overwhelmingly more influential in predicting the court's decision. The initial auditor's correction has low predictive power, while the dispute's value and its framing by the judge and taxpayer are paramount.



Deeper Dive: The High-Value Formal Dispute Anomaly

There is a **statistically significant pattern**: tax auditors tend to apply **Formal (F1)** corrections **to the largest disputes**, and these are the very cases that taxpayers are **most likely to win** outright in court.

A strong association exists between **'Disputes ≥ IDR 10 B'** and the **'F1 "Correction type by tax auditor'**.

This same **'F1 Correction type'** is strongly associated with court decision being **'Fully granted'** to the taxpayer.

This suggests a systemic issue where high-value formal corrections have a **low success rate**, representing a significant risk for tax authorities.

Conclusion: Predicting Tax Disputes is Possible, and Framing is Key

High Predictive Accuracy: Artificial Neural Networks are a viable tool for predicting tax court outcomes, achieving 85.4% accuracy on the test data.

The 'Big 3' Predictors: Dispute outcomes are best predicted not by the initial audit, but by 1) its monetary value, 2) the judge's framing of the issue, and 3) the taxpayer's framing.

The High-Value Anomaly: Tax authorities are most likely to lose on their largest monetary disputes when the case is based on formal, procedural grounds (F1 corrections).

What This Means: Actionable Insights for Key Stakeholders

For Tax Authorities

- The high reversal rate for high-value F1 disputes signals a need to review the methodology and evidence standards for these corrections.
- The divergence from judicial perspective suggests a need for unified training on interpreting tax rules.

For Taxpayers & Practitioners

- Confirms the strategic value of re-framing disputes from procedural to substantive issues at the appeal stage.
- Highlights that the monetary value of a dispute significantly shapes its trajectory and outcome.

For Academics & Researchers

- Demonstrates the powerful application of Artificial Intelligence (ANN) as a predictive tool in the legal-tax field.
- Provides a quantitative framework for analyzing judicial decision-making patterns.

Implications & Recommendations for a More Efficient System

For Tax Authorities

- **Re-evaluate F1 Corrections:** Critically assess the methodology for high-value formal disputes, as they have a low success rate in court.

- **Unified Training:** Bridge the interpretative gap between auditors and court judges to ensure consistent application of tax rules.

For Taxpayers & Advisors

- **Focus on Material Arguments:** Strategically frame appeals around the substance (M1, M2) of the expense, as this aligns with judicial preference.

- **Leverage Predictive Insights:** Use the key predictors (value, framing) to assess the probability of success and inform appeal strategies.

For Future Research

- **Integrate Technology:** Further explore AI and machine learning for risk assessment, audit selection, and outcome forecasting.

- **Expand the Scope:** Apply this methodology to other types of tax disputes and jurisdictions to test the generalizability of the findings.

Can Machine Learning Predict Import Tax Litigation Outcomes?

Source:

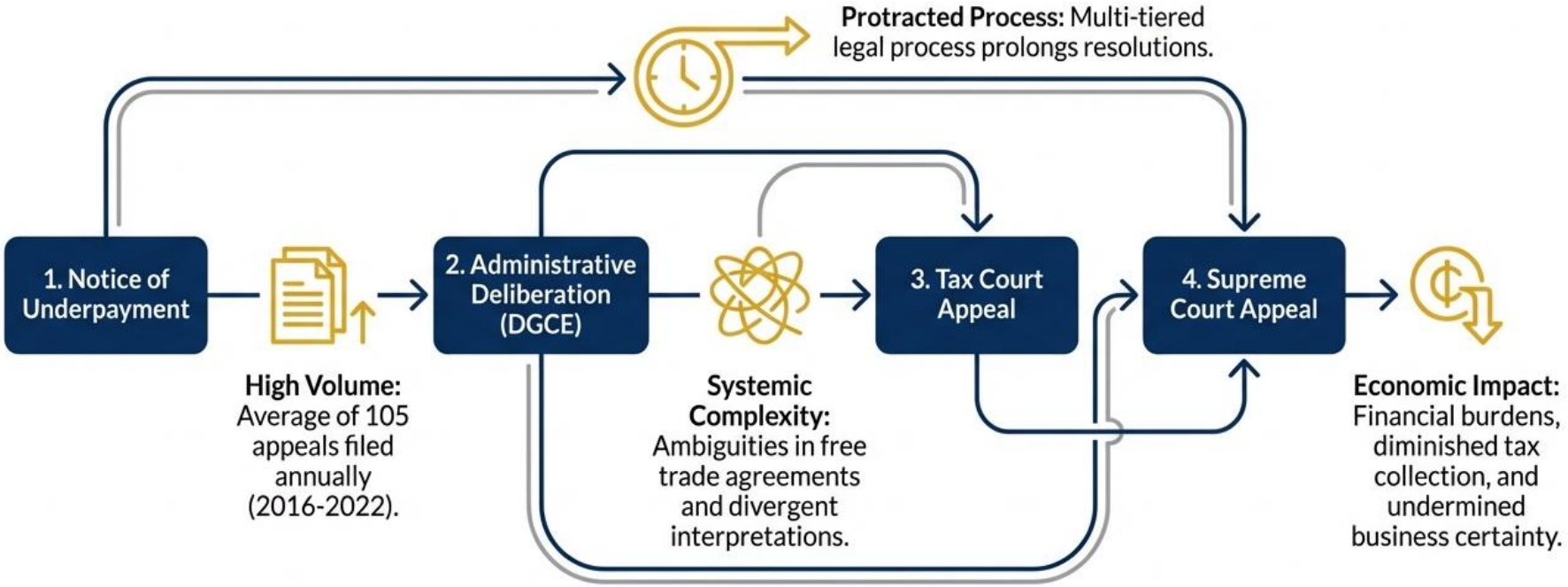
Rosid, A., & Palupiningrum, N. (2025). Machine learning in tax litigation: Evidence from Indonesian import tax disputes (Working Paper Series 09-25).

Summary

This study examines how artificial neural networks (ANN) can be used to forecast the outcomes of import tax disputes in Indonesia, offering a new lens on legal uncertainty in tax administration. Using data from 452 court cases decided between 2016 and 2022, the authors develop a predictive model that achieves accuracy exceeding 90 percent in classifying whether appeals are granted, rejected, or declared inadmissible. The analysis reveals that two factors dominate judicial outcomes: the monetary value of the dispute and the type of commodity involved. High-value cases are more likely to be rejected, while disputes related to certain industrial inputs face distinct legal hurdles tied to classification and valuation issues. Beyond prediction, the paper's central contribution is policy-oriented. It argues that integrating machine learning into tax administration can enhance transparency, help authorities prioritize high-risk cases, and allocate legal and audit resources more efficiently. More broadly, the findings suggest that data-driven tools can support greater consistency in tax litigation, benefiting both policymakers and businesses operating in complex import regimes.

The High Stakes of Import Tax Disputes in Indonesia

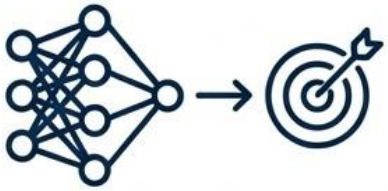
Indonesia's tax administration faces a significant challenge with import tax disputes, characterized by high volume, complexity, and systemic inefficiencies.



Two Core Questions Guiding Our Investigation

To address the gap in applying advanced analytics to Indonesian tax disputes, this study leverages Artificial Neural Networks (ANNs) to provide data-driven insights. We aim to answer two fundamental questions:

1



Question 1 (Prediction): How accurately can an Artificial Neural Network model predict the outcomes of import tax dispute court decisions?

This question assesses the performance of the ANN model in forecasting whether a tax court decision will be favorable or unfavorable based on various input factors.

2

Question 2 (Influence): What are the primary factors that most significantly influence these tax court decisions?

This question aims to identify and rank the most critical variables, such as types of goods, tax types, and legal basis, that affect the final court rulings.

Step 1: Building the Empirical Foundation

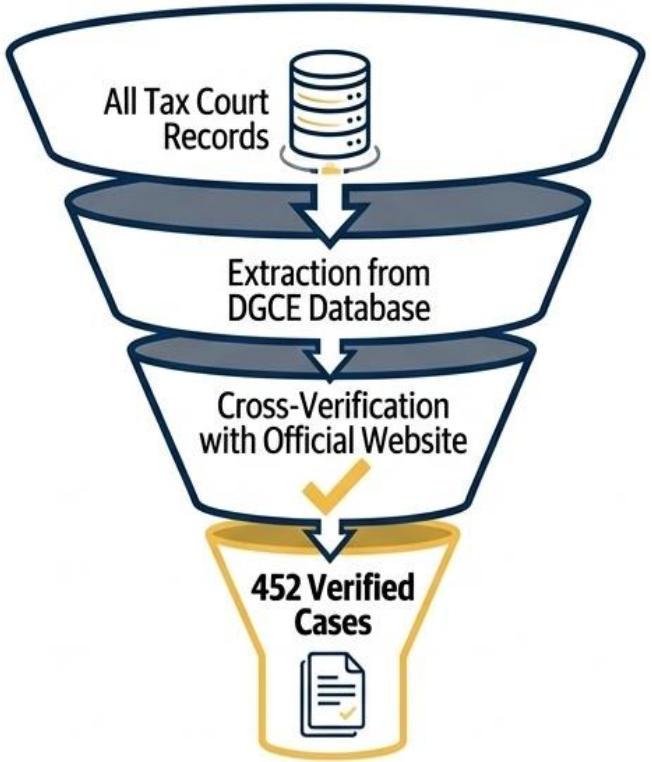
Sourcing and Preparing a Dataset of 452 Tax Court Decisions

Data Source & Period: The analysis is based on 452 Tax Court decisions concerning import tax disputes filed by taxpayers between 2016 and 2022.

Collection Process:

- Decisions were extracted from the Directorate General of Customs and Excise's (DGCE) appeal summary database.
- Each decision was cross-verified through the Tax Court Secretariat's official website.
- Data was meticulously filtered to include only decisions explicitly linked to Import Related Taxes (PDRI).

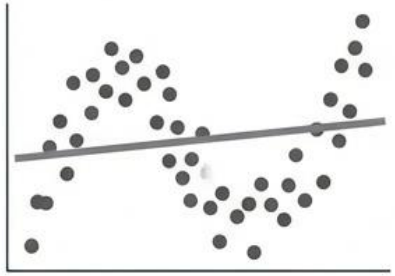
Outcome: The final dataset comprises 452 fully litigated disputes, each with a formal judicial determination: "Granted," "Rejected," or "Inadmissible."



Step 2: Selecting the Right Analytical Tool

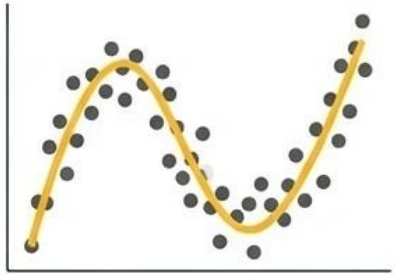
Employing a Multilayer Perceptron (MLP) Artificial Neural Network

Traditional Linear Models



Cannot effectively capture complex, non-linear relationships.

Artificial Neural Networks (ANNs)



Recognized for superior predictive power in complex contexts.

- **Model:** Multilayer Perceptron (MLP), a predominant ANN architecture known for high predictive accuracy.
- **Process:** The research follows the Cross-Industry Standard Process for Data Mining (CRISP-DM) framework, ensuring a structured and rigorous approach.
- **Algorithm:** The model uses a backpropagation algorithm for iterative learning and error reduction.

Step 3: Defining the Model's Inputs

Four Key Explanatory Variables That Shape Dispute Outcomes

The model's predictive power relies on four variables identified from literature and practice as critical determinants.

Variable 1: Dispute Category

Captures procedural dimensions (e.g., classification, valuation).

Variable 2: Cause of Dispute

Illuminates systemic weaknesses (e.g., substance, procedure, authority).

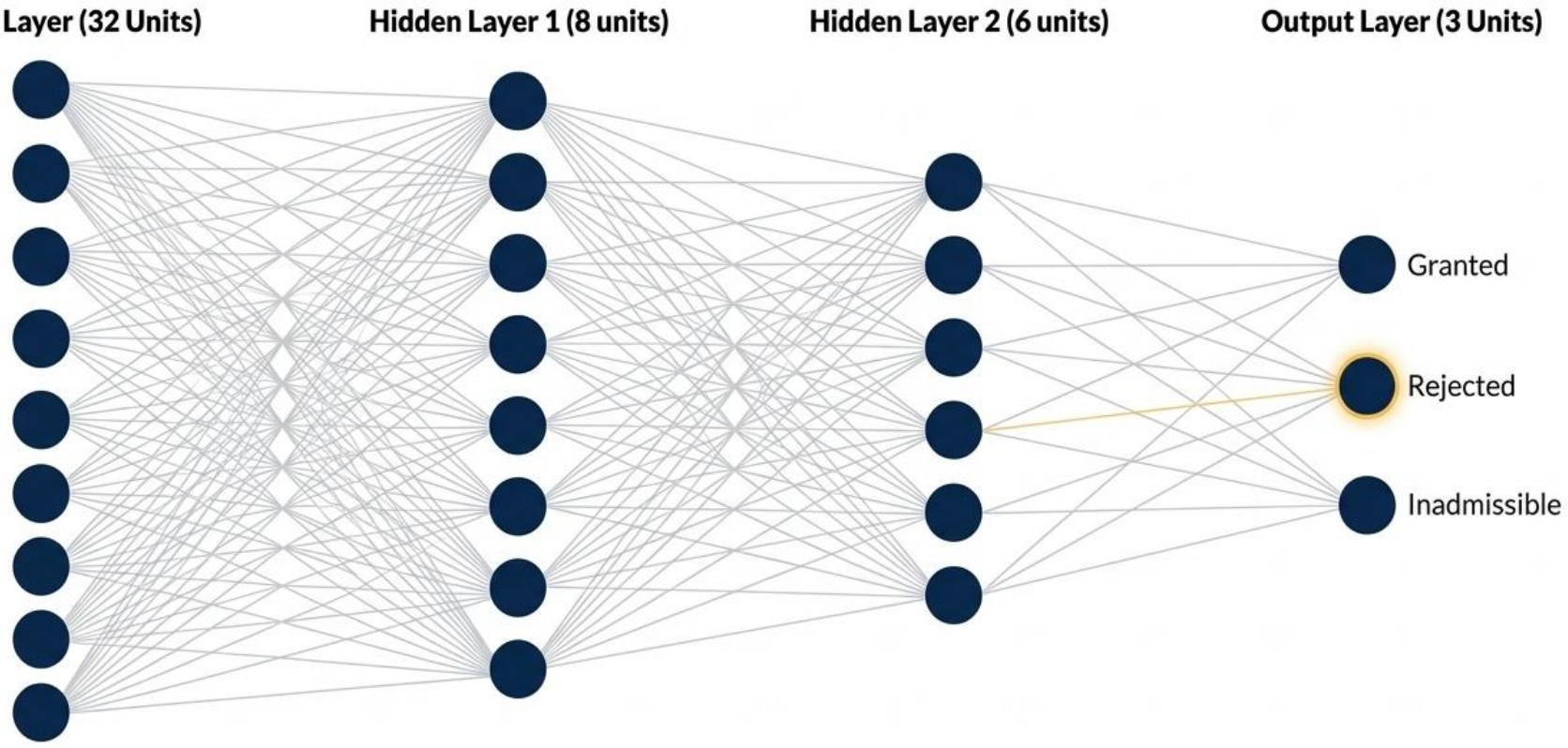
Variable 3: Commodity Type

Accounts for sector-specific regulatory complexities and tariffs.

Variable 4: Dispute Value

Reflects the economic stakes, which influence scrutiny and procedural complexity.

Step 4: Constructing the Predictive Architecture



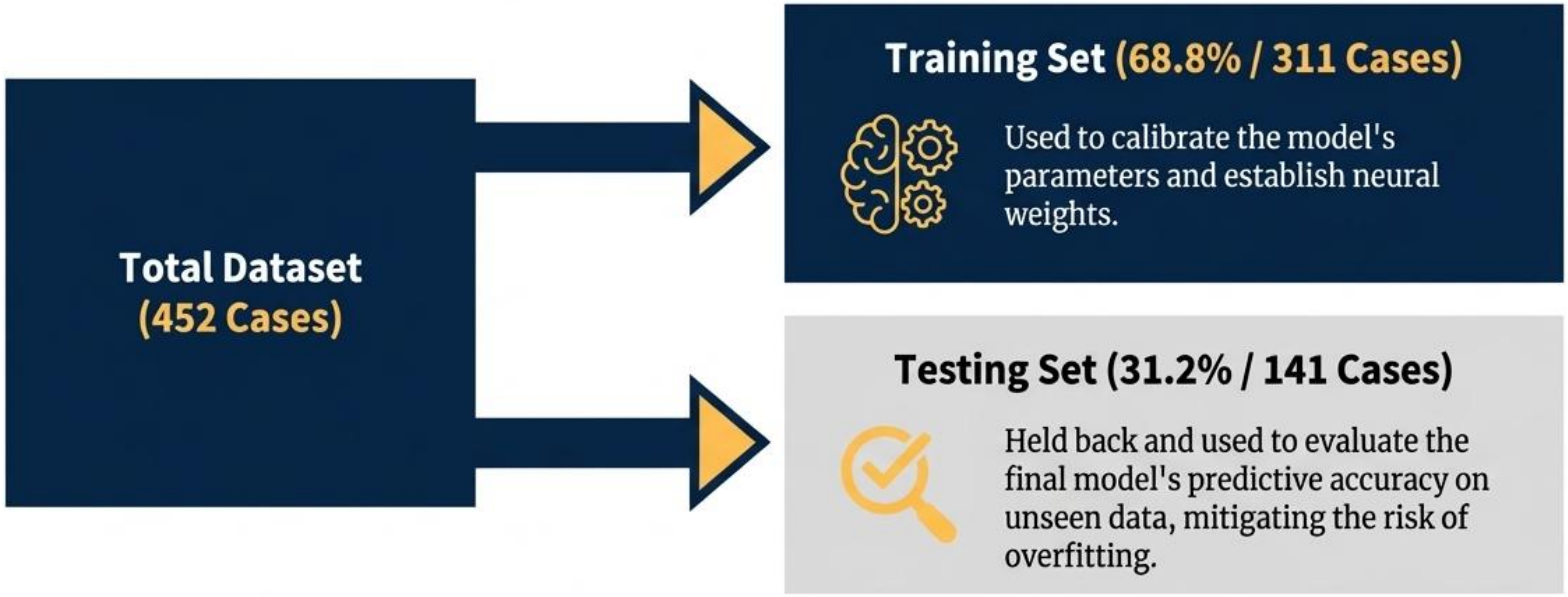
Encodes the initial data from the four explanatory variables.

These layers perform complex computational transformations and pattern recognition using a Hyperbolic tangent activation function.

Generates the final prediction, corresponding to the three possible court decisions

Step 5: Training and Validating the Model for Robustness

* **The Challenge:** To ensure the model can accurately predict new cases, not just memorize the data it was trained on.
* **The Solution:** Data Partitioning: The dataset of 452 cases was partitioned into two subsets.

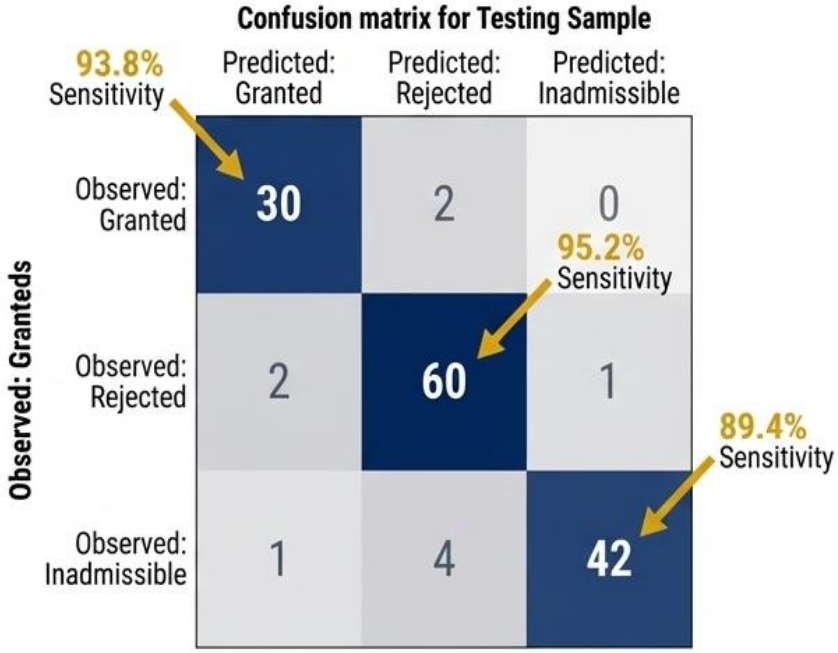


This 70/30 split is a standard and appropriate approach for datasets with fewer than 1,000 observations.

Finding 1: The Model Achieves High Predictive Accuracy

90.6%
Training Data Accuracy

93.0%
Testing Data Accuracy

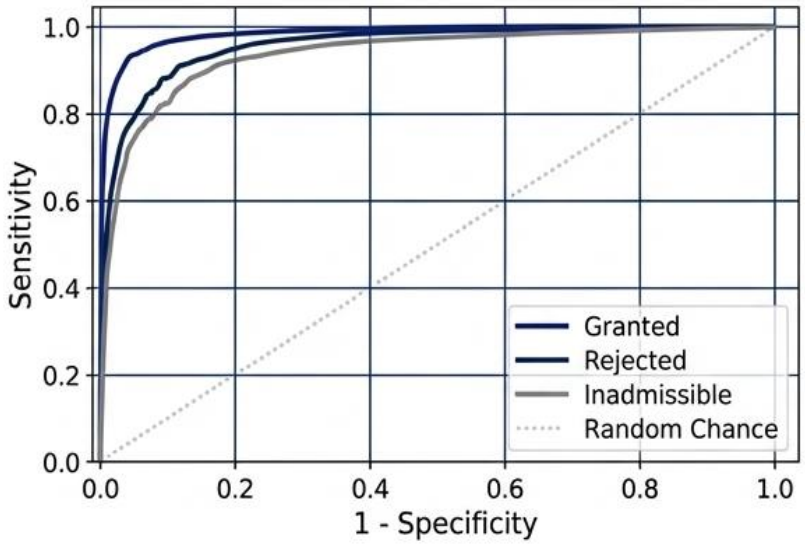


The ANN model demonstrates a powerful ability to predict tax court outcomes, confirming its effectiveness.

Finding 2: Model Performance is Consistently Robust

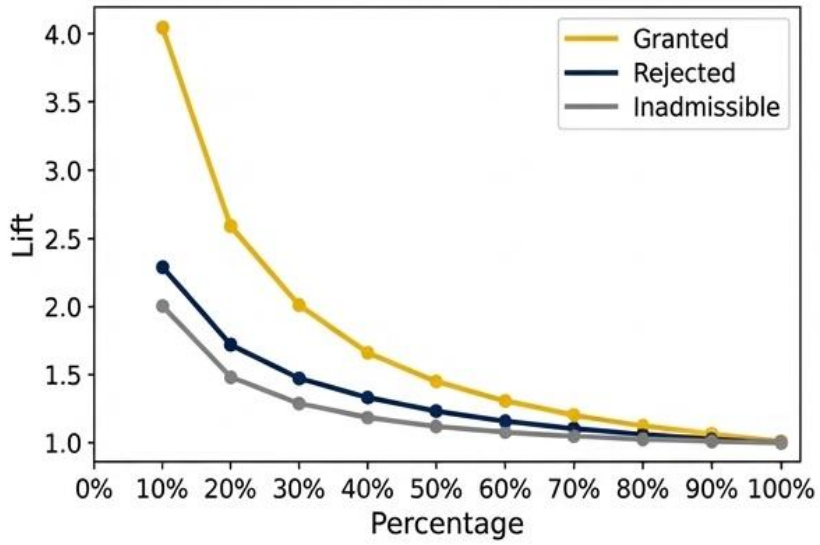
Validation beyond accuracy using ROC curves and Lift charts.

Receiver Operating Characteristic (ROC) Curves



Curves close to the top-left corner indicate exceptional accuracy with high sensitivity and specificity. The model is significantly better than random chance.

Lift Chart



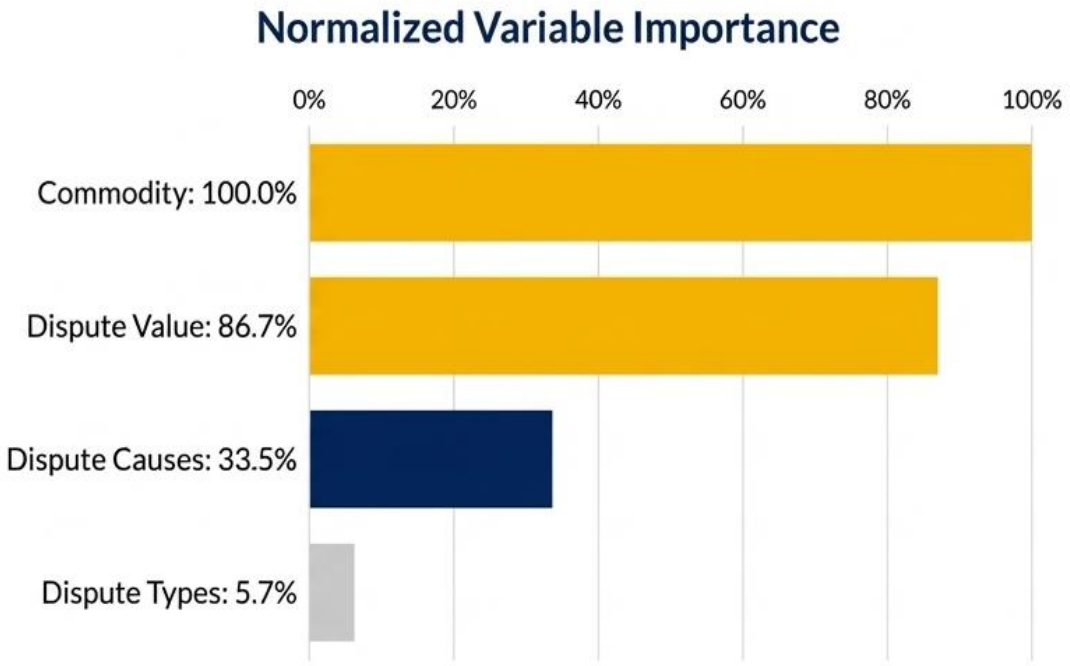
The model predicts 'Granted' cases over 4x more effectively than random selection in the top 10% of cases, demonstrating its practical utility for triaging.

Finding 3: Commodity and Dispute Value are the Key Drivers

Answering "What are the primary factors influencing tax court decisions?"

Key Insight: Not all variables are created equal. The model's predictions are overwhelmingly driven by the type of commodity and the monetary value of the dispute.

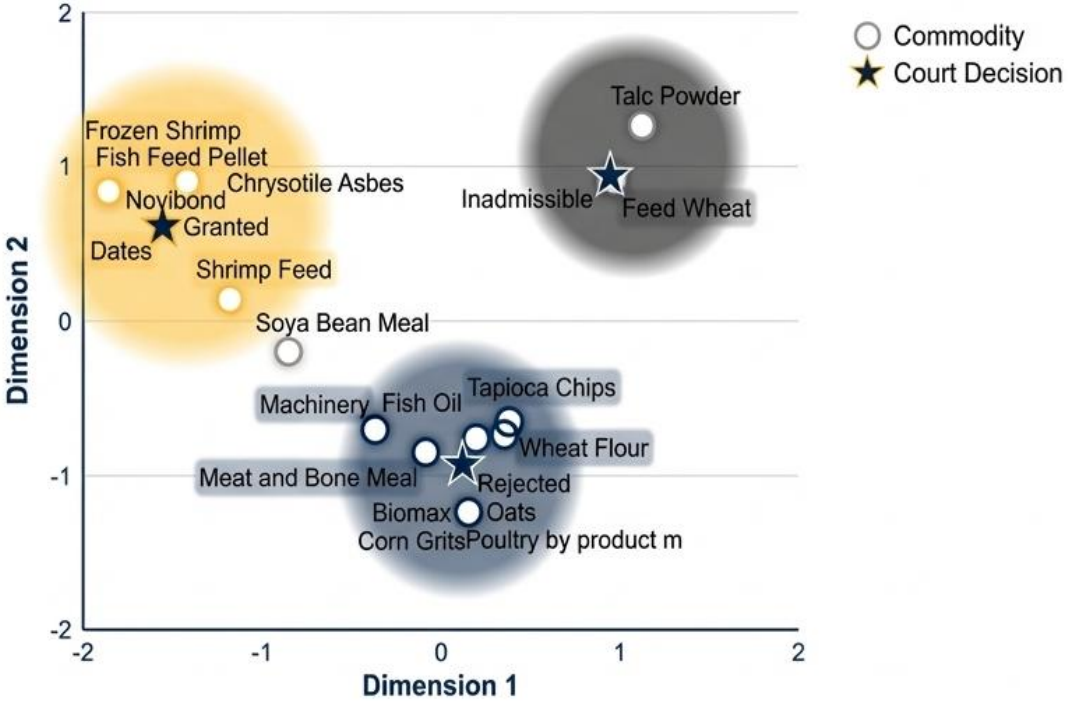
Implication: This provides a clear focus for policymakers and businesses; context-specific factors are more critical than general procedural categories.



Deeper Dive: Unpacking the Commodity Connection

Using correspondence analysis to link specific commodities to outcomes.

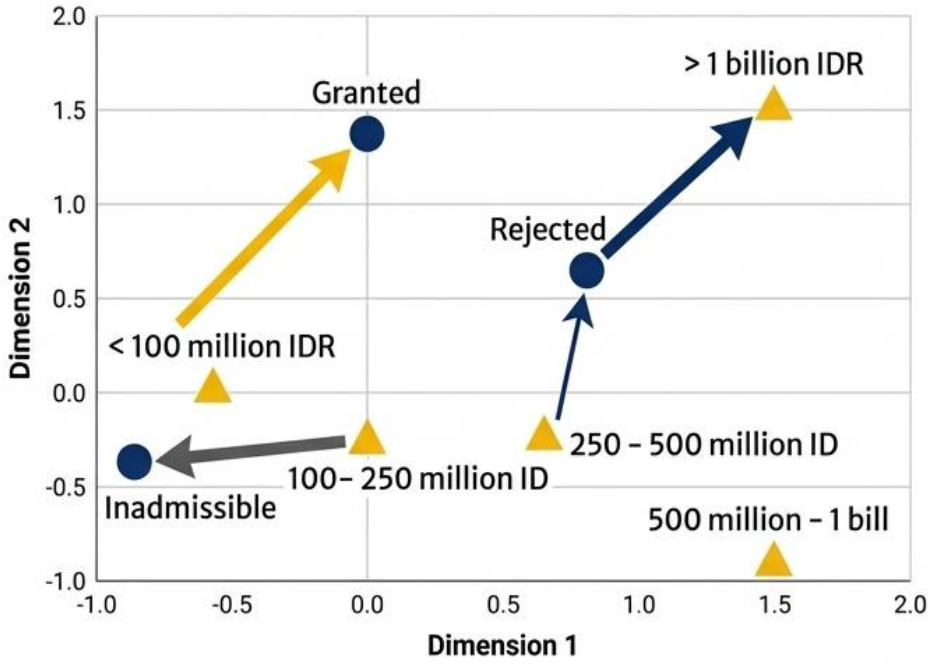
- **Strongly Associated with "Granted":** Disputes involving commodities like Dates, Frozen Shrimp, Fish Feed Pellet, and Shrimp Feed.
- **Strongly Associated with "Rejected":** Disputes involving Machinery, Meat and Bone Meal, Fish Oil, Wheat Flour, and Tapioca Chips.
- **Strongly Associated with "Inadmissible":** Disputes involving Feed Wheat and Talc Powder.



Insight: Litigation outcomes vary significantly by commodity type, reflecting different levels of regulatory scrutiny, complexity, and documentation standards.

Deeper Dive: Following the Money

How the monetary value of a dispute correlates with its likely outcome.



Key Associations:

- **"Granted" Decisions:** Predominantly associated with lower-value disputes (< 100 million IDR).
- **"Rejected" Decisions:** Strongly linked to high-value groups, especially > 1 billion IDR.
- **"Inadmissible" Decisions:** Aligned most closely with the 100–250 million IDR value group.

Insight: There is a clear disparity in outcomes based on financial stakes. Higher-value cases face disproportionately higher rejection rates, raising questions about equitable access to justice.

From Findings to Action: Implications for Policy and Business

For Tax Administration & Policymakers

- **Resource Allocation:** Use the model as a pre-screening tool to prioritize high-risk or complex disputes, improving administrative efficiency.
- **Targeted Reforms:** Identify patterns (e.g., high high rejection rates for specific commodities) to guide regulatory clarification and streamline procedures.
- **Enhance Consistency:** Use data-driven insights to support consistency in administrative rulings and judicial decision-making.

For Businesses & Importers

- **Strategic Risk Management:** Anticipate likely dispute outcomes based on commodity and value to better allocate litigation resources.
- **Improve Compliance:** Understand which types of transactions face the highest scrutiny and enhance documentation and compliance efforts accordingly.

About the author

Arifin Rosid, Ph.D.

Arifin is the Head of Sorong Tax Office at the Directorate General of Taxation, Ministry of Finance of Indonesia, and a lecturer in taxation in the Department of Accounting, Faculty of Economics and Business, Universitas Indonesia. He holds a PhD in Taxation from the School of Taxation and Business Law, UNSW Business School, University of New South Wales, Sydney.

He also serves as an Associate Editor of *Scientax: Jurnal Kajian Perpajakan*, acts as a regular reviewer for leading scholarly journals, and is an Adjunct Senior Research Fellow at the Department of Taxation and Business Law, Monash University, Australia.

Thank you

"*If it is **not written**, it is **not research**.*"