# Modeling Corporate Purpose: A Comparative Simulation of Stakeholder and Shareholder Governance Models

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## Abstract

This study investigates the debate over corporate purpose by developing a comparative mathematical framework to evaluate the financial implications of shareholder-centric and stakeholder-oriented governance models. Drawing on foundational theories from economics and business ethics, the research develops two distinct models: a profit-maximization model aligned with shareholder primacy and a multi-objective stakeholder model that incorporates financial, social, and environmental metrics. Using a ten-year simulation, the study finds that firms adopting a stakeholder approach demonstrate stronger long-term performance in revenue, profit margins, and return on investment, while also generating stakeholder value. The simulation further reveals that although the shareholder model yields higher initial profits, it proves unsustainable over time, ultimately leading to weaker financial performance and highlighting how a narrow focus on shareholder value can undermine long-term profitability and competitiveness. These results challenge the assumption that prioritizing shareholder returns leads to optimal outcomes and highlight the strategic advantages of stakeholder governance. The findings further suggest that the stakeholder model fosters governance practices that are both ethically grounded and inclusively structured, while offering greater resilience and stability in the face of economic uncertainty. The research contributes to business ethics by translating normative theories of corporate purpose into operational models and offering a structured, predictive comparison of governance approaches through simulation.

**Keywords**: Corporate Purpose; Stakeholder Theory; Shareholder primacy; Financial Performance.

## Introduction

In recent decades, the debate over the purpose of the corporation has become increasingly prominent in academic spheres (Pfarrer, 2013). At the heart of this debate lies a fundamental question: for whom should the corporation be run? Two dominant paradigms have emerged in response, the shareholder-centric model and the stakeholder-oriented model, each of which is rooted in distinct philosophical, ethical, and economic traditions. The shareholder model, which is strongly influenced by neoclassical economics and famously promoted by Milton Friedman (1970), holds that a firm's sole responsibility is to maximize shareholder wealth, provided it remains within the bounds of law. In contrast, stakeholder theory, most notably developed by Edward Freeman (Freeman, 2015), argues that corporations bear responsibilities not just to shareholders, but to all parties affected by their activities, including employees, customers, suppliers, communities, and the environment. This broader view reflects a growing concern with social, ethical, and environmental outcomes of corporate activity. The stakeholder paradigm might have gained traction as a potentially more sustainable and socially responsible model for business considering global challenges such as climate change, inequality, and corporate misconduct.

While a considerable body of theoretical and empirical literature has explored the merits and limitations of both the shareholder and stakeholder models, the debate remains open to further investigation. Proponents of the shareholder model emphasize its clarity, simplicity, and alignment with measurable financial outcomes (Danielson et al., 2011, 2024; Tse, 2011). In contrast, advocates of the stakeholder-oriented approach argue that sustainable long-term value creation requires balancing the interests of multiple stakeholders and addressing broader societal concerns. Substantial research has demonstrated a generally positive relationship between adopting a stakeholder orientation and financial performance, highlighting benefits such as increased resilience, stability, and competitive advantage (Chen, 2025; Friede et al., 2015; Gao et al., 2021).

However, some studies present contradictory findings that challenge this positive association (List & Momeni, 2021; Mahoney & Roberts, 2007; Makni et al., 2009a). These suggest that, under certain conditions, stakeholder-focused initiatives may lead to inefficiencies, increase managerial discretion, or fail to

deliver anticipated financial returns. This divergence highlights the need for a more rigorous and structured means of comparison. In response, this research develops a mathematical framework that systematically evaluates the financial implications of the shareholder and stakeholder models. Specifically, the study constructs two formalized objective functions: a profit-maximization model representing the shareholder-centric approach and a multi-objective function representing the stakeholder model. By incorporating a range of financial metrics (e.g., revenue, costs, risk) alongside broader stakeholder-related factors (e.g., employee well-being, environmental impact), the framework enables simulation and scenario analysis to predict firm performance under each model. This methodological approach allows for a direct comparison of outcomes, providing insights into the conditions under which each model may lead to superior financial performance.

This research aims to develop a comparative mathematical model that evaluates the long-term financial outcomes of stakeholder and shareholder paradigms, thereby providing a structured basis for assessing their effectiveness. To achieve this, the study first critically examines the theoretical foundations of both models, focusing on their implications for corporate purpose and performance. It then constructs formal mathematical representations of each approach, capturing their respective objective functions, constraints, and decision variables. The stakeholder model further integrates both quantitative and qualitative metrics, such as financial returns, employee well-being, and environmental impact, to operationalize the value delivered to different stakeholder groups. A ten-year simulation analysis is conducted to compare the predicted financial trajectories of each model across competitive scenarios. Through this approach, the research seeks to offer insights into the trade-offs, risks, and strategic considerations relevant to the two paradigms.

By modelling the shareholder and stakeholder paradigms side by side, this research aims to make several important contributions. First, it introduces a formal mathematical structure that captures how each model evaluates trade-offs and outcomes, offering a clear and systematic basis for comparison. Second, it enables a predictive assessment of how firms operating under each paradigm are likely to perform. This is achieved through a ten-year simulation analysis, which allows for the examination of long-term financial trajectories and the dynamic impacts of each governance model over time. Finally, by

translating ethical and philosophical theories of corporate purpose into quantitative and operational terms, the study contributes to bridging the gap between normative frameworks and practical decision-making in the field of corporate strategy and performance evaluation.

## Literature Review

Stakeholder-oriented and shareholder-centric models represent two philosophically distinct approaches to running a firm, reflecting fundamentally different perspectives on the firm's purpose and the scope of its responsibilities. Shareholder theory views the firm as a nexus of contracts, existing primarily to maximize the net profits of its owners (Pfarrer, 2013). In contrast, stakeholder theory broadens the perspective, asserting that value should be created and fairly distributed among all parties who "affect or are affected by" the firm (Pfarrer, 2013). These divergent viewpoints have shaped both academic and practical discourse, contributing to the emergence of concepts such as corporate social responsibility (CSR), socially responsible enterprises, and environmentally sustainable business models, each of which reflects an evolving recognition that corporate success increasingly depends on balancing financial performance with broader societal and environmental responsibilities.

Adam Smith's 'Wealth of Nations' (1776) lays the foundation for the shareholder perspective, suggesting that profit-seeking in competitive markets advances social welfare through the "invisible hand," a premise that twentieth-century scholarship subsequently transposed into a coherent governance philosophy. Advocates of the Austrian and Chicago schools, exemplified by Hayek, Kirzner, and Friedman, promoted 'laissez-faire' minimalism thinking. They asserted that business carries no broader duty beyond maximizing profits for shareholders. Friedman (1970), a prominent advocate of the shareholder-centric perspective, asserted that a business's sole responsibility to society is to maximize shareholder profits, provided it operates within the bounds of the law. This emphasis on profit maximization laid the groundwork for subsequent theoretical developments focused on how to structure firms in ways that ensure managerial decisions consistently serve the goal of maximizing shareholder profits. Agency theorists such as Jensen and Meckling (1976a) highlighted potential challenges arising from the ownership-control divide, characterizing managers as potentially self-interested actors whose alignment with shareholder

interests could be improved through incentive-based compensation and oversight by independent boards.

Complementing this work, Williamson's transaction-cost economics (Williamson, 1981) casted efficient contracting as the organizing principle of the firm, thereby elevating cost minimization and shareholder wealth as paramount objectives. Such theorizing leads to governance models in which executive compensation is tied to stock performance, independent board members are expected to closely monitor management, and investment is directed only toward projects with expected returns that exceed their costs. Such an approach is appealing because of its clarity, measurability, and alignment with the objective of maximizing shareholder value (Tse, 2011).

Yet, one might argue that this narrow emphasis on shareholder value has produced several adverse consequences. These include a focus on financial performance at the expense of long-term value creation that accounts for broader stakeholder impacts, underinvestment in human capital, and the externalization of social and environmental costs to other stakeholders. These issues became widely visible after major corporate scandals, and during the 2008 global financial crisis. Ghoshal (Ghoshal, 2005) cautioned that viewing executives solely as self-interested profit seekers could become a 'self-fulfilling prophecy,' ultimately encouraging the very opportunistic behavior that agency theory aims to prevent. Such critique has contributed to a broader discussion about whether a more expansive understanding of corporate purpose might better support long-term, sustainable value creation. Stakeholder theory, as advocated by its proponents, offers a broader perspective on corporate responsibility compared to the more narrowly focused shareholder-centric view (Carroll, 2017; Freeman, 2015). Rooted in ethical considerations, stakeholder theory emphasizes the moral obligation of firms to account for the interests of all parties affected by their actions (Phillips et al., 2017a).

Stakeholder groups encompass both internal and external actors. Internal actors include owners, executives, and employees, while external actors include customers, government, suppliers, local communities and the environment (Pfarrer, 2013). All of these actors both influence and are influenced by corporate decisions. Consequently, corporations should account for their interests in the decision-making process, implying that business responsibility extends beyond mere profit maximization for shareholders.

(Carroll, 2017) argued that corporate responsibility should go beyond legal compliance and profit maximization for shareholders, encompassing a commitment to the ethical standards and social expectations that may not be explicitly reflected in legal frameworks. He, therefore, introduced a CSR pyramid comprising four levels: economic, legal, ethical, and discretionary (philanthropic) responsibilities.

A growing body of research highlights the advantages for firms that adopt a stakeholder-oriented approach, as reflected in practices such as CSR, environmental, social, and governance (ESG) initiatives, sustainability strategies, inclusive governance models, and socially responsible business practices, rather than focusing solely on maximizing shareholder interests. Meta-analytical evidence suggests a generally positive association between ESG activities and firm performance. In one of the most comprehensive reviews to date, (Friede et al., 2015) analyze over 2,000 empirical studies and find that approximately 90% report a non-negative relationship between ESG performance and financial outcomes, with the majority indicating a positive association. (Cremers et al., 2019a) also provides empirical evidence that enhanced stakeholder orientation can increase long-term firm value, particularly for complex, innovative, and stakeholder-reliant firms.

Prior research has sought to examine the relationship between stakeholder-oriented approach and specific factors. For example, (Gao et al., 2021) investigate the relationship between stakeholder orientation and firms' cost of debt, leveraging the adoption of constituency statutes across U.S. states. These statutes legally permit corporate directors to consider the interests of a broader range of stakeholders, not just shareholders, when making business decisions. The authors find that firms incorporated in states that enacted constituency statutes experienced a statistically significant reduction in loan spreads, approximately 7%, relative to similar firms in states without such statutes. This suggests that lenders perceive stakeholder-oriented firms as less risky. (Chen, 2025) also indicates that constituency statutes are associated with a reduced cost of equity for firms operating in highly competitive industries. However, they highlight that in low-competition industries; the adoption of constituency statutes is linked to higher costs of equity and reduced future cash flows. They, therefore, conclude that the impact of constituency statutes is contingent on industry competitiveness. Further, (Albuquerque et al., 2019)

showed that stakeholder-oriented firms tend to exhibit lower systematic risk and experience smaller financial drawdowns during crises, as the loyalty of customers and employees contributes to more stable and resilient cash flows.

Cultivating strong stakeholder relationships can serve as a critical source of competitive advantage. According to (Russo & Fouts, 1997), firms adopting stakeholder-oriented approach are more likely to implement management practices tailored to the needs of their stakeholders and aligned with organizational goals. These practices tend to be unique to each firm, making them difficult for competitors to replicate in the short term, and thus strengthening the firm's competitive position (Hillman & Keim, 2001). In addition, stakeholder-oriented approach can strengthen product differentiation, which in turn may lead to increased profit margins and a reduction in firm-specific risk (Albuquerque et al., 2019; Lins et al., 2017). Further, and building on the resource-based view and stakeholder management literature, Choi & Wang, (2009) examined how a firm's relationships with nonfinancial stakeholders, such as employees, suppliers, customers, and communities, influence the persistence of financial performance. Their findings indicate that while strong stakeholder relations contribute to sustaining superior financial performance, their more critical function lies in helping underperforming firms recover more effectively. This suggests that positive stakeholder engagement plays a particularly vital role in restoring firm performance during periods of underperformance.

Empirical evidence also suggests that a strong stakeholder orientation, particularly toward employees, is positively associated with superior firm performance. (De Bussy & Suprawan, 2012a) presented their findings from two longitudinal empirical studies conducted in Australia, six years apart, which underscore the critical role of employees as a primary stakeholder group in driving corporate financial performance. Their research provides strong evidence that employee orientation, defined as the extent to which firms prioritize and engage with employee interests, has a greater impact on financial outcomes than orientation toward other key stakeholders, including shareholders. These results highlight the strategic value of employee-related initiatives and suggest that corporate-level strategies and communication resource allocations may benefit from prioritizing employee engagement.

Despite the largely positive findings in the literature regarding the relationship between stakeholder-oriented practices and firm performance, some studies present different results. For example, Makni et al., (2009a) report no significant association between ESG and financial performance among Canadian firms and even identify a negative impact of environmental considerations on profitability. Similarly, Mahoney & Roberts, (2007) observe that while strong ESG considerations may attract greater institutional investment, it does not necessarily translate into improved financial performance. Moreover, Omran et al., (2002) suggested that that there is no significant difference in shareholder returns between companies that adopt a stakeholder-oriented approach and those that focus solely on shareholders. In addition, List & Momeni, (2021), drawing on evidence from a natural field experiment, found that the implementation of environmental and social policies could unintentionally lead to a reduction in employee effort in their core tasks. This suggests that stakeholder-oriented initiatives may generate unintended internal inefficiencies. Similarly, Masulis & Reza, (2015a) reported that corporate philanthropic activities were associated with a decline in shareholder wealth, raising concerns about the potential for such initiatives to divert resources away from value-maximizing uses.

Stakeholder theory is not without its critics. Managing relationships with multiple stakeholder groups requires addressing diverse constituencies and balancing several objectives at once. This complexity can lead to ambiguity, as pursuing multiple goals simultaneously may create confusion around priorities and decision-making (Tse, 2011). In other words, stakeholder theory fails to provide concrete, actionable guidance for managers to effectively implement stakeholder orientation in real-world decision-making (Danielson et al., 2024; Tse, 2011).

However, stakeholder theory is intentionally designed as a flexible framework for evaluating and balancing stakeholder interests, rather than a rigid approach (Phillips et al., 2017a). This openness is not a weakness but a necessary feature that allows managers to adapt their decisions to the evolving dynamics of the market and the specific contexts in which their firms operate. In addition, a common criticism of stakeholder theory is the assumption that it requires treating all stakeholders equally, regardless of their relative contributions or legitimacy. Critics argue that this egalitarian interpretation

makes the theory impractical for guiding real-world decisions (Phillips et al., 2017a). However, stakeholder theory does not prescribe uniform treatment; rather, it endorses value-based and differentiated consideration, where stakeholders are attended to in proportion to their contributions, risks, or legitimacy (Phillips et al., 2017a). Stakeholder theory explicitly allows for prioritization and the establishment of hierarchies among stakeholders, reflecting the varied roles and impacts different groups have on the firm. Considering the ongoing debate surrounding the effectiveness of the stakeholder and shareholder models, and the mixed empirical findings that underscore the complexity of their relationship with firm performance, there is a clear need for a systematic, model-based comparison. This research aims to address that need by evaluating and predicting the long-term financial outcomes associated with each governance approach.

## Methods

This research employs a quantitative modeling and simulation approach to fundamentally reformulate and empirically examine stakeholder theory within a precise mathematical framework. This methodology moves beyond traditional qualitative analyses, aiming to provide a robust, data-driven understanding of how different corporate objective functions impact organizational performance and value distribution. Building upon the foundational concepts introduced by Edward Freeman in his seminal work, Strategic Management: A Stakeholder Approach (1984), this study develops and compares two distinct models: a traditional shareholder-centric model and a more comprehensive stakeholder-oriented model. The core objective is to isolate and quantify the effects of stakeholder-oriented decision-making on both financial metrics and broader value creation over time.

The shareholder model is mathematically formulated as a profit maximization function, aligning with neoclassical economic theory and the perspective famously promoted by Milton Friedman (1970). The primary objective of the shareholder model is to maximize short-term financial returns for shareholders. Mathematically, this is represented as "Maximize" $\pi$, where profit ($\pi$) is defined as the difference between total revenue (R) and total costs (C), i.e., $\pi$=R-C. This model emphasizes core financial metrics derived from variables such as product price (p), quantity sold (q), and various cost

components, including labor, materials, operations, and taxes. The analytical strength of the shareholder model lies in its simplicity and direct focus on quantifiable financial performance, consistent with agency theory's emphasis on aligning managerial actions solely with shareholder interests (Jensen & Meckling, 1976b).

Conversely, the stakeholder-inclusive model adopts a more encompassing and ethically nuanced perspective, drawing significantly from Freeman's (1984) work. This model aims to maximize a composite weighted utility function, W, which represents the aggregated value delivered to a broader spectrum of constituents. This is formally expressed as "Maximize" $W=\sum w_i \cdot V_i$, where wi denotes the normalized weight assigned to each specific stakeholder group, and V_i represents the value function for that group. Key stakeholder groups explicitly considered in this model include shareholders, employees, customers, partners/suppliers, and society/environment.

The critical distinction of this model lies not only in the breadth of stakeholders considered but also in the inherent complexity of its objective function, which necessitates the operationalization of diverse value functions. These value functions incorporate a blend of monetary and non-monetary, qualitative aspects. For instance, employee value considers wages and a safety index, while societal value integrates an ESG score and community engagement. This multi-objective framework inherently acknowledges potential interdependencies and trade-offs among stakeholder interests, suggesting that sustainable, long-term value creation often arises from balancing these varied claims (Phillips et al., 2017b), rather than singularly pursuing financial returns.

The methodology involves constructing explicit mathematical equations for each model, incorporating real-world variables and dynamic parameters. For the shareholder model, this includes annual update rules for price, quantity, and cost categories based on predefined growth rates. For the stakeholder model, similar financial calculations are performed, but total costs also include community-related expenses. Crucially, the stakeholder model incorporates detailed value functions for each group, such as shareholder value (V_SH) as a function of profit and ROI, employee value (V_E) based on labor cost and a safety index, and societal value (V_SO) integrating an ESG score and community engagement, each weighted by specific parameters ($\alpha$,$\beta$,$\gamma$, etc.).

The simulation operates over a 10-year horizon, providing a sufficient timeframe to observe both short-term fluctuations and long-term trends. It integrates differentiated annual growth rates for price and quantity, alongside specific cost escalations for various categories, including general inflation and distinct increases for labor, operations, and community costs. Initial conditions, such as price, quantity, revenue, and cost components, were set identically for both models ($100 for price, 1000 units for quantity) to ensure a controlled comparison. This rigorous setup allows the research to isolate the direct effects of stakeholder-oriented decision-making on financial performance and value distribution. The models were implemented using Python, leveraging its capabilities for numerical computation and data visualization. This allowed for the generation of robust numerical results and graphical representations, facilitating clear comparisons and providing empirical validation for the theoretical claims regarding stakeholder theory. This quantitative approach helps move the discourse on stakeholder orientation, such as corporate social responsibility and sustainable business practices, from conceptual advocacy to evidence-based insights.

## Mathematical Structured Comparison Frameworks for Shareholder and Stakeholder Models

## Shareholder Model:

4.1.1. Primary Objective:

The primary objective of the shareholder model is to maximize short-term profit for shareholders.

Mathematical Representation:

Profit ($pi$) is defined as: $\pi = R - C$

Components:

Profit ($pi$): $\pi = p \times q - \left(C_{\text{labor}} + C_{\text{materials}} + C_{\text{operations}}\right)$

Revenue ($R$): $R = p \times q$

Cost ($C$): $C = C_{\text{labor}} + C_{\text{materials}} + C_{\text{operations}} + C_{\text{taxes}}$

## Stakeholder Model:

4.2.1. Primary Objective:

The primary objective of the stakeholder model is to maximize weighted value for all stakeholders.

4.2.2. Mathematical Representation:

$$W = w_S \cdot V_S + w_E \cdot V_E + w_C \cdot V_C + w_P \cdot V_P + w_M \cdot V_M$$

Components:

**Weights**: $0 \leq w_i \leq 1, \quad \sum w_i = 1$ where:

$w\_S$ = Weight of Shareholders

$w\_E$ = Weight of Employees

$w\_C$ = Weight of Customers

$w\_P$ = Weight of Partners/Suppliers

$w\_M$ = Weight of Society/Environment

Value Functions:

Shareholders ($V\_S$): $V_S = \alpha \cdot \pi + \beta \cdot ROI$

Employees ($V\_E$): $V_E = \gamma \cdot \text{Wage} + \delta \cdot \text{Safety\_Index}$

Customers ($V\_C$): $V_C = \varepsilon \cdot \text{Quality} + \zeta \cdot \text{Price\_Fairness}$

Partners/Suppliers ($V\_P$): $V_P = \eta \cdot \text{Contract\_Stability} + \theta \cdot \text{Payment\_Terms}$

Society/Environment ($V\_M$): $V_M = \iota \cdot \text{ESG\_Score} + \kappa \cdot \text{Community\_Engagement}$

## Comparing Stakeholder and Shareholders Models:

Table 1 provides a foundational comparison between two prominent models of corporate governance and business operation: the Shareholder Model and the Stakeholder Model. It highlights their differing core objectives, the primary variables they focus on, and their inherent complexities. This table serves as a conceptual framework for understanding the distinct philosophies that drive decision-making and performance evaluation in each model, setting the stage for a deeper analysis of their practical implications and simulation results.

Table (1): Shareholder vs. Stakeholder Models: A Comparative Analysis

| Aspect | Shareholder Model | Stakeholder Model |
|---|---|---|
| Objective | Maximize profit (pi) | Maximize weighted value (W) |
| Key Variables | Price (p), Quantity (q), Costs (C) | Weights (w_i), Value metrics (V_i) |
| Complexity | Low (linear equations) | High (nonlinear interactions) |

## Key Numerical Assumptions:

### Initial Conditions:

Table 2 outlines the starting values for all key parameters used in the simulation of both the Shareholder and Stakeholder models. These initial conditions are identical for both models across common parameters, ensuring a fair baseline for comparison. The table also highlights where the Stakeholder Model introduces additional considerations, such as "Community Costs," reflecting its broader scope of responsibilities beyond traditional shareholder interests. These foundational values serve as the common ground from which the distinct dynamics and outcomes of each model emerge over the 10-year simulation period.

Table (2) Initial Conditions for Shareholder and Stakeholder Model Simulations:

| Parameter | Shareholder Model Value | Stakeholder Model Value | Description |
|---|---|---|---|
| Initial Price | $100 | $100 | Selling price per unit |
| Initial Quantity | 1000 units | 1000 units | Number of units sold |
| Initial Revenue | $100,000 | $100,000 | Initial total revenue |
| Labor Costs | $30,000 | $30,000 | Employee wages and benefits |
| Materials Costs | $25,000 | $25,000 | Raw materials and components |
| Operations Costs | $15,000 | $15,000 | Running the business |

| | | | |
|---|---|---|---|
| | | | (utilities, etc.) |
| Taxes | $10,000 | $10,000 | Estimated tax liability |
| Community Costs | N/A | $5,000 | Community engagement efforts |
| Simulation Period | 10 Years | 10 Years | Duration of the simulation |
| | | | |

## Growth and Cost Factors (Annual Rates):

Table 3 details the annual growth and cost factor assumptions critical to simulating the progression of both the Shareholder and Stakeholder models over time. This table reveals the divergent strategic decisions embedded within each model, particularly concerning pricing, quantity changes, and the escalation of various cost categories. Notably, the Stakeholder Model incorporates specific, often higher, increases for factors like labor, operations, and community costs, reflecting its broader commitment to stakeholder well-being, while the Shareholder Model maintains a more uniform general cost increase. These differential rates directly influence the financial trajectory and outcomes of each model throughout the simulation period.

Table (3): Annual Growth and Cost Factor Assumptions for Shareholder and Stakeholder Models:

| **Parameter** | **Shareholder Model Value** | **Stakeholder Model Value** | **Description** |
|---|---|---|---|
| Price Increase Rate | 2.5% | 2.0% | Annual rate at which selling price increases. |
| Quantity Change Rate | -1.25% (decrease) | 1.5% (increase) | Annual rate of change in quantity sold. |
| General Cost Increase Rate | 3.0% | 3.0% (for Materials, Taxes) | General inflation for costs not specifically adjusted. |
| Labor Cost Increase Rate | 3.0% (uses General) | 3.3% | Specific annual increase rate for labor costs. |
| Operations Cost Increase Rate | 3.0% (uses General) | 3.6% | Specific annual increase rate for operations costs. |

| Parameter | Shareholder Model Value | Stakeholder Model Value | Description |
|---|---|---|---|
| Materials Cost Increase Rate | 3.0% (uses General) | 3.0% (uses General) | Annual increase rate for materials costs. |
| Taxes Increase Rate | 3.0% (uses General) | 3.0% (uses General) | Annual increase rate for taxes. |
| Community Cost Increase Rate | N/A | 3.9% | Specific annual increase rate for community costs (Stakeholder model only). |
| Base Growth Rate (Reference) | 5% | 5% | General market growth assumption, used to derive Price/Quantity rates as per description. |
| | | | |

Note: The "Base Growth Rate" of 5% was mentioned as a general assumption from which some model-specific rates were derived (e.g., Price Increase Rate Stakeholder = 5% * 0.4 = 2%). The table above lists the actual annual rates applied directly in the simulation calculations.

## Stakeholder Weights (Stakeholder Model):

Table 4 presents the explicit weighting assigned to each key stakeholder group within the Stakeholder Model. These weights are crucial for defining the 'weighted value' objective of the Stakeholder Model, illustrating how different groups—shareholders, employees, customers, partners/suppliers, and society/community—contribute to the overall assessment of the model's success. The allocation of these percentages directly influences strategic decisions by guiding resource distribution and performance evaluation, ensuring that the model strives for a balanced approach to value creation across its diverse constituencies.

Table (4): Stakeholder Group Weighting in the Stakeholder Model:

| Stakeholder Group | Weight | Description |
|---|---|---|
| Shareholders | 25% | Relative importance assigned to shareholder value |

| Stakeholder Group | Weight | Description |
|---|---|---|
| Employees | 20% | Relative importance assigned to employee well-being and satisfaction |
| Customers | 25% | Relative importance assigned to customer satisfaction and value |
| Partners/Suppliers | 15% | Relative importance assigned to maintaining fair and stable relationships with suppliers and partners |
| Society/Community | 15% | Relative importance assigned to social and environmental impact, including ESG factors and community engagement |
| Total | 100% | The weights must sum to 100% to ensure the total stakeholder value is a properly weighted average of individual stakeholder value functions |
| | | |

## Value Function Parameters (Stakeholder Model):

Table 5 details the specific parameters and their assigned values used to construct the individual value functions for each stakeholder group within the Stakeholder Model. These parameters, denoted by Greek letters (e.g., $\alpha$, $\beta$, $\gamma$), represent the relative importance of different metrics (e.g., profit, ROI, labor cost, product quality, ESG score) in defining value for each respective stakeholder. This granular breakdown is essential for quantifying and ultimately maximizing the "weighted value" objective, as it dictates how the model's

performance will be evaluated across the diverse interests of shareholders, employees, customers, partners/suppliers, and society/community.

Table (5): Value Function Parameters for Stakeholder Model

| Stakeholder Group | Parameter | Value | Description |
|---|---|---|---|
| Shareholders | Alpha (α) | 1.0 | Weight for profit (π) in shareholder value function. |
| | Beta (β) | 0.5 | Weight for ROI (Return on Investment) in shareholder value function. |
| Employees | Gamma (γ) | 0.7 | Weight for labor cost in employee value function. |
| | Delta (δ) | 0.3 | Weight for safety index in employee value function. |
| Customers | Epsilon (ε) | 0.6 | Weight for product quality in customer value function. |
| | Zeta (ζ) | 0.4 | Weight for price fairness in customer value function. |
| Partners/Suppliers | Eta (η) | 0.5 | Weight for contract stability in partner/supplier value function. |
| | Theta (θ) | 0.5 | Weight for payment terms in partner/supplier value function. |
| Society/Community | Iota (ι) | 0.7 | Weight for ESG (Environmental, Social, Governance) score in society value function. |
| | Kappa (κ) | 0.3 | Weight for community engagement in society value function. |
| | | | |

## Simulation Equations and Results

### Simulation Equations:

This section details the mathematical equations employed to model the Shareholder and Stakeholder approaches within the simulation.

### Shareholder Model Equations:

*6.1.1.1. Core Financial Metrics (Calculated annually):*

Revenue ($R$): $R = p \times q$ Where:

$p$ = Price per unit in the current year

$q$ = Quantity sold in the current year

Total Costs ($C$): $C = C_{\text{labor}} + C_{\text{materials}} + C_{\text{operations}} + C_{\text{taxes}}$ Where:

$C_{\text{labor}}$ = Labor Costs in the current year

$C_{\text{materials}}$ = Materials Costs in the current year

$C_{\text{operations}}$ = Operations Costs in the current year

$C_{\text{taxes}}$ = Taxes in the current year

Profit ($\pi$): $\pi = R - C$

Profit Margin: Profit Margin $= \begin{cases} \frac{\pi}{R} & \text{if } R > 0 \\ 0 & \text{otherwise} \end{cases}$

Return on Investment (ROI): ROI $= \begin{cases} \frac{\pi}{C} & \text{if } C > 0 \\ 0 & \text{otherwise} \end{cases}$

**6.1.1.2. Update Rules (Year-over-Year Changes):**

Price Update ($p_t$): $p_t = p_{t-1} \times (1 + g_{p\_sh})$ Where:

$p_t$ = Price in the current year $t$

$p_{t-1}$ = Price in the previous year $t - 1$

$g_{p\_sh}$ = Price Increase Rate for Shareholder Model (0.025 or 2.5%)

Quantity Update ($q_t$): $q_t = q_{t-1} \times (1 + g_{q\_sh})$ Where:

$q_t$ = Quantity in the current year $t$

$q_{t-1}$ = Quantity in the previous year $t - 1$

$g_{q\_sh}$ = Quantity Change Rate for Shareholder Model (-0.0125 or -1.25%, indicating a decrease)

Cost Update ($C_{i,t}$ for each cost category $i$): $C_{i,t} = C_{i,t-1} \times (1 + c_{\text{gen}})$ Where:

$C_{i,t}$ = Cost of category $i$ (labor, materials, operations, taxes) in year $t$

$C_{i,t-1}$ = Cost of category $i$ in year $t - 1$

$c_{\text{gen}}$ = General Cost Increase Rate (0.03 or 3%)

## Stakeholder Model Equations

*6.1.2.1. Core Financial Metrics (Calculated annually):*

In terms of core financial metrics, the stakeholder model mirrors the shareholder model except that total costs also incorporate community costs in the profit calculation.

Revenue ($R$): $R = p \times q$

Total Costs ($C_{\text{total}}$): $C_{\text{total}} = C_{\text{labor}} + C_{\text{materials}} + C_{\text{operations}} + C_{\text{taxes}} + C_{\text{community}}$ Where:

$C_{\text{community}}$ = Community Costs in the current year

Profit ($\pi$): $\pi = R - C_{\text{total}}$

Profit Margin: Profit Margin $= \begin{cases} \frac{\pi}{R} & \text{if } R > 0 \\ 0 & \text{otherwise} \end{cases}$

Return on Investment (ROI): ROI $= \begin{cases} \frac{\pi}{C_{\text{total}}} & \text{if } C_{\text{total}} > 0 \\ 0 & \text{otherwise} \end{cases}$

**6.1.2.2. Total Stakeholder Value (W):**

$W = w_S \cdot V_S + w_E \cdot V_E + w_C \cdot V_C + w_P \cdot V_P + w_M \cdot V_M$ Where:

$W$ = Total stakeholder value

$w_i$ = Weight of stakeholder group $i$:

$w_S$ (Shareholders) = 0.25

$w_E$ (Employees) = 0.20

$w_C$ (Customers) = 0.25

$w_P$ (Partners/Suppliers) = 0.15

$w_M$ (Society/Community) = 0.15

$V_i$ = Value function for stakeholder group $i$

**6.1.2.3 Value Functions (V_i):**

Shareholder Value ($V_S$): $V_S = \alpha \cdot \pi + \beta \cdot \text{ROI} \cdot C_{\text{total}}$ Where:

$\alpha$ (Alpha) = 1.0

$\beta$ (Beta) = 0.5

Employee Value ($V_E$): Safety Index = $\begin{cases} \min\left(1.0, \frac{C_{\text{operations}}}{C_{\text{total}} \times 0.2}\right) & \text{if } C_{\text{total}} \times 0.2 > 0 \\ 0 & \text{otherwise} \end{cases}$ $V_E = \gamma \cdot C_{\text{labor}} + \delta \cdot$ Safety Index $\cdot C_{\text{labor}}$ Where:

$\gamma$ (Gamma) = 0.7

$\delta$ (Delta) = 0.3

Customer Value ($V_C$): Quality = $\begin{cases} \min\left(1.0, \frac{C_{\text{materials}} + C_{\text{operations}}}{C_{\text{total}} \times 0.5}\right) & \text{if } C_{\text{total}} \times 0.5 > 0 \\ 0 & \text{otherwise} \end{cases}$ PriceFairness = $\max(0, 1 - \text{Profit Margin})$ $V_C = \varepsilon \cdot \text{Quality} \cdot q + \zeta \cdot \text{PriceFairness} \cdot q$ Where:

$\varepsilon$ (Epsilon) = 0.6

$\zeta$ (Zeta) = 0.4

Partner/Supplier Value ($V_P$): Contract Stability = $\begin{cases} \min\left(1.0, \frac{C_{\text{operations}}}{C_{\text{total}} \times 0.3}\right) & \text{if } C_{\text{total}} \times 0.3 > 0 \\ 0 & \text{otherwise} \end{cases}$ Payment Terms = $\begin{cases} \min\left(1.0, \frac{\pi}{R \times 0.2}\right) & \text{if } R \times 0.2 > 0 \text{ and } \pi > 0 \\ 0 & \text{otherwise} \end{cases}$ $V_P = \eta \cdot$ Contract Stability $\cdot C_{\text{materials}} + \theta \cdot \text{PaymentTerms} \cdot C_{\text{materials}}$ Where:

$\eta$ (Eta) = 0.5

$\theta$ (Theta) = 0.5

Society/Community Value ($V_M$): ESGS core = $\begin{cases} \min\left(1.0, \frac{C_{\text{operations}}}{C_{\text{total}} \times 0.25}\right) \times \left(1 - (\text{Profit Margin} \times 0.5)\right) & \text{if } C_{\text{total}} \times 0.25 > 0 \\ 0 & \text{otherwise for the first part} \end{cases}$

Community Engagement = $\begin{cases} \min\left(1.0, \frac{C_{\text{community}}}{C_{\text{total}} \times 0.1}\right) & \text{if } C_{\text{total}} \times 0.1 > 0 \\ 0 & \text{otherwise} \end{cases}$

$V_{M\_\text{profit\_component}} = \begin{cases} \pi & \text{if } \pi > 0 \\ 0 & \text{otherwise} \end{cases}$ $V_M = \iota \cdot \text{ESGScore} \cdot V_{M\_\text{profit\_component}} + \kappa \cdot \text{Community Engagement} \cdot V_{M\_\text{profit\_component}}$ Where:

$\iota$ (Iota) = 0.7

$\kappa$ (Kappa) = 0.3

**6.1.2.4. Update Rules (Year-over-Year Changes - Stakeholder Model):**

Price Update ($p_t$): $p_t = p_{t-1} \times (1 + g_{p\_st})$ Where:

$g_{p\_st}$ = Price Increase Rate for Stakeholder Model (0.02 or 2%)

Quantity Update ($q_t$): $q_t = q_{t-1} \times (1 + g_{q\_st})$ Where:

$g_{q\_st}$ = Quantity Change Rate for Stakeholder Model (0.015 or 1.5%, indicating an increase)

Cost Update ($C_{i,t}$ for each cost category $i$):

Labor Cost: $C_{\text{labor},t} = C_{\text{labor},t-1} \times (1 + c_{\text{labor\_st}})$

$c_{\text{labor\_st}}$ = Labor Cost Increase Rate (Stakeholder Specific: 0.033 or 3.3%)

Materials Cost: $C_{\text{materials},t} = C_{\text{materials},t-1} \times (1 + c_{\text{gen}})$

$c_{\text{gen}}$ = General Cost Increase Rate (0.03 or 3%)

Operations Cost: $C_{\text{operations},t} = C_{\text{operations},t-1} \times (1 + c_{\text{ops\_st}})$

$c_{\text{ops\_st}}$ = Operations Cost Increase Rate (Stakeholder Specific: 0.036 or 3.6%)

Taxes: $C_{\text{taxes},t} = C_{\text{taxes},t-1} \times (1 + c_{\text{gen}})$

$c_{\text{gen}}$ = General Cost Increase Rate (0.03 or 3%)

Community Cost: $C_{\text{community},t} = C_{\text{community},t-1} \times (1 + c_{\text{comm\_st}})$

$c_{\text{comm\_st}}$ = Community Cost Increase Rate (Stakeholder Specific: 0.039 or 3.9%).

## Simulation Results:

This comprehensive set of equations forms the mathematical foundation upon which the simulation calculates the year-over-year progression for both the shareholder and stakeholder models.

### Numerical Simulation Results:

Table 6 vividly illustrates the divergent outcomes of prioritizing either a shareholder or stakeholder model over a 10-year simulation period. The results suggest that while the shareholder model may initially focus on maximizing profit through price increases, the stakeholder model, by considering a broader

range of interests, appears to foster more sustainable and robust growth in the long run.

The simulation reveals stark differences between the shareholder and stakeholder models after 10 years. The shareholder model, prioritizing profit through higher pricing, saw a decrease in quantity sold, leading to lower overall revenue and profit ($5,390.15) despite lower total costs. In contrast, the stakeholder model, balancing stakeholder value, achieved a significantly higher quantity sold due to a more competitive price, resulting in substantially greater revenue ($141,525.25) and profit ($24,286.21). Consequently, the stakeholder model exhibited remarkably higher profit margins and ROI, indicating that investing in diverse stakeholders fosters more robust financial health and growth in the long term.

Table (6): Final Simulation Results: shareholder vs. stakeholder model performance (Year 10)

| Metric | Shareholder Model (Year 10) | Stakeholder Model (Year 10) | Difference (Shareholder - Stakeholder) |
|---|---|---|---|
| Price per Unit | 128.01 | 121.90 | 6.11 |
| Quantity Sold | 882 | 1161 | -279 |
| Revenue | 112,878 | 141,469 | -28,591 |
| Total Costs | 107,513 | 117,239 | -9,726 |
| Profit | 5,365 | 24,230 | -18,865 |
| Profit Margin (%) | 4.75% | 17.13% | -12.37 pp |
| ROI (%) | 4.99% | 20.67% | -15.68 pp |
| Total Stakeholder Value (W) | N/A | 23,492 | - 23,492 (stakeholder model only) |
| | | | |

## Graphical Evidence

The accompanying visualizations show that although both models exhibit profit growth, the stakeholder model surpasses the shareholder model in the later periods. Over time, the stakeholder model also generates substantially

more total value than its shareholder-focused counterpart. Moreover, the stakeholder model delivers balanced value across all stakeholder groups, fostering a positive cycle of growth.

Figure 1 illustrates four key outcomes for both models. In the top-left panel, total revenue for the Shareholder Model (blue line with circles) rises steadily but slowly over the ten-year period, whereas the Stakeholder Model (green line with crosses) climbs much more steeply, suggesting that prioritizing a broader range of stakeholders leads to significantly higher revenue generation. The top-right panel compares net profit: although the Shareholder Model begins with higher profit, it declines consistently over time and finishes below its starting point, while the Stakeholder Model—despite a lower initial profit—grows steadily, overtakes the Shareholder Model around year 3, and ends with a much higher net profit, indicating superior long-term profitability under stakeholder-oriented decision-making. In the bottom-left panel, both models show increasing price per unit, but the Shareholder Model's price rises more aggressively, reflecting a strategy to maximize revenue per sale; the Stakeholder Model's more moderate price increases, particularly in later years, imply a focus on maintaining affordability. Finally, the bottom-right panel reveals that the Shareholder Model experiences a steady decrease in quantity sold—likely a consequence of higher prices reducing competitiveness—whereas the Stakeholder Model achieves strong, consistent growth in units sold, aligning with its higher total revenue and underscoring the effectiveness of strategies that enhance market appeal and customer satisfaction.

Figure (1): Comparative Simulation Results: Shareholder vs. Stakeholder Model Performance Over 10 Years

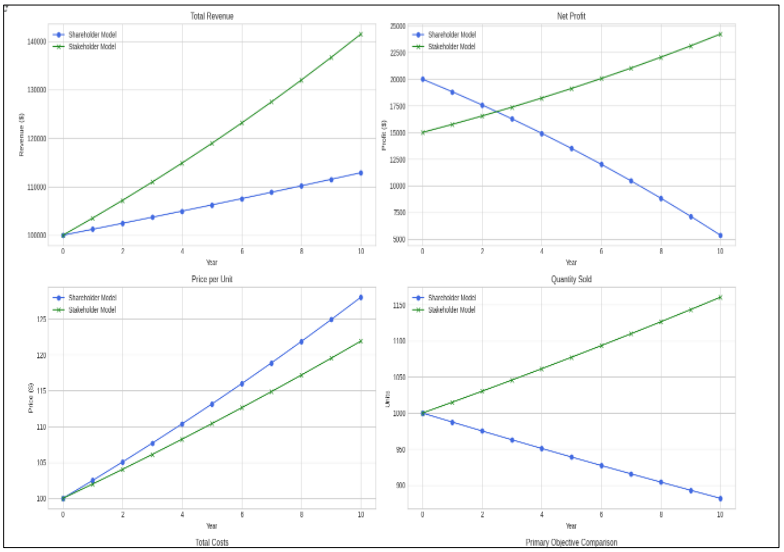



Figure 2 shows that the shareholder model initially achieves higher profit but, by focusing narrowly on financial returns, sees declining long-term profitability despite its controlled cost structure. In contrast, the stakeholder model invests more, resulting in higher total costs but also significantly greater total revenue and steadily increasing net profit. Over time, the stakeholder model surpasses the shareholder model in both profit and overall value creation. This suggests that considering broader stakeholder interests fosters sustainable growth and greater long-term success compared to a purely profit-driven approach. The stakeholder model's strategies appear to build stronger customer relationships and potentially enhance brand value, driving higher sales volumes. Ultimately, the simulation indicates that a stakeholder-oriented approach yields more favorable long-term outcomes.

Figure (2): Comparative Analysis of Total Costs and Primary Objectives: Shareholder vs. Stakeholder Models Over 10 Years

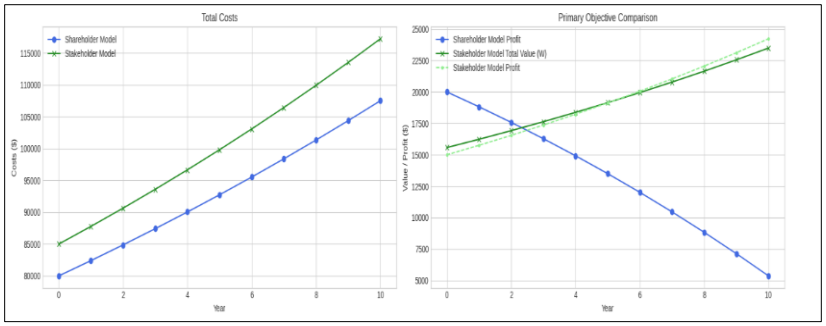
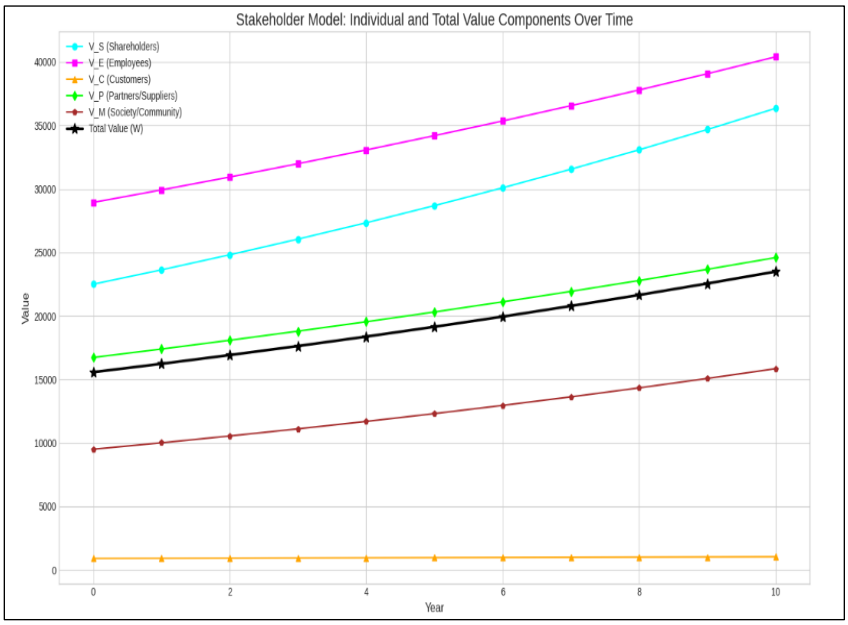



Figure 3 shows the individual and aggregate stakeholder values over the ten-year simulation. The magenta line with squares, (V_E) for employees, exhibits a substantial, consistent upward trend driven by increased wages, enhanced benefits, and improved working conditions. The orange line with triangles, (V_C) for customers, remains relatively low and rises very gradually over time. The flat customer value curve reflects mathematical constraints such as bounded quality metrics, economic realities involving trade-offs between profit and customer value, and market saturation effects. Maintaining customer value, therefore, requires deliberate investments in quality and pricing strategies that can conflict with traditional profit-maximization. This phenomenon is not a modeling error but a realistic depiction of the difficulty in sustaining customer value growth within mature, profitable businesses. The lime green line with plus signs, (V_P) for partners and suppliers, demonstrates a steady and notable increase as a result of more favorable contract terms and stronger collaborative relationships. The brown line with pentagons, (V_M) for society and community, climbs steadily thanks to investments in sustainability initiatives, community development programs, and ethical business practices. Finally, the black line with stars shows total stakeholder value W, which aggregates all individual values and confirms the overall success of the stakeholder model in generating broad-based value over the decade.

Figure (3): Stakeholder Model: Individual and Total




## Discussion and Conclusion

This study developed a comparative mathematical model to evaluate the long-term financial outcomes of shareholder and stakeholder paradigms. By simulating both models over ten years, the study provides a structured framework for comparing how different governance approaches influence long-term strategic and financial outcomes, helping to translate abstract theories of corporate purpose into operational insights. The simulation results reveal a compelling divergence in long-term financial outcomes between the shareholder-centric and stakeholder-oriented models. The stakeholder model consistently outperforms the shareholder model in both profit margin and ROI by the end of the simulation period. This finding aligns with previous studies [18,24] that have shown stakeholder-oriented firms to perform financially better than shareholder-centric firms.

The simulation also reveals that while the shareholder model initially achieves higher profits, the model proves unsustainable over time. By year 10, the shareholder approach results in lower revenue and declining profits, ultimately yielding a profit of only $5,390.15 and an ROI of 4.99%, in contrast to the stakeholder model's significantly stronger long-term performance. These

outcomes suggest that a narrow focus on shareholder value may undermine profitability and competitiveness in the long run, potentially harming the very shareholders it aims to benefit. This result is not consistent with prior empirical research, which argues that a focus on shareholder value maximization leads to superior financial performance [10,26]. This result invites a re-examination of shareholder primacy, the long-standing principle in corporate governance theory that a firm's primary obligation is to maximize shareholder wealth, as rooted in agency theory [13]. Under this model, managers are expected to act solely in the interest of shareholders to prevent inefficiencies. However, (Wiersema & Koo, 2022) observe, this view has become increasingly misaligned with the realities of modern corporate governance. Institutional investors are reshaping governance priorities by demanding attention to ESG issues. In this context, the simulation findings support the view that rigid adherence to shareholder primacy may overlook broader strategic benefits and long-term value creation, reinforcing the growing relevance of stakeholder-oriented governance.

Adopting a stakeholder approach has significant implications for firm performance, as demonstrated by the simulation results. In this context, (He & Chittoor, 2023) argue that stakeholder-oriented practices, such as environmental responsibility, fair treatment of employees, and community engagement, can enhance firm value. In other words, stakeholder-focused practices contribute to building intangible assets like trust and reputation, which support long-term competitiveness. Further, the simulation results provide strong evidence that adopting a stakeholder-oriented model leads to superior long-term performance, particularly in sales and revenue generation. By year 10, the stakeholder model achieved a significantly higher quantity sold, resulting in much greater total revenue compared to the shareholder model. This performance is attributed to strategies such as competitive pricing, employee investment, and stronger supplier and customer relationships, which collectively enhance market appeal and customer satisfaction. These findings support the position that stakeholder-oriented practices can drive sustainable growth by aligning firm objectives with the broader interests of its ecosystem. This result aligns with prior empirical research, which demonstrated that stakeholder governance positively influences product market performance. For example, (Lu & Wei, 2024) revealed that firms adopting stakeholder-oriented

practices experienced higher sales growth and delivered more impactful innovation.

Beyond direct financial implications, adopting a stakeholder approach also carries important social and environmental consequences. The simulation results show that the stakeholder model generates social and environmental benefits through steady increases in societal value, driven by investments in sustainability initiatives, community development programs, and ethical business practices. This outcome is consistent with findings from prior studies, which suggested that adopting a stakeholder approach significantly enhances environmental and sustainability outcomes by aligning corporate strategies with broader societal and environmental goals [6]. Unlike the shareholder-centric model, which prioritizes financial returns, the stakeholder model encourages long-term value creation by considering the interests of employees, communities, and the environment. Moreover, stakeholder-oriented firms are more likely to adopt proactive environmental practices such as emissions reduction, sustainable resource use, and renewable energy investment (Kotsantonis & Serafeim, 2019). These actions benefit the planet while simultaneously strengthening the company's reputation, enhancing stakeholder trust, and supporting long-term viability.

The simulation results indicate that firms adopting a stakeholder-oriented model experience more sustainable growth over time, characterized by steady increases in profit, ROI, and total stakeholder value. This pattern of sustained performance suggests that such firms are better positioned to withstand external pressures, including economic downturns and market volatility. A parallel can be drawn with (Wu et al., 2023) who investigated the performance of banks during the 2007–2008 global financial crisis. Their study revealed that while shareholder-oriented banks pursued aggressive profit strategies and outperformed in boom periods, they suffered greater losses during the crisis due to higher exposure to systemic risk. In contrast, stakeholder-oriented banks, although more conservative in growth during stable times, demonstrated greater resilience and suffered fewer losses when the financial system was under stress. These observations reinforce the conclusion that the stakeholder approach promotes ethical and inclusive governance while simultaneously supporting a more sustainable and stable business model capable of enduring adverse conditions.

In response to the central question at the heart of the stakeholder versus shareholder paradigm debate, to whom should corporations be run, the findings point decisively toward the stakeholder model as the more effective and sustainable paradigm. The simulation results challenge the assumption that focusing exclusively on shareholder returns leads to optimal performance. Over ten years, firms guided by a stakeholder approach achieved higher revenue, profit margins, and ROI, while also fostering stronger relationships with employees, customers, suppliers, and society at large. These outcomes suggest that long-term financial success is more reliably achieved when corporate strategies account for the interests and well-being of all key stakeholders. Furthermore, the stakeholder model encourages practices such as fair labor policies, environmental stewardship, and community investment. These initiatives help build trust, enhance reputation, and support resilience in the face of changing market and societal expectations. In contrast, the shareholder-centric model showed signs of decline and instability over time. Taken together, the evidence supports the view that corporations should be run in service of a broader ecosystem of stakeholders whose contributions and interests are essential to sustainable value creation.

The current study contributes to business ethics by addressing the interconnected dimensions of ethical corporate conduct, including governance, strategic decision-making, and sustainability. First, it offers a formal mathematical framework for comparing shareholder-centric and stakeholder-oriented models, translating abstract normative theories into operational terms suitable for simulation and practical evaluation. By simulating both models over ten years, the research delivers a predictive analysis of long-term financial trajectories under each governance paradigm. This approach is both novel and empirically grounded. Second, the integration of financial, social, and environmental variables into the stakeholder model represents a meaningful advancement in modeling holistic corporate performance. The study also bridges theory and practice by demonstrating that stakeholder-oriented strategies are not merely ethically desirable but also economically advantageous, reinforcing calls for a redefinition of corporate purpose in line with ESG principles.

Nevertheless, this study has several limitations. The simulation relies on mathematical representations that necessarily simplify complex real-world

dynamics, such as consumer behavior, regulatory shifts, and competitive market responses. These simplifications may limit the external validity of the findings across diverse industries or geopolitical contexts. Additionally, the model assumes rational decision-making and stable market conditions over a decade, which may not reflect the volatility or uncertainty faced by actual firms. The quantification of stakeholder value, particularly social and environmental impacts, also involves subjective judgments and proxies that could be refined in future research. Lastly, while the model offers strong predictive insights, empirical validation through real-world case studies or longitudinal data analysis would strengthen the generalizability of its conclusions

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Supplementary Materials: The Python code used for the simulation is available at: https://github.com/eyas70/Mathematical-Model-of-Stakeholder-Theory.git

Data Availability Statement: The simulation code and data supporting the findings of this study are publicly available on GitHub at https://github.com/eyas70/Mathematical-Model-of-Stakeholder-Theory.git