



Financial determinants of governance scores in hospitality and tourism enterprises

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Abstract

While the importance of robust corporate governance in hospitality and tourism (H&T) enterprises is widely acknowledged among scholars in the fields of H&T and general management, existing literature reveals several gaps, inconclusive findings, and disparate conclusions. In addressing these gaps and advancing scientific understanding, this study delves into the estimation of governance scores in H&T enterprises through an exploration of financial indicators. Leveraging the Thomson Reuters Eikon database and employing machine learning methodologies such as bagging, random forest, and boosted regression algorithms, our research identifies the most influential predictors of governance scores. Our results highlight that assets/equity emerges as the most potent predictor of shareholder score in H&T businesses, while the composition of independent board members is identified as the paramount predictor of both governance score and management score. Beyond contributing to the scholarly discourse, our study holds significant practical implications. By elucidating the nexus between financial metrics and governance ratings, our findings empower H&T businesses to strategically align their governance mechanisms, fostering enhanced corporate governance practices.

Keywords Corporate governance score · Shareholder score · Financial indicators · Machine learning · Hospitality and tourism

1 Introduction

Corporate governance aims to address interest conflicts between management and shareholders, as well as between large and small shareholders thereby lowering agency issues (Rani et al. 2014; Olorunsola et al. 2023). According to the agency hypothesis, organizations with greater corporate governance standards outperform their rivals because they have lower agency costs and more effective monitoring procedures (Bonazzi and Islam 2007). Improved corporate governance systems, as (Ngobo and Fouda 2012), decrease uncertainty between shareholders and executives. Several studies use primary and survey-based data on corporate governance structure at the business level within a certain industry. Several studies found a link between governance methods and financial

modeling in service-based industries including tourism and hospitality (Ernawati et al. 2018; Otieno et al. 2015). The majority of prior studies stress that improved corporate governance results in higher business valuation (Aggarwal 2013).

Human, social, environmental, and economic challenges have dramatically impacted the globe in recent years, increasing societal distrust and social and economic inequities (Abdelmoula et al. 2022; Jafari et al. 2023). Authorities, private and public organizations, enterprises, and society have all emphasized the significance of creating a new concept of sustainable growth concept that includes both market prosperity and social development (Chauhan et al. 2022). The European Union (EU) passed the 2014/95/EU directive in this respect, which mandates businesses to report non-financial data (Ottenstein et al. 2021). This guideline aims to achieve comparable levels of openness across states by allowing for a wide range of options in the consideration of environmental, social, and governance aspects, as well as diversity efforts pursued in every enterprise (Arraiano and Hategan 2019). Recently, corporate governance has emerged as a key concern in developing countries (Suman and Singh 2020). The governance score, specifically, has been a significant matter of great concern (Abdelmoula et al. 2022).

Understanding the drivers of governance scores can therefore benefit both directors and scientific growth in the area. A significant concern in this respect is how H&T enterprises' financial variables affect their governance rankings. The question is important in several ways. While scientific studies on corporate governance are abundant in the finance and management fields (Jiang and Kim 2020), gaps in specific sectors and institutional settings persist. The industry context is crucial in calculating governance ratings since it is connected with distinct competitive dynamics, disruptive concerns, and profitability variances (Qureshi et al. 2020). For instance, the H&T industry is recently facing disturbance to its conventional business model as a result of e-travel agencies, home-sharing companies such as Airbnb providing alternatives to typical hotels, and centralization of major investors such as Marriott and Starwood modifying the nature of competition. Furthermore, whereas the H&T business was originally constituted primarily of small businesses, considerable concentration has resulted in a few giant corporations, such as Marriott following its acquisition of Starwood (Li and Singal 2022). As business size grows, management ownership reduces, and agency costs due to diverging interests between managers and shareholders rise (Garanina and Kaikova 2016), resulting in the establishment of corporate governance.

Despite its significance, no investigation has previously examined the determinants of governance scores in the H&T literature. Such a chasm impedes future studies and does not offer professionals clear directions. Furthermore, a double robust calculation of best predictors of governance ratings using machine learning methods is lacking. Although empirical studies have often been utilized by researchers to explore the repercussions of governance systems, to the best of our knowledge, no research in the H&T literature has employed the machine learning approach with applicable algorithms. Several research, on the other hand, has used panel data analysis or regression analysis to assess determinants or consequences of governance structures (Kılıç et al. 2021; Li and Singal 2022; Uyar et al. 2020b). Given the importance of governance scores in firm performance and sustainable development, and the fact that various funding metrics predict governance scores separately in various types of firms,

it is crucial to comprehend the financial determinants of governance scores in H&T enterprises.

Thus, our analysis addresses a vacuum in the H&T literature by rigorously evaluating the causal inference of financial drivers on governance ratings using 262 H&T corporations from Thomson Reuters Eikon with 452 cases from 2019 to 2021. The major goal of this study is to show a sliver of robust evidence for a probable association between financial drivers and governance scores of H&T enterprises by using machine learning algorithms.

This research paper contributes to the H&T literature by introducing new analytical techniques such as ensemble approaches using machine learning algorithms such as lasso regression, bagging, random forests, and boosted regression in R to investigate the best (financial) predictors of governance scores. As a result, we have focused on the causal links between financial indicators and governance ratings, as well as the aggregate influence of all financial indicators on the scores. Our study aimed to answer these issues about the causal influence of financial variables using a set of machine learning methods that had not been employed in earlier investigations. This article, on the other hand, is of interest to practitioners and other stockholders interested in the firm. Indeed, if greater corporate governance is associated with higher business performance, better-governed companies ought to outperform poorly-governed enterprises. The growth of financial transparency allows us to promote reporting practices that strengthen society's trust, which in turn has a beneficial impact on valuation. Improving the corporate governance index is crucial for investors and the government.

The H&T industry faces various risks, such as financial, operational, and reputational risks (González-Torres et al. 2021). Consequently, understanding corporate governance structure can help organizations identify, assess, and manage these risks effectively, which is vital in the H&T sector. This study also offers practical insights into the key financial indicators that correlate with governance scores. The findings of this research empower H&T businesses to make more informed and data-driven decisions regarding their corporate governance practices. Additionally, The H&T sector often grapples with crises (Dayour and Adam 2022), as seen with recent events like the COVID-19 pandemic (Karatepe et al. 2021; Saydam et al. 2022; Sulu et al. 2022). Understanding how governance scores relate to financial indicators can help companies strengthen their crisis management strategies, ensuring they are well-prepared and resilient in times of adversity.

Finally, Investors, lenders, and financial institutions play a significant role in the H&T industry. Understanding the link between financial metrics and governance scores which was highlighted in this study can provide investors with valuable insights when allocating capital. This can impact the availability of financing and investment opportunities for industry stakeholders.

2 Research questions

What are the key financial determinants that significantly influence corporate governance scores in the hospitality and tourism industry?

What is the impact of corporate governance scores on sustainable development in hospitality and tourism businesses, and how do higher governance scores relate to support for sustainability initiatives?

3 Literature review

3.1 Corporate governance and its practices

Corporate governance (CG) has arisen relatively recently as a unique and methodical academic subject of study (Pandey et al. 2023). Organizational economics, finance, sociology, information theory, management, microeconomics, psychology, and organizational theory all overlap in this discipline (Turnbull 2019). Aside from a widely discussed public discourse concerning the administration of corporations and the alteration of regulations it has prompted, various corporate scandals, starting with well-known incidents like “WorldCom” and “Enron, Tyco,” have heightened the attention of investors and sparked the curiosity of scholars in the area of corporate governance (Pandey et al. 2023). Research has shown through empirical evidence that there is a causal connection between shareholder wealth and corporate governance (CG) (Shank et al. 2013), leading researchers to explore various CG mechanisms and their effects on firm input decisions (such as research and development and investments) and organizational performance results (Pandey et al. 2023). The CG literature emphasizes the different methods available to shareholders to ensure that management acts in their best interests (Reddy et al. 2010). A complex interaction of external and internal factors drives a company’s corporate governance (CG) practices. Internal factors include the nature of the firm’s agency difficulties (Tuschke and Gerard Sanders 2003), the board of directors and corporate charters (Gillan et al. 2003), and the firm’s ownership (Borisova et al. 2012). Firms’ industry affiliation (Johnson et al. 2009) and the country where the firm operates (Sarhan et al. 2019) are the crux of external factors. These internal and external forces interact to impact CG practices in businesses. Other Internal mechanisms include the independence of the board, the size of the board, and the formation of board committees. At the same time, other external mechanisms include block ownership, the degree of debt financing, the market for corporate control, and product market competitiveness (Denis and McConnell 2003). Ownership is regarded as the most critical internal and external element impacting CG companies (Tuschke and Gerard Sanders 2003). Because ownership is inextricably linked to agency expenses, it is essential to comprehend CG (Shleifer and Vishny 1997).

The objective of CG is to facilitate the successful functioning of companies (Tian and Twite 2011) and to reduce agency problem-related costs (Chen et al. 2012). CG is the use of contracts that delineate management’s responsibilities and freedoms and profit distribution in great detail (Guillet and Mattila 2010). Management literature is replete with studies on CG and its link to business performance (Arora and Sharma 2016). However, this research uses an event study approach to evaluate the market’s response to introducing a new CG plan (Guillet and Mattila 2010). Coates (2000) calls attention to the fact that event research methodology cannot measure the impact of governance requirements.

3.2 Corporate Governance scores and financial performance

The idea that corporate governance (CG) is necessary to avoid conflicts of interest between management and shareholders, especially regarding the costs associated with these conflicts, is not recent. Berle and Means (1932) suggested that in order to minimize losses, managers must be managed. Corporate frauds, such as those at Parmalat in Europe and WorldCom, Nortel, and Enron in America, have supported this notion, as have the huge

expenses associated with them. Such controversies have led to the financial system crash, the loss of employment, and the fall in the value of pension schemes (Berthelot et al. 2010). Hence, the effective implementation and evaluation of corporate governance are essential for organizations. CG refers to the set of rules, practices, and procedures that guide and control the operation of a company (Pandey et al. 2023). CG scores are used to measure the effectiveness of a company's governance practices. Outside these definitions of CG, there is an agreement among practitioners or academics on the critical components of an effective governance structure (Jackling and Johl 2009). The majority of CG studies to date have examined individual aspects of CG separately using various approaches.

Governance Metrics International ranking considers the market for control, board responsibility, internal controls and financial disclosures, shareholder rights, pay, and company conduct (Ghabri 2022). Institutional Shareholder Services evaluate firms based on data generated concerning ownership, board of directors, audits, remuneration, anti-takeover sections, chief executive officer and director progressive practices, contract and regulation requirements, and director education (Berthelot et al. 2010).

Existing research has discovered a link between strong corporate governance policies and improved financial performance. The authors found that excellent governance standards may increase a company's accountability and transparency, leading to better decision-making and financial outcomes. Such studies are motivated by the fact that a practical CG framework enables enterprises to obtain various benefits, including a cheaper cost of capital, improved performance, and easier access to external finance (Claessens and Yurtoglu 2013; Denis and McConnell 2003; Klapper and Love 2004). According to Alqallaf and Alareeni (2018a, b), information technology and information systems, internal processes, policies and procedures, CG, and organizational structure are all highly beneficial in increasing market share. Appropriate CG guarantees that management can provide an investment return to investors by prohibiting management from acting opportunistically or fraudulently (Prasinta 2012). Firms can provide a return to investors if they achieve improved financial performance. Higher performance indicates that businesses' prospects are promising. Higher financial performance is favourable for investors and can raise the value of a company. Santoso (2019) states that excellent CG impacts business value via financial performance.

3.3 Corporate governance mechanisms in hospitality and tourism industry

A public company is epitomized by the distinction between control and ownership (Berle and Means 1932), which necessitates the implementation of governing structures that prevent the prevalence of management's self-interest and guarantee the owner's yield on investment (Shleifer and Vishny 1997). Even though scholastic endeavor on CG is abundant, especially in management and finance (Bebchuk and Weisbach 2010), there is still a lacuna in individual sectors and regulatory frameworks (Li and Singal 2022).

The industry specifics are significant in designing governance methods since it is connected with distinctive competitive characteristics, disruptive risks, and profitability variances (McGahan and Porter 1997). For instance, hospitality and tourism industry is currently disrupting its conventional way of doing business due to concepts such as home-sharing firms like Airbnb proposing an option to conventional hotels, internet-based travel agents, and consolidation of big companies like Starwood and Marriott modifying the market environment. Because of the business's changing external environment as well as its distinctive characteristics, research on CG in the hospitality and tourist industry is

critical. In contrast to other sectors, the hospitality and tourism industry is more competitive, has more leverage, and has higher capital intensity (Singal 2015) which can impact management decision-making and what and how CG structures are employed. Effective and efficient tourism corporate governance not only helps firms minimize risk, progress corporate value and financial performance, and improve the firm's competitiveness, but it also encourages the development of the tourism sector (Deng and Zhou 2022). Corporate governance has been regarded as vital and fundamental to all business activities and industries, including tourism and hospitality. CG mechanisms in the hospitality and tourism industry aim to ensure that a company is run transparently and responsibly while balancing the interests of various stakeholders, including owners, management, customers, suppliers, financiers, governments, and the community.

4 Methodology

4.1 Sampling and procedure

Our study is completely dependent on data from the Thomson Reuters Eikon database, which has already been used in other investigations (Nimer et al. 2023; Uyar et al. 2020a). Thomson Reuters monitors officially disclosed firms in over 100 countries worldwide and offers a way to the board of directors, governance procedures, and technical and market information. H&T is one of 54 sectors of the economy, which also includes hotels, resorts, travel companies, bars and restaurants gambling and casinos, and recreation and leisure industries (Kılıç et al. 2021). As a result, the analysis is based on Thomson Reuters data on all publicly listed H&T companies. This piece's key dataset comprises 672 firm-year data from the H&T industry for 2019, 2020 and 2021. The sample is subjected to missing data analysis as part of the filtration process. Data pre-processing is performed prior to machine learning analysis, which includes screening for missing data. As a consequence of our investigation, the final sample comprises 452 business data from 2019 to 2021.

4.2 Variables

The variables and their meanings are shown in Table 1. Financial determinants are predictor variables such as "gross margin (GM)," "EBITDA margin," "operating margin," "pretax margin (PM)," "net margin (NM)," "asset turnover (AT)," "pretax return on assets (ROA)," "pretax return on equity (ROE)," "reinvestment rate (RR)," "quick ratio (QR)," "current ratio (CR)," "assets/equity (AE)," "debt/equity (DE)," "LT debt to total capital (DT)," "fixed asset turnover," "WC/sales growth (WC)," as well as "return on invested capital (RC)." On the other hand, outcome factors include "governance pillar score," "management score," as well as "shareholder's score." We also investigated if business characteristics might influence data analysis. Therefore, the analytical approach includes "market capitalization (MC)," "CEO duality," "independent board members score (IM)," and "board size (BS)." We also investigate the role of year on the model (TI). Financial data represents financial ratios for defined variables. As predictor values, we looked at financial ratios. CEO duality is a dummy variable. We normalized the values for IM and BS data to ease future investigation. We divided our sample into three sub-categories based on market capitalization: big with a market capitalization of more than \$10 million US dollars, medium with a market capitalization of more than \$2 million, and small with a market

Table 1 List of variables

Variables	Definition
<i>Predictor variables</i>	
Gross margin	The ratio of the difference between revenue and cost of goods sold
Operating margin	The ratio measuring revenue after the deduction of operating expenses
EBITDA margin	The ratio of earnings before interest, taxes, depreciation, and amortization
Pretax margin	The ratio of profit a company generates before it pays its taxes
Net margin	The ratio of net income generated from a company's revenue
Asset turnover	The ratio of total sales or revenue to average assets
ROA	The ratio that indicates how profitable a company is in relation to its total assets
ROE	The ratio of net income attributable to common shareholders
Reinvestment rate	The ratio at which cash flows from an investment can be reinvested into another
Quick ratio	The ratio that measures a company's ability to meet its short-term obligations with its most liquid assets
Current ratio	The ratio that measures a company's ability to pay short-term obligations or those due within one year
Assets/Equity	The ratio that reveals the proportion of an entity's assets that have been funded by shareholders
Debt/Equity	The ratio that measures a company's financial leverage
LT debt to total capital	The ratio that measures how much financial leverage a company has and if its funded mainly through debt
Fixed asset turnover	The ratio that measures how efficiently a firm creates net sales from its fixed-asset investments
WC/sales growth	The ratio that measures the number of times working capital has been turned over
Return on invested capital	The ratio of return a company makes on the cash it invests in its business
<i>Outcome variables</i>	
Governance pillar score	It measures the company's governance performance based on verifiable reported data in the public domain
Management score	It measures a company's commitment and effectiveness towards following best practice corporate governance principles
Shareholder score	It measures a company's effectiveness towards equal treatment of shareholders and the use of anti-takeover devices
<i>Business characteristics</i>	
Market capitalization	The total value of all a company's shares of stock
CEO duality	1 if the same manager occupies the CEO and the board chair roles, 0 otherwise
IM	The percentage of independent board members (%)
Board size	The total number of executives on the board of each sample company

IM is independent board members score

capitalization of less than \$2 million. This is also employed to figure out the size of the businesses. Furthermore, governance scores vary from 0 to 100, with 100 representing the highest grade given to a corporation.

Control variables in strategic management research are often business size, leverage, and profitability (e.g., Lai et al. 2016). The selection of these three control factors is justified by the fact that larger, more leveraged, and more lucrative firms are more likely to engage in governance procedures due to the financial resources available and the need for

greater legitimacy concerns. Based on earlier research (e.g., Krause et al. 2014), we consider financial determinants as potential predictors that might significantly predict firms' governance scores.

4.3 Analytical procedure

Initially, we employed R programming alongside fundamental forward selection techniques to conduct multiple regression and best subset regression analysis for identifying pertinent variables. Subsequently, we integrated a regularized regression model, specifically employing lasso regression, as our second model to incorporate predictor variables. Lasso regression is a powerful tool for lowering the granularity of variables in a dataset and selecting relevant predicting components (Wang et al. 2007). The aforementioned model estimates by minimizing the ensuing function akin to the regression model β_j :

$$\sum_{i=1}^n \left(y_i - \sum_j x_{ij} \beta_j \right)^2 + \lambda \sum_{j=1}^p |\beta_j|$$

where n is the number of occurrences and i is the index of each observation in the regression. The regularization element is included in the minimization tool, as shown in the equation, to retain moderate regression coefficients β_j . The regularization phrase indicates the penalty level λ . Once λ equals zero in lasso regression, it essentially operates akin to an ordinary least squares (OLS) estimate. As a result of the penalty component, specific coefficients tend to approximate zero, impacting the "equation's" continual. Therefore, lasso regression stands as a widely favored method for parameter estimation. The value of λ holds significance in lasso regression, as emphasized by Tian et al. (2021). Subsequently, the model was further developed utilizing relaxed lasso regression.

Next, in the context of a set of attributes comprising $X_1, X_2, \dots, X_p$ from the estimator X , the standardized regression analysis endeavors to predict association among the target variable Y and a path of features represented by $\mathbf{X}$:

$$Y = f(X) + \epsilon$$

where ϵ is the error phrase.

Governance scores are the "target variable Y " equation, as well as the features " X " are "gross margin," "EBITDA margin," "operating margin," "pretax margin," "net margin," "asset turnover," "pretax ROA," "pretax ROE," "reinvestment rate," "quick ratio," "current ratio," "assets/equity," "debt/equity," "% LT debt to total capital," "fixed asset turnover," "WC/sales growth," and "RC."

We employ a machine learning approach to estimate function $f(\cdot)$ and discuss the applicability of individual techniques, and "ensemble methods" as an alternative to conventional statistical techniques such as linear modeling. Ensemble techniques strive to increase the generalization capability and robustness of a single estimate by combining the predictions of several estimators. They are often divided into two types: average approaches and boosting methods. The former (for example, random forest) creates various estimators independently and averages their estimates. Because it has a reduced variance, the ensemble estimator is frequently superior to any single estimator. The latter (for example, gradient boosting) builds basic estimators successively to reduce bias. The ensemble estimator is created by combining many weak estimators. We offer a brief summary of the models utilized below.

Bagging was created to increase the stability and accuracy of machine learning systems. This approach generates numerous bootstrap samples. Eventually, it accumulates the poor scores by taking the average of them. The way predictors are deemed in the random forest (RF) differs from bagging. The method chooses a “random subset of predictors” from the overall predictor set as candidates for subdivisions at each split, ensuring that dominant predictors do not overly influence every tree’s subdivisions. The primary objective of the random forest technique is to inject variability into the learning process, enabling differentiation among trees and facilitating the aggregation of their predictions using an ensemble approach (Breiman, 2001).

Furthermore, the approaches utilize Mean Decrease Accuracy (%IncMSE) and Mean Decrease Gini (IncNodePurity) to assess the significance of variables. %IncMSE is calculated by evaluating recorded prediction and contrasting it to the variable’s unallowed test set prediction (normalized by the standard error). IncNodePurity, on the other hand, uses the Gini Index to assess the quality of a split for each variable (node) in a tree. A greater %IncMSE and IncNodePurity number indicate that the variable is more important (Soner et al. 2018).

We utilize the Random Forest algorithm and the succeeding model to assess respectively antecedents’s inferential ability in clarifying the output variable Y .

$Y \sim$ Gross Margin + EBITDA Margin + Operating Margin + Pretax Margin + Net Margin + Asset Turnover + Pretax ROA + Pretax ROE + Reinvestment Rate + Quick Ratio + Current Ratio + Assets/Equity + Debt/Equity + % LT Debt to Total Capital + Fixed Asset Turnover + WC/Sales Growth + RC + TI + MC + CEO Duality + IM + BS.

We use first the single component of governance score, governance pillar score as target variable, Y_{GPS} , and then other two components management score and shareholder score. The random forest algorithm of the outcome variable is denoted by $\hat{Y}$. We engage in hyperparameter tuning to identify the optimal factor by initially bearing in mind the range of “random seeds” (100) for the “pseudo-random engine” and a specific number of trees ($n_{trees}=378$). The hyper-parameters to be streamlined are: $mtry$, which represents predictors chosen at each splitting node, and $nodesize$, which represents the minimum threshold of a single node. For instance, the value $mtry=7$ indicates that seven factors are randomly sampled as candidates at each split, and one of them is employed to shape the split. We select the seed/ $mtry$ / $nodesize$ mixture that results in the least mean squared residuals.

Using the 80–20% splitting principle, we divide the dataset into test and training sets. The succeeding settings are made after the criteria tuning: For the target variable, $Y_{Governance\ Pillar\ Score}$ $mtry=7$ and $nodesize=1$. As seen in Table 4, the estimated coefficients of each model are measured using R-squared values.

Boosted regression trees with *gbm* algorithm, sometimes referred to as stochastic gradient boosting, is a Friedman (2001) approach that employs “fixed-sized decision tree” by way of a weak estimating calculation (Leathwick et al. 2006). The prediction is produced via a linear program rather than parallelizing the tree-building process as in the random forest. To enhance the current fit, each tree is adjusted based on the findings of the preceding trees. A boosted regression trees algorithm has the capacity to handle both multiple kinds of regressors and missing data, it is immune to the consequences of severe outliers and the addition of extraneous determinants, and it can fit relationships between predictors (Friedman and Meulman 2003).

5 Findings

5.1 Subset regression

Initially, we employed the forward step variable selection process. To construct the optimal model, we evaluated two criteria for selecting “subset regression models” the “Bayesian Information Criterion (BIC)” as well as the “Adjusted R2 Criterion (ADJR2)” (refer to Table 2). The findings indicate that, according to the “Bayesian Information Criterion” (BIC), the best model is composed of four drivers from the governance pillar score (IM, BS, QR, and CR). In contrast, based on the Adjusted R2 Criterion (ADJR2), the best models include thirteen drivers from the governance pillar score (TI, MC, IM, BS, GM, PM, AT, QR, CR, AE, DE, DT, and RC). Regarding management score, according to BIC, IM, BS, AT, QR, and CR are the best predictors, while ADJR2 results show 12 predictors (i.e., TI, AM, BS, GM, NM, AT, ROA, QR, CR, AE, DE, and DT). For shareholder scores, BIC produced three best predictors (i.e., ROE, RR, and DT), while ADJR2 displayed nine best predictors (i.e., MC, IM, BS, NM, ROE, RR, QR, CR, and DT).

Table 2 Forward selection results

Predictors	BIC			ADJR2		
	Outcomes			Outcomes		
	GS	MS	SS	GS	MS	SS
Intercept	0.198	− 0.004	− 0.126	0.246	− 0.142	0.297
IM	0.476	0.467	−	0.444	0.454	0.065
BS	0.136	0.125	−	0.116	0.140	− 0.074
AT	−	0.283	−	0.226	0.313	
QR	0.935	0.659	−	0.768	0.573	0.915
CR	− 1.002	− 0.719	−	− 0.835	− 0.631	− 0.921
ROE			− 0.716			− 0.798
RR			0.969			1.152
DT			0.516	0.139	0.042	0.417
TI				− 0.075	− 0.070	− 0.109
MC				− 0.139		
GM				0.450	0.402	
PM				− 0.147		
AE				− 0.007	− 0.008	
DE				0.020	0.023	
RC				0.762		
NM					− 0.106	− 0.117
ROA					0.803	

IM=Independent board members score, BS=board size, AT=asset turnover, QR=quick ratio, CR=current ratio, ROE=pretax return on equity, RR=reinvestment rate, DT=debt to total capital, TI=year, MC=market capitalization, GM=gross margin, PM=pretax margin, AE=assets/equity, DE=debt/equity, RC=return on invested capital, NM=net margin, ROA=pretax return on assets

Table 3 Relaxed lasso optimal results

	Outcomes		
	Governance score	Management score	Shareholder score
Best predictors			
Intercept	0.132	0.562	0.174
IBMS	0.428	0.323	0.021
CR	− 0.093	− 0.036	− 0.805
MC			− 0.044
BS			− 0.026
NM			− 0.105
ROE			− 0.564
RR			0.892
QR			0.796
DE			0.001
DT			0.256

IM (IBMS)=independent board members score, BS=board size, QR=quick ratio, CR=current ratio, ROE=pretax return on equity, RR=reinvestment rate, DT=debt to total capital, MC=market capitalization, DE=debt/equity, NM=net margin

Table 4 R² values for test data

Model	BIC	ADJR2	Lasso-optimal	Relaxed lasso-optimal	Bagging	RF	BR
<i>Governance pillar score</i>							
R ²	0.14	0.21	0.20	0.20	0.26	0.26	0.22
<i>Management score</i>							
R ²	0.13	0.14	0.16	0.16	0.24	0.23	0.20
<i>Shareholder score</i>							
R ²	0.59	0.13	0.10	0.13	0.07	0.08	0.01

BIC is the Bayesian information criterion, ADJR2 is adjusted R², RF is the random forest, and BR is boosted regression trees

5.2 Lasso regression

Following the implementation of the forward selection methods, we proceeded with the application of relaxed lasso regression, optimized based on the outcomes of the initial lasso regression. The outcomes are detailed in Table 3. As per these results, the most influential predictors for the governance pillar score and management score are (identified as IM, demonstrating a positive effect, and CR, displaying a negative effect. Relaxed lasso optimal analysis shows that the best predictors of shareholder score are

MC, IM, BS, NM, ROE, RR, QR, CR, DE, and DT. MC, BS, NM, ROE, and CR have negative effects on shareholder score while others have positive impacts (Table 4).

5.3 Ensemble methods

First of all “tree-based algorithms” were applied to the governance scores data to assess the impact of financial determinants. Apart from achieving high predictive accuracy, these algorithms reveal the most significant aspects of predictor effectiveness. The results of these algorithms were compared to highlight the performance of “bagging,” “random forest,” and “boosted regression” governance scores (Olorunsola et al. 2023). Consequently, Figs. 1, 2 and 3 represent the variable’s significance of “bagging,” “random forest,” and “boosted regression” respectively, in determining hotels’ governance scores and their components.

In accordance with the bagging algorithm; with respect to the %IncMSE, IM, CR, and BS are the most critical variables for governance scores (Fig. 1a), while IM, CR and AT are most important variables for management score (Fig. 1b). For shareholders

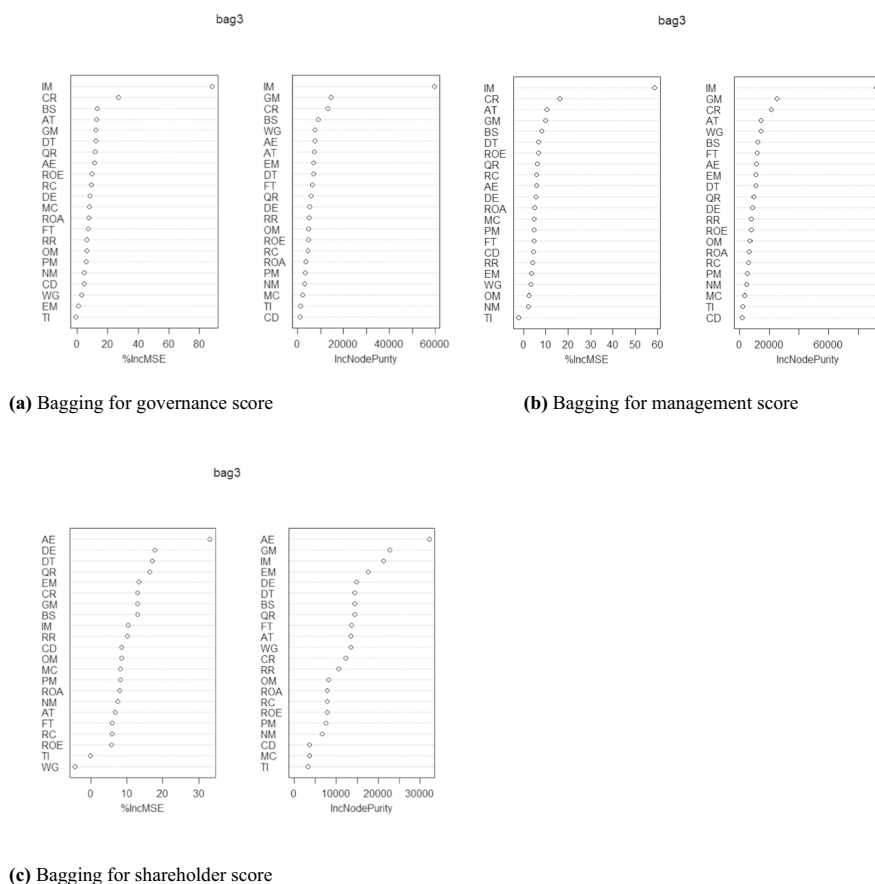


Fig. 1 Bagging algorithm results

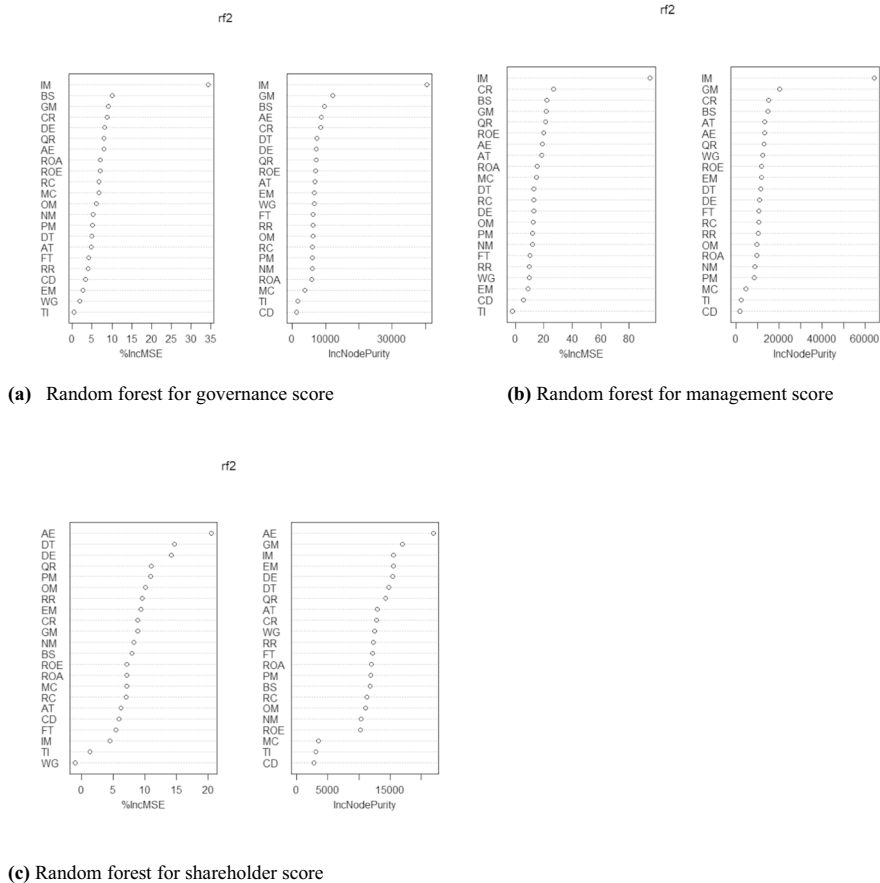
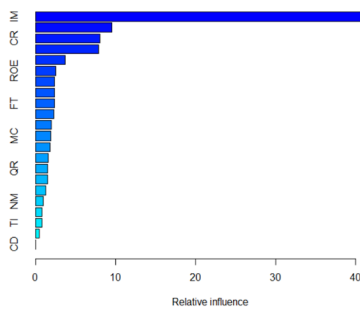


Fig. 2 Random forest algorithm results

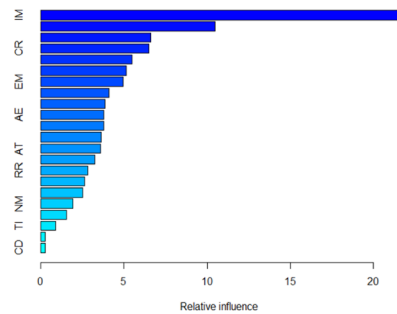
score, AE, DE, and DT are most crucial variables according to %IncMSE (Fig. 1c). In Fig. 2a and 2b, according to IncNodePurity, IM, GM, and BS are the most important variables for governance score, but IM, GM, and CR are the most important predictors for management score, respectively. Figure 2c shows that AE, GM, and IM are the most important predictors of shareholders score in accordance with IncNodePurity. According to Fig. 2, IM is of paramount.

Additionally, our study illustrated the significance of variables, particularly in the top-performing algorithm, boosted regression. The analysis indicates that within the RF algorithm's selection for explaining the governance pillar score IM (independent board members score), emerges as the most influential variable, succeeded by CR, and subsequently by ROE (Fig. 3a). For estimating management score, the most important variable is IM, followed by CR, and EM (Fig. 3b). For shareholder score, AE, IM, and AT are the most important variables, respectively (Fig. 3c). We aim to discover how financial factors affect the company's governance rankings. That is, though greater financial performance methods may favorably influence a business's governance mechanisms,

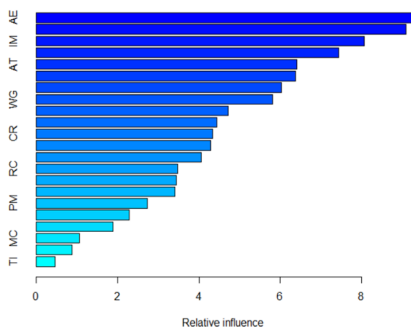
management, and shareholder strategies, lesser financial metrics could not be inherently valuation, but instead constrain the company with restricted governance procedures. Interestingly, while the most important predictor of governance pillar score and management score are related to business characteristics (i.e., IM), shareholder score is predicted by completely different financial determinants which requires a unique approach to estimate shareholder score in H&T organizations compared to its counterparts.



(a) Variable importance for governance score



(b) Variable importance for management score



(c) Variable importance for shareholder score

Fig. 3 Variable importance for governance scores in boosted regression

6 Discussion and conclusion

6.1 Discussion

The existing body of literature on corporate governance has underscored the intricate associations between governance mechanisms and firm performance. For example, initial investigations have lent support to the agency-theoretic viewpoint, revealing that institutional ownership exerts a positive influence on stock price movements and overall firm performance within the H&T sector (Chen et al. 2009; Leung and Lee 2006). Nevertheless, it is important to note that the impact of institutional ownership is subject to variations contingent on the specific national and industry contexts. Notably, when considered in emerging markets, the effects of institutional ownership exhibit a mix of outcomes (Al-Najjar 2015), and sectors characterized by government intervention witness disparate effects (Wang et al. 2014).

Moreover, studies have uncovered the divergent consequences of large shareholders and state ownership on firm performance and financing, contingent upon the unique context within which they are examined (Chen et al. 2017; Yeh and Trejos 2015). Family ownership, another facet explored in the literature, has been associated with financial robustness; however, it is imperative to recognize that this association is nuanced and differs between lodging and restaurant firms (Singal 2015; Masset et al. 2019).

The relationship between corporate governance provisions and firm performance, as well as the role of debt in mitigating agency-related issues, has also been an area of investigation. Governance provisions, often represented by indices such as the GIM-index and E-index, have demonstrated varying effects on firm performance. Their adoption has been observed to exert diverse influences on a firm's overall performance (Altin et al. 2016; Guillet and Mattila 2010). Of particular note, the E-index has been linked to suboptimal firm performance, emphasizing the critical role of these provisions in governance. In addition, research efforts have examined the influence of debt in ameliorating the agency problems associated with free cash flow (Park and Jang 2013). Despite the extensive depth in the literature on corporate governance, this study explores financial determinants of governance scores which have eluded the literature, especially in the context of the H&T sector.

Formal organizational governance rankings lacked convergent validity since they are created using temporary arithmetic means of metrics (Christensen et al. 2021; Svanberg et al. 2022). Notwithstanding this alarming data, there is a scant debate about what rankings actually assess or ought to assess in the field. Environmental, social, and governance scores are determined by gauging businesses' assessment methods of the comparative malfeasance of the numerous features utilized in the ranking. As a result, environmental, social, and governance responsibilities are typically described in evidence-based quantification as performing excellently. The quantitative depiction of the notion is undermined or spread by this subjective and quirky component of rankings, which also constantly supports the conflicting evidence of the financial predictors of governance scores. Consequently, it is necessary to develop a governance rating system that offers a greater guarantee of legitimacy and relies less on the appraiser (Fluharty-Jaidee and Neidermeyer 2023; Svanberg et al. 2022).

There are several variations of the investment plan, but current studies indicate that big investors favour making investments in businesses that uphold their governance obligations since doing so safeguards their image (Suman and Singh 2020; Wu et al.

2017). Ignoring contentious issues helps big investors uphold their legal obligation to capital owners and to the community, and is eventually guided by anticipated financial indicators.

Recent research suggests that corporate governance scholars can adopt a more rigorous study design when establishing causal relations in H&T research (Li and Singal 2022). Considering this invitation, we first adopt various algorithms (e.g., forward selection, lasso regression, bagging, and random forest) with a machine learning approach to explore the best predictors of governance scores in the H&T industry. Contrarily, the H&T literature offers very little to provide in terms of financial factors that may be used to estimate a corporate governance score with allusions to financially significant governance concerns (Svanberg et al. 2022), which lack intellectual justification and accurate calculations.

We explore the potential of employing machine learning to create a model that identifies the best financial predictors affecting governance scores in hospitality and tourism (H&T) enterprises. This involves defining corporate governance scores as adhering strictly to governance responsibilities. Such a model aims to determine whether a financial indicator independently contributes as a predictor of governance scores alone. Our machine learning tests reveal that financial variables have a substantial prediction performance on governance ratings. When contrasted with the standard regression technique, the random forest algorithm gets the greatest predictive accuracy, indicating the capacity to incorporate the predictors' non-linear structure. In terms of the variable importance, the algorithm identifies IM, CR, and ROE as the best predictive variables for the governance score, and IM, CR, and EM for the management score. However, AE, IM, and AT are the best predictors of shareholder score.

6.2 Implications

This research contributes to the development of corporate governance theories, particularly in the context of the hospitality and tourism industry. Identifying the financial indicators that predict governance scores, enriches our understanding of how governance mechanisms work in practice and provides a basis for refining theoretical frameworks. Furthermore, the study bridges the gap between financial metrics and corporate governance, which is an area where prior research has not delved deeply into the context of the H&T industry. Additionally, the integration of financial indicators into corporate governance theories provides a more comprehensive perspective on governance practices. The research findings offer insights into how specific financial metrics can impact governance scores, shedding light on the mechanisms that drive accountability in organizations. This can contribute to the development of accountability theories that incorporate financial determinants. Also, the use of machine learning algorithms, such as bagging, random forest, and boosted regression, for predicting governance scores presents theoretical advancements. This methodological approach offers a new way of analyzing and understanding governance mechanisms, which can be applied to other sectors as well.

The study spans various domains, including corporate governance, finance, and the H&T industry. Theoretical implications extend beyond individual disciplines, facilitating cross-disciplinary discussions and fostering a more holistic understanding of governance practices. Finally, the study aligns with stakeholder theory, which emphasizes the importance of considering various stakeholders' interests in governance. The findings contribute to stakeholder theory by revealing how governance practices impact different stakeholders, including shareholders, managers, and the broader community.

The present investigation also offers valuable information to H&T business executive directors and company owners. First and foremost, owners should take the results into account when determining corporate governance mechanisms. In accordance with the findings, owners may consider transparency in their financial metrics so that they can better ensure higher scores in their corporate governance. Second, managers, particularly CEOs, may take these findings into account when deciding whether to consider or ignore the financial indicators to rate environmental, social, and governance scores. Third, hotel owners may undoubtedly utilize the data to back up and strengthen governance systems. Researchers and investors in the H&T business can utilize the findings to analyze financial assets by considering environmental, social, and governance performance. Given that our findings highlight IM and CR as the greatest predictors of governance score and management score, investors and analysts may use these findings to assess a company's capacity to satisfy its short-term responsibilities as well as the objectivity and effectiveness of a corporate board. Board committees could decide to review their governance practices so as to more effectively match financial metrics and governance scores to optimize value creation.

7 Limitations and future research directions

This study's applicability beyond the included Hospitality and Tourism (H&T) enterprises and its relevance to other industries is limited. Further research could investigate governance scores in smaller H&T enterprises, potentially yielding differing outcomes due to their limited financial and human resources compared to larger firms. The report recommends various avenues for further research. For instance, exploring how governance scores impact the potential for sustainable development could yield insights, such as whether enterprises with higher governance scores actively support or oppose to such development initiatives. Another potential research direction might be to investigate the significance of creating governance practices, such as determining if it is enough to boost company value or if its connection with other procedures generates more additional shareholder performance. In contrast to our research, research studies can delve more extensively into the factors that influence environmental, social, and governance activities. Are there discrepancies in the drivers of these efforts, either due to the absence of expertise regarding economic metrics, inadequate backing for sustainability activities in enterprises, or a poor grasp of how to effectively combine all three of these processes in H&T companies? In addition, our analysis only considers governance score, management score, and shareholder score as governance scores; due to data accessibility. Additional studies might investigate other procedures, like CSR scores. Finally, we suggest a detailed investigation of the underlying causes that influence environmental, social, and governance ratings on financial success. Let's examine how actions regarding greenhouse gases, creativity, resource utilization rights, for humanity, labor, product accountability, community, ownership, leadership, and CSR strategy affect financial success.

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Declarations

Conflict of interest The authors declare no conflict of interest.

Ethical approved All authors have made substantial contributions to the research and preparation of the paper. All listed authors have reviewed and approved the final version of the manuscript.

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