



The role of institutional quality in advancing sustainable development goals: A mixed-methods panel data analysis of ASEAN member states (2016–2023)

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ABSTRACT

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Sustainable development goals.

This study explores the causal relationship between institutional quality and achieving Sustainable Development Goals (SDGs) among the ten ASEAN member states for the years 2016–2023. With the presence of severe multicollinearity among all individual institutional quality indices, with Variance Inflation Factor values lying between 18.041 to 56.021, the study applies the Principal Component Analysis method to reduce the number of predictors and group them into two functional categories—Administrative Quality and Voice and Accountability. By using a balanced panel data set along with the application of Pooled Ordinary Least Squares estimation technique with a one-year lag in independent variables to tackle the endogeneity issue, the findings show that Administrative Quality has an overwhelming impact on sustainability, especially about lower-middle-income countries, having an important positive impact ($B = 10.928$). On the contrary, the upper-income economies face institutional saturation where the effect of standard administrative variables diminishes considerably. One of the interesting findings from the current research is the positive coefficient on strategic public borrowing ($B = 0.066$, $p < 0.01$). This finding should be understood in terms of a conservative approach to economic growth rather than an expansionary approach aimed at stimulating growth. Moreover, qualitative cross-case analysis of Singapore, Thailand, Vietnam and Cambodia shows that the paradox in this region is mainly driven by command stability and performance legitimacy.

Contribution/Originality: This study contributes to the literature by quantifying the non-linear impact of institutional quality on SDGs in ASEAN through PCA to resolve multicollinearity. It identifies the "Institutional Saturation" effect and demonstrates how strategic public debt and administrative capacity—rather than participatory models—drive sustainable outcomes in upper-income economies.

1. INTRODUCTION

1.1. Background of the Study

The introduction of the 2030 Agenda for Sustainable Development by the United Nations (UN) in 2015 signified a worldwide paradigm shift in evaluating development efforts through expanding the scope of analysis beyond Gross Domestic Product (GDP) and into assessing social, environmental, and economic development indicators (United Nations, 2015). However, despite the unifying effort towards achieving all 17 SDGs set forth, the execution of the plan within the framework of the Association of Southeast Asian Nations (ASEAN) has been significantly varied. While experiencing remarkable economic growth, the ability to turn financial means into sustainable results differs

across nations in the ASEAN region. Consequently, an emerging public policy inquiry arises from such trends: why do countries within the same regional group have varying levels of sustainability despite the common economic agenda?

Based on the premises of New Institutional Economics (NIE), divergent levels of development in terms of institutions can be explained (Acemoglu & Robinson, 2012; North, 1990). Institutions act as main conduits for the allocation of resources and development. High-level institutions with effective government performance, quality regulations, and strong anti-corruption mechanisms minimize transaction costs and reduce the amount of waste. On the contrary, poor institutional infrastructure, characterized by corruption and inefficient bureaucracy, hampers the process of implementing sustainable development initiatives.

This phenomenon provides room for empirical exploration within the framework of ASEAN. Based on "Performance Legitimacy," some ASEAN member countries derive their legitimacy not through democratic processes but rather from efficient administrative capabilities, allowing stability and delivery of public goods in their territory. Such an institutional structure leads to the emergence of a distinct "Sustainability over Income Paradox" when middle-income nations tend to obtain better SDG Index Net Scores than higher-income nations within ASEAN.

However, previous academic studies either assume ASEAN as a homogeneous block of countries or make use of outdated data from before 2015. Hence, there is a lack of evidence of modern institutional factors in the years ranging from 2016 to 2023. Moreover, prior literature is faced with a problem of multicollinearity between variables of the Worldwide Governance Indicators (WGI) (Kaufmann, Kraay, & Mastruzzi, 2010). This study aims to fill the research gaps mentioned above and analyze ASEAN institutions using a balanced panel dataset of all 10 ASEAN members over eight years (2016-2023). Applying the concept of PCA to condense several WGI dimensions into two predictors (Administrative Quality and Voice and Accountability) and performs a one-year lagged pooled OLS regression with a stratified income sub-panel.

1.2. Research Questions (RQs)

RQ1: Is there any significant statistical causal influence of the national institutional quality on net SDGs achievement within the regional aggregate?

RQ2: How do the functional dimensions of institutional quality, Administrative Quality and Voice and Accountability significantly affect SDGs achievement within the regional aggregate?

RQ3: Does the causation relationship between institutional quality and SDGs have structural nonlinearity, depending on national income levels, and what can explain such nonlinearity in the context of the regional "Sustainability over Income Paradox"?

1.3. Hypotheses (H)

Hypothesis 1 (H₁): Administrative Quality is a key factor in SDGs achievement within the regional aggregate.

Hypothesis 2 (H₂): There is no statistically significant causal influence of Voice and Accountability on SDGs achievement within ASEAN states, which indicates that the region is dependent on the ability of states to execute policy rather than on the participative system.

Hypothesis 3 (H₃): The return from the institutional reforms is non-linear and income-dependent; the administrative institutions have high returns for low-middle-income states, but they are saturated in high-income and upper-middle-income countries.

2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1. Theoretical Background

The theoretical background of the study lies in New Institutional Economics (NIE) as an analytical model to evaluate how institutional constraints affect macro-developmental trajectories. According to North (1990),

institutions are human-created rules of socioeconomic exchange. Under the Sustainable Development Goals, institutional quality represents the main channel through which political and financial power of a state is transmitted into actual developmental outcomes. High institutional strength reduces transaction costs and prevents risks associated with institutional leakage and, consequently, ensures that public welfare expenditures are not diverted due to inefficiency and rent-seeking (Acemoglu & Robinson, 2012; Williamson, 1985; World Commission on Environment and Development, 1987).

The link between institutional strength and sustainability in Southeast Asia is defined by the Performance Legitimacy paradigm, as it differs from Western developmental models in prioritizing procedural democracy and civil freedoms, as captured by the Voice and Accountability indicator (Sen, 1999). A considerable number of ASEAN countries have state legitimacy based on administrative efficiency, namely macroeconomic stability, provision of essential infrastructure, and public services (Alagappa, 1995; Quah, 2010). Hence, the studied region is characterized by a special kind of governance model wherein Administrative State Capacity, the combination of government effectiveness, regulatory quality, and rule of law, is a key determinant of long-term strategic decisions, including sustainability goals.

In addition, the present study utilizes Endogenous Growth Theory (Romer, 1990) where technological and institutional innovations are considered intrinsic and endogenous sources of sustained economic performance. If applied to sustainability frameworks, this theory implies that governance systems not only facilitate development but also serve as a self-reproducing engine that ensures growth amid global economic crises. Finally, Public Choice Theory is used to assess Institutional Saturation, as continuous growth of bureaucracy without innovations in fiscal policy could be associated with diminishing returns on institutional investments. As observed within developed ASEAN states, institutional saturation tends to become more pronounced with increasing GDP per capita.

2.2. Literature Review

The academic literature examining the link between institutional quality and sustainability outcomes has significantly evolved in recent decades. While earlier studies were mainly focused on evaluating individual dimensions of governance as determinants of economic growth, modern literature emphasizes the multidimensional nature of the UN Sustainable Development Goals.

2.2.1. Institutional Strength and Sustainability Returns

Public institutional capacity is considered the key mechanism of resource allocation. Within the Asian region, Sagarik (2019) has shown that primary governance indicators, government effectiveness, regulatory quality, control of corruption, and rule of law- are key to development outcomes. Public management contributes to effective spending of the public budget on development, thus setting up a basic criterion for sustainability.

On the global level, Barbier and Burgess (2021) estimated the effect of WGI on net welfare changes related to each of the 17 SDGs. They found that sustainable development success depends upon strong institutions and low country risks, while poorer countries face serious institutional problems leading to the erosion of welfare returns (Barbier & Burgess, 2021; Musah, 2024). Similarly, in a recent study, Barbier and Burgess (2023) stressed that developing economies face severe trade-offs: while achieving nominal development, their institutional issues prevent the creation of sustainability due to rapid loss of natural capital, thus requiring strong environmental governance.

Regionally, the relationship between institutional robustness and regional sustainability progress has been assessed by Sadiq et al. (2023), focusing on environmental, social, and corporate governance. It was found that institutions exert a powerful impact on the progress in achieving SDGs, with advanced economies benefiting from strong institutional capacity, while nations with fragile administrations lag in development outcomes.

2.2.2. Macroeconomic Anomalies and Statistical Redundancies

The work of Mun, Hook, Kun, Mazlan, and Ahmad (2023) introduces a valuable model explaining the behavior of institutions under various income levels. By applying the SDGI framework, they found major inconsistencies and statistical anomalies among different dimensions of WGI. Middle-income economies reveal no significant relationship between traditional economic fundamentals and sustainability progress. Instead, they operate within the scope of what is called a pseudo-economy, where institutional factors have not yet been recognized. Within high-income economies, the relationship between specific WGI components (e.g., government effectiveness or control of corruption) may reveal diminishing returns in the case of high levels of development, meaning that too many regulations could foster inefficiency (Fukuyama, 2013).

To avoid data redundancy and multicollinearity in estimating regression models, Mun et al. (2023) suggest a model that includes disaggregation and recombination of individual governance indicators based on their impact on specific sustainability targets. Hence, it is possible to identify development-enabling dimensions and those that bias estimations.

Moreover, Sadiq et al. (2023) prove that macroeconomic variables, including economic growth and capital investments, tend to display very irregular behavior in relation to WGI components. Thus, rapid economic growth is likely to generate revenues for social projects while worsening environmental outcomes due to poor regulation. Therefore, fiscal control mechanisms (gross fixed capital formation, expenditures, and public debts) are to be included in the assessment.

2.2.3. Limitations of Existing Studies and Research Gaps

A thorough review of cross-country literature identified three important limitations that this study intends to address.

First, geographic exclusivity. Most of the available literature relies on global databases (Barbier & Burgess, 2023; Mun et al., 2023), treating all countries as one monolithic entity without accounting for local features of governance in different regions (e.g., Performance Legitimacy paradigm within ASEAN, where the legitimacy of authorities is determined by their ability to deliver public services rather than democratic procedures).

Second, methodological monoculture and econometric misfit. Most models include all six WGI indicators within one equation. As WGI components have structural similarities and interrelatedness, this practice could induce multicollinearity and lead to biased estimations. In addition, conventional temporal frameworks rarely span before 2019, missing fiscal adjustments in response to the COVID-19 pandemic (from 2020 to 2023).

Third, the lack of fiscal frameworks in modern studies of governance. To overcome these limitations, the current study uses a balanced panel dataset of ten ASEAN countries over eight consecutive years (2016–2023). Through PCA, the six governance dimensions are reassigned into two groups, Administrative Quality and Voice and Accountability, and then used in pooled OLS regressions with a one-year lag and qualitative causal analysis.

3. RESEARCH METHODOLOGY

3.1. Methodological Design and Operational Framework

A combined mixed-methods approach is applied, where quantitative econometrics is followed by qualitative causal synthesis in the evaluation of the proposed hypotheses. Specifically, the process starts with quantitative estimation, where statistical benchmarks and relationships are identified, and then proceeds with a qualitative validation phase in which country-level macro-legal evidence is synthesized to confirm or contextualize empirical results. Such a combination allows analysis of economic outputs in the political-economic reality of the countries involved.

3.2. Population and Sample Design

The target population consists of ten ASEAN member countries (Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam). The data matrix assumes the use of a balanced panel data structure with an original time span of eight years (2016–2023). A one-year lag ($t-1$) is used in order to avoid reverse causality and thus reduce the cross-section, arriving at an effective sample size of $N = 70$.

3.3. Data Collection and Operational Parameters

The empirical framework uses macro-level variables based on data from reputable international databases and official regulations of countries.

3.3.1. Quantitative Data

Dependent variable: Net sustainable development trajectories are measured by the Sustainable Development Goal Index (SDGI), using continuously updated values available from the Sustainable Development Report archive (Sachs, Lafortune, Fuller, & Drumm, 2023).

Independent variables: The measures of institutional performance are represented by six dimensions of the Worldwide Governance Indicators (WGI) (Kaufmann et al., 2010). In order to minimize high multicollinearity, the six WGI variables undergo Principal Component Analysis, which provides two distinct functional indicators of institutional performance, namely, Administrative Quality and Voice & Accountability.

Control variables: The omitted-variable bias is addressed by adding four fiscal/market variables with a one-year lag ($t-1$) to account for the potential explanatory power of the country's financial condition, namely: Lag GDP Growth (GDP growth, annual %), Lag GFCF (gross fixed capital formation, % of GDP), Lag Public Debt (public debt, % of GDP), and Lag Government Expenditure (government expenditure share, % of GDP).

Statement on Data Availability: All cross-country time-series needed to estimate the regression matrix can be found at open public access. The indicators of governance are based on the World Bank Worldwide Governance Indicators repository (<https://info.worldbank.org/governance/wgi/>). Values for sustainable development goals are retrieved from the SDSN official archive (<https://dashboards.sdgindex.org>). Macroeconomic indicators were obtained from the World Development Indicators of the World Bank and the IMF World Economic Outlook.

Handling of Missing Data: According to the research design, the balanced panel dataset should include ten countries for eight years of observations, which means a total of 80 observations. Core independent and dependent variables have no gaps, meaning full coverage. A correction was applied to the control fiscal variables since, in their original form, the indicators of public debt used in the model assumed the variable "Central government debt (% of GDP)." A preliminary audit indicated that, in many cases, data gaps exist for some countries in the transition ASEAN economies category (Cambodia, Lao PDR, Myanmar, Vietnam, collectively called the CLMV states). The reliance on the Central government debt variable in the presence of many missing entries would require removal of all observations for these countries (listwise deletion), leaving the pooled OLS specification with insufficient degrees of freedom (World Bank, 2024).

To prevent deletion of these data, another measure of the government budget deficit was found, which proved to be available for all countries during the entire observation period (2016–2023). This variable, "Public debt, general government gross, % of GDP," is retrieved from the International Monetary Fund Global Debt Database. After applying a lag of one year ($t-1$), this variable eliminates the need for listwise deletion of CLMV countries. The result is a dataset with only 10 observations reduced to the final sample size of $N = 70$.

3.3.2. Qualitative Empirical Evidence

Empirical data from the following sources are collected to validate econometric results by examining the causes of institutional returns.

Singapore: Significant Infrastructure Government Participation Act 2021 (SINGA), The Singapore Green Plan 2030, the Carbon Tax Legislation for 2022, official policy reports, and peer-reviewed academic literature.

Thailand: 20-Year National Strategy 2018–2037, progress reports of the Eastern Economic Corridor Office, 2018 onwards, official policy reports, and peer-reviewed academic literature.

Vietnam: Power Development Plan 7 Revision (PDP7 Revised), Anti-corruption campaign (Dot Lo), official policy reports, and peer-reviewed academic literature.

Cambodia: Rectangular Strategy IV 2018, Public Financial Management Reform Program, UN Development Briefs for Cambodia, economic land concessions (ELCs) according to the Land Law 2001, official policy reports, and peer-reviewed academic literature.

3.4. Econometric Specification and Estimation Strategy

3.4.1. Econometric Equation

A multistage statistical model is created to test the parameters and detect the direction of institutional return. Since it is required to establish temporal precedence between institutional quality and sustainable development, a one-year lag is used. The baseline econometric specification has the following structure:

$$SDGI_{i,t} = \alpha + B_1 WGIGroupA_{i,t-1} + B_2 WGIGroupB_{i,t-1} + \Gamma X_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

Where $SDGI_{i,t}$ is the Sustainable Development Goals Index of country i for year t ; α is the intercept; B is a set of parameters; $WGIGroupA$ and $WGIGroupB$ refer to principal component grouping of independent variables; $X_{i,t-1}$ are control variables, consisting of GDP growth, GFCF, government expenditure, and public debt.

3.4.2. Estimation Protocol

In the estimation of the key parameters in the proposed model, the robust specification of pooled OLS is employed. In the current setting, institutional variables display considerable variability cross-sectionally, while being relatively static along the time axis. In other words, the use of the fixed-effects regression will lead to an important reduction in the cross-country variance and an increase in the standard errors, owing to degrees-of-freedom restrictions on subpanels created for each level of income. Hence, the appropriate methodology would be to use one-year-lagged pooled OLS regression with stratification according to income levels.

Regarding the empirical support for the econometric model of choice, the following post-estimation step will involve applying the Hausman specification test in order to examine the null hypothesis about the independence of the country-specific effect and the regressor set. Essentially, the results obtained from the tests are used as a basis for choosing between the two estimators, namely Random Effects (RE) and Fixed Effects (FE). Nonetheless, even though the null hypothesis ($\text{chisq} = 0.369$, $\text{df} = 6$, $\text{p-value} = 0.999$) cannot be rejected in favor of the RE estimator, the specified model specification employs a one-year lagged Pooled Ordinary Least Squares (Pooled OLS) estimation method. Specifically, from an econometric point of view, in case the null cannot be rejected, both estimators become asymptotically consistent, but it is specifically the Pooled OLS method, which allows obtaining robust estimates due to sample size restrictions and high degrees-of-freedom limitations within the income-based sub-panels (Wooldridge, 2010).

3.5. Qualitative Methodology and Causal Synthesis Framework

The study applies the rigorous process of Causal Synthesis in order to link the statistical results to observable policy phenomena during the time period 2016–2023.

Step 1: Select Representative Case Studies. The selected countries include Singapore and Thailand as high-income and upper-middle-income, and Vietnam and Cambodia, which belong to the lower-middle-income group. These nations will help to explain how institutional variables affect the regression coefficients.

Step 2: Empirical Data and Analysis. The synthesis is based on the following data resources: data from the Sustainable Development Report 2023, information from the World Bank (WGI), and the IMF (WEO/WDI). In addition, national strategies and legislative acts are analyzed, such as Thailand's 20-Year National Strategy (2018–2037), Singapore's (Significant Infrastructure Government Loan Act 2021, 2021), Vietnam's Dot Lo anti-corruption campaign, and Cambodia's Rectangular Strategy Phase IV.

Step 3: Validation and Refutation. Empirical evidence is used in the process to support, explain, or refute regression outcomes. For example, a significant negative relationship for certain independent variables can be explained with the help of underlying mechanisms such as Institutional Saturation and Performance Legitimacy in ASEAN countries.

Step 4: Causal Synthesis Framework. Empirical evidence is linked to statistical results using the Three Lenses Framework (Ancona, Kochan, Scully, Van Maanen, & Westney, 2009): (1) Strategic Lens - analysis of alignment with SDG targets. (2) Political Lens - assessment of power relations and Performance Legitimacy affecting the execution of policies. (3) Cultural Lens - identification of normative factors (patron-client networks vs. meritocracy).

3.6. Ethical Considerations

Ethical standards for conducting secondary research are strictly followed. All data used for statistical analysis and interpretation were gathered from publicly available sources. Interpretation of statistical results in the qualitative phase is objective and not biased.

4. RESEARCH RESULTS

4.1. Descriptive Statistics and Institutional Landscape

Descriptive statistics reflect the developmental trajectory and institutional changes of the ten ASEAN member states from 2016 to 2023 as described in the methodology section. Following North (1990), a one-year lag was used for the independent and control variables, accounting for the delay between changes in institutional variability and SDGs outcomes. Table 1 presents a comprehensive summary of the descriptive statistics for the dependent, independent, and control variables across the ten ASEAN member states from 2016 to 2023, establishing the baseline institutional and macroeconomic landscape before model estimation.

Table 1. Summary of Descriptive Statistics (N = 70 after 1-year lag).

Variables	Mean	Std. Dev.	Minimum	Maximum
SDG Index (SDGI)	66.806	4.143	58.03	75
Lag Control of Corruption (CC)	-0.1756	0.972	-1.36	2.14
Lag Government Effectiveness (GE)	0.256	0.967	-1.69	2.28
Lag Rule of Law (RL)	-0.087	0.876	-1.53	1.84
Lag Regulatory Quality (RQ)	0.112	0.887	-1.24	2.23
Lag Political Stability (PS)	-0.022	0.908	-2.2	1.6
Lag Voice and Accountability (VA)	-0.747	0.643	-1.82	0.17
Lag GDP Growth (%)	3.407	4.495	-12.02	9.76
Lag GFCF (% GDP)	3.51	8.926	-27.32	28.31
Lag Public Debt (% GDP)	50.698	34.242	2.06	154.3
Lag Government Expenditure (%)	21.286	5.189	13.61	39.35

With respect to the descriptive summary statistics above, it is notable that despite having a regional SDGI average of 66.806 and thus demonstrating continuous development in the region, there is still a large standard deviation (4.143) in SDGI, along with a disparity between the best performer with SDGI of 75.00 (Thailand) and the worst performer with SDGI of 58.03 (Cambodia) of 16.97 points. From within the Worldwide Governance Indicators, government effectiveness exhibits the highest positive institutional variable (0.256), while Voice and Accountability scores the lowest average (-0.747).

4.2. Quantitative Econometric Analysis

4.2.1. Multicollinearity Diagnostics and PCA Refinement

Initially, it was found that among WGI institutional factors there was pronounced multicollinearity (VIF ranging from 18.127 to 56.021). Hence, PCA with Varimax rotation was carried out ($KMO = .782$, $p < .000$) in order to reduce multicollinearity without loss of theoretical importance of the variables. Two stable factors were formed, accounting for 94.96% of the total variance.

1. Administrative Quality (WGIGroupA): Combination of PS, RL, GE, CC, and RQ.
2. Voice and Accountability (WGIGroupB): Combination of VA.

This modification ensured reduction of all VIF values to below 2.0 in the baseline aggregate model, rendering the model stable. Nevertheless, upon stratification of income sub-panels, multicollinearity distortions have been found. For example, in the upper-middle-income subgroup, there was a sign reversal of the Administrative Quality factor due to extreme multicollinearity (VIF for macroeconomic controls reaching 20.765) coupled with an overfitting problem in the small sample model ($N = 3$).

To avoid biased results and maximize variance preservation, the following method of unification of upper-echelon institutions was introduced. Namely, the upper-middle-income group was merged with the high-income one to create a single "upper-income" sub-panel (including Thailand, Singapore, Brunei, Malaysia, and Indonesia). This allowed for overcoming the small-sample restriction and ensuring econometric stability of the upper panel, resulting in the drop of all VIF values to acceptable thresholds. Estimated coefficients reflected fundamental ideas of NIE (Migdal, 1988).

4.2.2. Regression Results and Model Estimation

Parameters were estimated using a 1-year lagged Pooled OLS technique, with results presented for both Regional Aggregate and Income-based Models (for capturing non-linearity). Table 2 demonstrates the empirical regression coefficients obtained from the 1-year lagged Pooled OLS estimation, capturing both the regional aggregate effects and the stratified income-based parameters to uncover institutional non-linearity.

Table 2. Regression Coefficients of Institutional Quality on SDG Index.

Independent Variables	Model 1 (All ASEAN)	Model 2 (IG1: Lower-Middle)	Model 2 (IG2 & IG3: Upper-Middle/High)
Administrative Quality	1.599*	10.928**	-3.414**
Lag Voice and Accountability	1.198 (ns)	-1.011 (ns)	-4.317**
Lag GDP Growth	-0.068	-0.167	-0.056
Lag GFCF	0.063	0.088	0.002
Lag Public Debt	-0.008	-0.036	0.066**
Lag Govt. Exp	-0.043	0.359*	-0.097
R-squared	0.884	0.912	0.837

Note: ** $p < 0.01$, * $p < 0.05$, (ns) = Non-significant.

Based on empirical evidence, Administrative Quality appears to have the greatest causal influence on results in lower-middle-income countries ($B = 10.928$, $p < .01$). Addressing the empirical boundaries problem for this case involves looking at the non-standardized PCA-derived factor scores of the administration matrix and noticing that they have a significantly constrained scale, with standard deviation (SD) of 0.918 and full range being 3.62 units (-1.51 , Maximum = 2.11). As a result of the relatively narrow scale for the independent variable, considering the broad 17-point spread of the dependent variable, SDGI, the coefficient estimates the impact of a significant change by 1 unit on about one-third of the whole ASEAN governance range. Hence, in a policy sense, an increase of just 0.1 unit of the factor can be considered to lead to the improvement of net SDGI by 1.09 points.

4.2.3. Diagnostic Post-Estimation and Non-Linearity Testing

First, to ensure structural validity, a polynomial specification including Administrative Quality squared (WGIGroupA_Sq) was estimated to test the continuous non-linearity of governance returns within the region. There were found strong significant positive coefficient for the initial value of Administrative Quality ($B = 4.496$, $p < .01$) and a negative one for its square ($B = -3.214$, $p < .01$). This allows concluding that administrative factor returns within the ASEAN region are subject to the stage-based inverted U-shape pattern, which corroborates the institutional saturation hypothesis (Law & Azman-Saini, 2012; North, 1990). Table 3 illustrates the polynomial regression results for institutional non-linearity across the regional aggregate, evaluating the squared term of Administrative Quality to mathematically substantiate the institutional saturation effect.

Table 3. Polynomial Regression Results for Institutional Non-Linearity (All ASEAN).

Model Variables	Unstandardized Coefficients (B)	Standard Error	Significance (p-value)
(Constant)	70.515	2.632	0.000***
Administrative Quality	4.496	0.690	0.000***
Lag Voice and Accountability	-0.572	0.715	0.427 (ns)
Lag GDP Growth	-0.190	0.103	0.071*
Lag GFCF	0.109	0.048	0.026**
Lag Public Debt	0.026	0.016	0.110 (ns)
Lag Govt. Exp	-0.128	0.097	0.189 (ns)
Administrative Quality_Sq	-3.214	0.518	0.000***

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$, (ns) = non-significant. Dependent Variable: Sustainable Development Goals Index (SDGI). Total Effective Observations N = 70.

Secondly, in order to address the issue of potential omission of important variables in the vector of Voice and Accountability (which showed $B = -4.317$, $p < .01$ in Model 2), separate and ungrouped individual institutional variables were included in the upper-income subgroup. It was found that VIF values for government effectiveness, regulatory quality, and rule of law indicators exceeded the threshold substantially (reaching up to 112.313), confirming the existence of extreme multicollinearity between individual institutional measures and requiring the introduction of PCA orthogonal factors.

4.2.4. Panel Stationarity Diagnostics and Time-Dimension Constraints

Levin-Lin-Chu Unit Root Tests for Panel Series were used to determine the presence of unit roots and thus the need for differencing. According to the criterion of Schwarz Information Criterion (SIC) with $p_{\max} = 1$ ($T = 7$), outputs were undefined ($z = NA$, $p = NA$), implying asymptotic convergence. However, in accordance with econometric research, the panel unit root tests suffer from size distortion and low power when T is less than 10 years. Thus, direct testing of unit root was considered infeasible. Maintaining lag structure prevents potential problems of non-stationarity and spurious regressions.

4.3. Analysis of Quantitative Findings

Administrative Predominance Hypotheses (H1 & H2): In the aggregate regional panel (Model 1), Administrative Quality turned out to be a significant determinant of SDG progress ($B = 1.599$, $p = .027$). In other words, voice and accountability do not show statistical significance, implying that ASEAN states' progress on SDG is due to administrative state performance, not procedural democracy.

Income-Development Hypothesis (H3): In the lower-middle-income states, administration produces most of the institutional returns ($B = 10.928$, $p < .001$), implying that state governance (control over corruption and administration performance) is a necessary condition for achieving SDGs.

Concerning Institutional Saturation and Fiscal Catalyst: While contrary to the overall picture, institutional returns in upper-income states are negative ($B = -3.414$, $p < .001$), demonstrating saturation and declining returns

on administrative reforms. However, while the public debt variable remains statistically significant yet relatively small in magnitude ($B = 0.066$, $p < .001$), one may conclude that upper-income countries need to focus on responsible fiscal reform and qualitative changes in capital utilization, such as turning debt obligations into structured green bonds.

4.4. Qualitative Findings and Comparative Case Synthesis

Below, the linkages between the results of quantitative analysis and policy-related phenomena of the period from 2016 to 2023 will be explained using selected cases as representatives of income clusters.

4.4.1. Upper-Income Cluster: Institutional Saturation and Strategic Debt

Within the upper-income group, public debt shows a positive association ($B = 0.066$, $p < .001$), whereas administrative returns are negative ($B = -3.414$, $p < .001$), implying saturation.

Singapore: Increase of public debt from 106.3% of GDP in 2016 to 172.8% in 2023 (IMF and WDI data), along with the introduction of the Significant Infrastructure Government Loan Act 2021 (2021), proves that strategic debt financing promotes sustainability goals, evidenced by SDGI improvement from 64 to 82 (Zakaria & Yew, 1994).

Thailand: Despite having relatively low institutional scores, Thailand ranks first in terms of SDGI in ASEAN, with the index reaching 75.00 in 2023 (World Bank data). Introduction of the 20-Year National Strategy (2018–2037) and Eastern Economic Corridor (EEC) policies demonstrates that strategic policy continuity amid political instability and stability in governmental performance leads to sustainable results, circumventing bureaucratic barriers (Thai Government Gazette, 2018; Yavaprabhas, 2018).

4.4.2. Lower-Middle Income Cluster: State Capacity vs Capability Traps

As for the lower-middle-income states, administrative returns are significant ($B = 10.928$, $p < .001$), along with government expenditures ($B = 0.359$, $p = .026$).

Vietnam: The high SDGI of Vietnam (index = 73.10) was associated with the introduction of the "Dot Lo" anti-corruption program, which facilitated improvement of economic and sustainable development indicators (such as GDP growth of 8.54%) through increased administrative efficiency and decreased transaction costs (Nguyen & Nguyen, 2025; Vu & Cao, 2022).

Cambodia: In Cambodia, the "capability trap" hypothesis applies. Despite adoption of the Rectangular Strategy Phase IV and Public Financial Management Reform Program (PFMRP) to foster state capacity, effective implementation remains impossible due to patron-client networks. Whereas administrative reforms contribute some improvements in SDGI, persistent extractivism explains poor sustainability performance of Cambodia compared to Vietnam (Scott, 1972).

4.4.3. Cross-Case Synthesis: Performance Legitimacy and Centralized Command

Analysis of income-based clusters reveals the main institution that is inherent for all of them, namely, primacy of centralized performance-based legitimacy and command stability of the states' leadership. Even though the mechanism varies according to the stage of development (the upper-income countries employ strategic debt instruments like Singapore's (Significant Infrastructure Government Loan Act 2021, 2021) to overcome administrative stagnation, while the lower-middle-income ones are focused on administrative reforms aimed at stabilizing basic state capacity, as in Vietnam's case), both rely heavily on centralized command authority to promote the 2030 Agenda.

Overall, the above cross-case synthesis supports the conclusion that the Sustainability-over-Income Paradox is largely caused by the administration of state performance rather than proceduralist institutions.

5. DISCUSSION

The empirical results obtained during the analysis provide for a complex understanding of institutional factors determining sustainable development in ASEAN and demonstrate an evolutionary path of development which calls into question traditional models of Western governance.

5.1. *The Primary Function of Administrative State Capacity*

The results of Models 1 and the cross-case analysis strongly confirm the validity of Hypothesis 1, according to which Administrative Quality represents the strongest determinant of SDGs in the region. This finding aligns with the framework of Performance Legitimacy, according to which state capacity in performing duties is more important than procedural democracy (Alagappa, 1995). Indeed, in Vietnam, the evident rise in SDGI after the Dot Lo corruption scandal demonstrates that, in less developed states, the capacity to deliver is crucial for sustainability. This aligns with the NIE theory, according to which the decrease in transaction costs is critical for development (Fukuyama, 2014; North, 1990).

5.2. *Institutional Saturation and Public Debt*

One of the valuable insights produced by this study is that Institutional Saturation is relevant to the upper-income group in ASEAN. This hypothesis is confirmed by the negative coefficient of Administrative Quality in Model 2 ($B = -3.414$, $p < .01$). It means that once the threshold level of administrative maturity is reached, traditional reforms fail to produce any additional value for net SDGI. Moreover, in the case of advanced ASEAN countries, the estimate shows that there exists a significant positive coefficient of Public Debt ($B = 0.066$, $p < .01$). In other words, in terms of economics, 1% increase in debt causes a change in net SDGI equal to 0.066, which seems low at first glance. However, its interpretation requires consideration of policy implications under the conditions of Pooled OLS infrastructure.

Usually, in economically more advanced countries, any increase in the number of public obligations signifies financial instability. In turn, however, in the framework of the proposed study, this result implies that public borrowings may act as the means of maintaining financial stability when used strategically. As shown by this study, once the issue of reverse causality is addressed with the help of lag structures, public debt is not a problem anymore. Instead, this fiscal measure becomes a means of financing high-capital environmental products without causing any harm to the national economy.

It should be noted that the partitioning of samples into two heterogeneous groups provides for the approximation of the impact of institutions. In turn, however, sub-sampling serves primarily as an indirect test of absolute quadratic non-linearity. A statistically significant negative coefficient of Administrative Quality in the upper-income sample means that the transitional tipping point exists, and the corresponding hypothesis can be tested mathematically. The presence of a positive coefficient ($B = 4.496$, $p < .01$) and the negative quadratic term ($B = -3.214$, $p < .01$) demonstrates that the returns to reforms in public management depend on the stage of development. This aligns with structural approaches suggested by Law and Azman-Saini (2012) and North (1990).

5.3. *The Accountability Paradox and Command Stability*

The strong negative effect of Voice and Accountability in the advanced sample conflicts with the modernization theories which suggest that democratization and development go hand-in-hand. Instead, this study reveals that the phenomenon of Command Stability is observed when central decision-making becomes the norm. It enables quick implementation of complicated SDGs strategies (such as the introduction of carbon taxes and energy transitions), thus avoiding difficulties associated with negotiations characteristic of participative approaches. Nevertheless, the negative parameter does not mean that accountability in ASEAN is harmful. Instead, in the implementation stage of

the 2030 Agenda, Administrative State Capacity becomes the key determinant of the achievement of SDGs rather than procedural democracy.

While interpreting this parameter, it is important to take into account the possible problems with omitted-variable bias and reverse causality. As regards omitted-variable bias, it was checked using reintroduction of ungrouped institution indicators into the regression equation. However, it resulted in considerable multicollinearity, with VIF values ranging from 61.501 to 112.313, which means that simultaneous estimation of various institutional indicators leads to severe data redundancy and parameter bias. It means that it is necessary to perform orthogonalization with the help of PCA, thus proving that the negative parameter does not originate in scaling errors.

In the advanced stage of institutional development, highly centralized systems are likely to introduce rigorous measures aimed at speeding up implementation of expensive sustainability programs, which inevitably decreases formal civil accountability parameters. The panel structure of the regression automatically controls for the issue of reverse causality. Indeed, states having high baseline sustainability indices will tend to use centralized methods to preserve their sustainable achievements, which limits further pluralism. Introduction of a lag of one year ($t-1$) makes it possible to control for the effects caused by contemporaneous interactions between the variables. Thus, the negative coefficient proves that in the advanced stage of the implementation of the 2030 agenda, top-down administrative capacity plays an important role.

5.4. Escaping the Capability Trap

The difference between Vietnam and Cambodia shows that Capability Traps and Isomorphic Mimicry still prevail in the area (Pritchett, Woolcock, & Andrews, 2013). Namely, while introducing certain forms of sustainable institutions, the Cambodian government fails to change its rules of the game, and it relies on patron-client networks for extraction. This explains why in these cases the statistically significant value of Administrative Quality exists. In other words, for developing countries of the region, sustainable development should not come from policy expansion but from increasing institutional capacity.

5.5. The "ASEAN Way" of Sustainable Development

Thus, overall, this discussion shows that the relation between institutions and SDGs in ASEAN is non-linear and income-dependent. The Sustainability over Income Paradox in middle-income ASEAN states demonstrates that high-quality institutions are substitutes for income.

6. CONCLUSION AND POLICY RECOMMENDATIONS

6.1. Conclusion

In summary, this study confirms that institutional quality is not a monolithically deterministic predictor of sustainable development in Southeast Asia but rather acts as a dynamic catalyst throughout different developmental stages in ASEAN member states. Using the robust 1-year lagged pooled OLS regression model adjusted for cross-sectional stratification based on average incomes, this research derives asymptotically unbiased parameters while accounting for potential endogeneity and timing biases. Empirically, it is demonstrated that the effects of governance are strongly non-linear. Within lower middle-income countries, whose economies undergo structural change, Administrative Quality, comprised of the effectiveness, corruption control, and rule of law aspects, emerges as the main institutional factor driving the net SDGs index. This conclusion is confirmed through qualitative observation of Vietnam's Dot Lo anti-corruption program, in which stringent administrative discipline decreases market transaction costs related to energy investments, and Cambodia's Rectangular Strategy, in which the embedded patronage networks create a continuous capability trap regardless of policy implementation. In contrast, in the baseline scenario of the upper-income cluster, there appears to be a clear Institutional Saturation threshold. Once an economy matures, further expansion of its structure produces increasingly smaller returns in terms of the net SDG

score increase. As an example of this phenomenon, a positive yet small parameter of Public Debt ($B = 0.066$, $p < .01$) requires caution in evaluating fiscal parameters of the advanced economies. Specifically, instead of a growth catalyst, such liabilities appear as a prudent stabilization tool that prevents macroeconomic turmoil without hampering long-term sustainability. An example of this phenomenon would be Singapore's (Significant Infrastructure Government Loan Act 2021, 2021) program that demonstrates how state debt can fund the development of expensive environmental public goods while keeping the country's fiscal position intact. Hence, in ASEAN, the trajectory suggests the existence of the performance legitimacy framework, implying the superiority of the state's capacity in providing public goods over the outcomes of pluralistic governance models.

6.2. Policy Recommendations

6.2.1. For Lower-Middle Income States (e.g., Cambodia, Lao PDR, Myanmar, the Philippines and Vietnam)

Transition from Isomorphic Mimicry to Institutional Resilience: Emerging economies need to abandon the practice of adopting foreign institutional structures without the capacity to enforce them. Following Vietnam's anti-corruption campaigns, authorities should focus on strengthening the foundations of their bureaucracy by reducing corruption and enforcing the law. This will help to lower transaction costs for attracting Foreign Direct Investment.

Institutionalization of Bureaucracy Competency Frameworks: State authorities need to strengthen the skills of civil servants. Creating specialized public-administration units will allow for proper implementation of macro-level international commitments in local urban plans.

6.2.2. For the Upper-Income Cluster (e.g., Brunei, Malaysia, Singapore, Thailand, and Indonesia)

Optimal Fiscal Restructuring Rather than Increased Debt Levels: As illustrated by a small yet positive Public Debt coefficient ($B = 0.066$), advanced economies should refrain from increasing their debt burden to finance sustainable development projects. The focus should be on defense-oriented fiscal reform inspired by Singapore's (Significant Infrastructure Government Loan Act 2021, 2021) program, involving systematic restructuring of existing debt vectors in order to allocate conventional public liabilities into green bonds targeted at long-term climate-related infrastructure assets.

Improvement of Regulatory Quality and Ensuring Stable Policy Anchors: Rather than just building up conventional bureaucracies, the state must raise the quality of regulation through improved administration so as to create conditions favorable for investment in the private sector. The authorities must develop institution-based target settings in which any barriers against implementing the circular economy approach would be removed in an organized fashion. Furthermore, to safeguard policy anchors from political instability and the unpredictability associated with short-term elections, it becomes indispensable to have legal guarantees for the implementation of long-term regulations, as evident from institutional examples like Thailand's 20-Year National Strategy (Kohpaiboon, 2020; Thai Government Gazette, 2018).

6.2.3. Regional Policy (ASEAN Level)

Development of Technical Institutional Interoperability: The ASEAN regional body needs to avoid setting fixed rules based on the assumption of economic homogeneity of all its member states. It needs to establish the frameworks of interoperability in order to optimize the flow of green capital across borders and the creation of a shared energy grid network.

Creation of Tiered Knowledge Transfer Mechanisms: Establish policy networks that recognize the varying degrees of institutional maturity of ASEAN member states. The advanced economies in the region should supply specialized technical knowledge on green fiscal management, whereas the transitioning states should focus on institutional stabilization.

6.3. Limitations and Future Research

While the mixed-method approach employed in this study produced valuable insights, some structural limitations deserve special consideration.

Firstly, econometric estimation is restricted by the use of a small dataset, namely only the sovereign states in ASEAN. Even though this sample size ($N = 70$ post-lag) is sufficiently large for basic static panel analysis, there are no observations in excess that can be utilized to estimate dynamic models like System GMM.

Secondly, quantitative analysis is limited to secondary data collected from global repositories. Though standardized, such indicators fail to account for informal institutions and behavioral factors, which could be better captured by using primary data collection techniques, such as conducting surveys or holding expert interviews.

Thirdly, since the net SDG Index works as a macro-metric, in future research it would be necessary to disaggregate parameters to assess the effect of institutional capacity on specific clusters of sustainable development goals. More precisely, it would be important to split environmental goals (SDGs 13–15) from social equity sectors (SDGs 1, 5, 10).

Finally, although this study has revealed the limit of bureaucratic growth in mature economies, the potential role of digital-state infrastructures as an alternative way out of institutional saturation remains unexplored, making it a promising venue for public administration research. However, an important limitation of this research lies in its use of a structural method for capturing nonlinearity of governance. While partitioning the sample into two subsamples captures the institutional inflection point, further studies should move beyond it by introducing an explicit squared interactive term (e.g., Administrative Quality squared) or estimating a Threshold Regression model.

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