

Research article

The Dynamic Determinants of Human Development in ASEAN: Evidence from the GMM System Model

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ABSTRACT

Disparities in quality of life between regions and the phenomenon of economic growth that is not always linear with equitable welfare distribution are major challenges in development today. This study examines to analyze the dynamic determinants of the human development index and its implications for regional mobility within the framework of Klassen typology. The observation period spans from 2018 to 2023. Using the System Generalized Method of Moments (GMM) approach to overcome endogeneity issues, this study estimates the impact of economic growth, economic freedom, government effectiveness, and inflation on the HDI. The findings results show that economic growth has a positive and significant effect on the HDI, with the long-run impact being much greater than the short-run impact. This confirms that improvements in quality of life are cumulative and require steady growth. Conversely, economic freedom is found to have a significant negative effect indicating that market liberalization without institutional maturity actually hinders equitable development. Meanwhile, government effectiveness and inflation did not show a significant effect, implying a gap in policy implementation. This study concludes that in order to encourage regional transition towards higher levels of development, policy strategies must focus on long-run economic growth sustainability and strengthening social safety nets before pursuing aggressive market liberalization.

ARTICLE INFO

Article history:

Received: September 10th, 2025
Revised 1: December 6th, 2025
Revised 2: January 27th, 2026
Accepted: January 28th, 2026
Published: January 30th, 2026

Keywords:

Human Development Index;
Economic growth; GMM
system; Economic freedom;
Klassen typology

JEL classification:

I31
O15
O53
C23

Citation:

Umiyati, E., Zevaya, F., & Asfihani, F. R. (2025). The Dynamic Determinants of Human Development in ASEAN: Evidence from the GMM System Model. *Jurnal Ekonomi Pembangunan*, 23(2), 111-124. DOI: 10.29259/jep.v23i2.23443

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1. INTRODUCTION

The contemporary shift in the global development paradigm has repositioned human agency at the center of economic activity (Tien et al., 2021). Under this framework, individuals are viewed as the primary drivers of innovation, facilitating progress within both societies and organizations. Aligned with this vision, the ASEAN Community 2025 identifies the enhancement of human capital as a fundamental pillar of regional integration. The success of this initiative is typically measured via the Human Development Index (HDI), a multidimensional quantitative metric that synthesizes education, health, and economic performance (Banik et al., 2022; and Majerník et al., 2021). Despite ASEAN's sustained economic growth, empirical evidence reveals a persistent paradox: the region continues to experience profound disparities in quality of life across its member states. From a theoretical perspective, this divergence can be analyzed through a synthesis of the capability approach and new institutional economics. Sen (2000) argues that income serves as a requisite tool, the ultimate objective of development is the expansion of substantive human freedoms. Furthermore, basic capabilities, specifically health and education, function as the primary determinants of economic resilience (Morse, 2023). However, the Endogenous Growth theory by (Romer, 1994) posits that the efficacy of human capital is contingent upon institutional quality. This is further reinforced by the New Institutional Economics school of thought, which characterizes institutions as the "rules of the game" (North, 1990). In the absence of effective governance (Good Governance) and economic freedom, macroeconomic growth often fails to translate into an equitable distribution of quality of life (Osińska et al., 2025).

The urgency of addressing this inequality is underscored by ASEAN HDI data from 2018 to 2023, as shown in Figure 1. The data indicates an uneven post-pandemic recovery and significant structural shifts within the region. For instance, Singapore (0.949) remains significantly ahead of the Mekong sub-region, highlighting an extreme range of regional inequality. Notably, Cambodia (0.600) has overtaken Myanmar (0.585), with the latter experiencing a sharp regression following its recent political crisis. Such structural barriers continue to impede the convergence of quality of life across the ASEAN bloc (Tri et al., 2021; and Tien et al., 2021). A review of extant literature reveals that analyses of HDI determinants are often polarized. The first thematic cluster of studies emphasizes macroeconomic variables, asserting that economic growth and price stability are prerequisite conditions for maintaining purchasing power and fiscal maneuverability (Prasetyo & Kistanti, 2020). Furthermore, improvements in HDI have been shown to maintain a reciprocal relationship with long-run labor productivity (Munawaroh et al., 2025). Conversely, high inflation rates have been empirically demonstrated to erode purchasing power, thereby significantly hindering human development progress (Lukman et al., 2023).

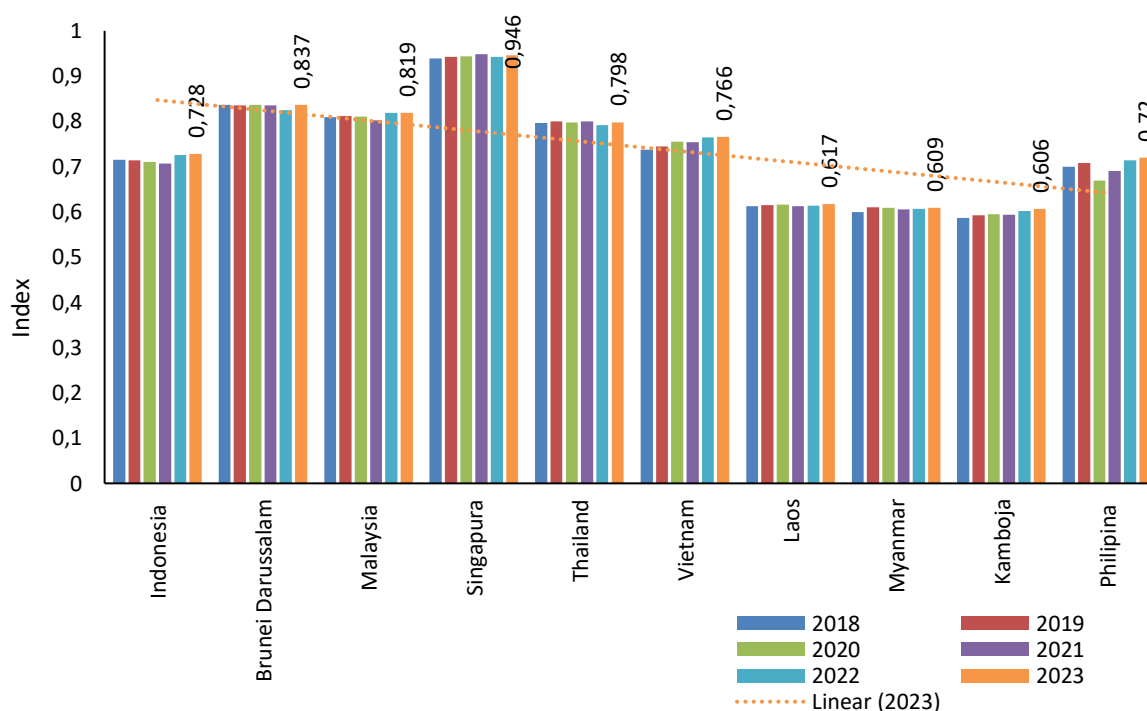


Figure 1. Human Development Index ASEAN 2018-2023

Source: Word Bank (2023)

The effectiveness of macroeconomic variables is inextricably linked to the surrounding institutional ecosystem, with institutional factors serving as primary determinants of development outcomes. Human development relies heavily on economic and political freedom, reflecting a government's capacity to facilitate equitable access to resources. Specifically, economic freedoms such as the ease of doing business and the protection of property rights have been shown to enhance market efficiency and foster the innovation necessary to drive HDI scores (Feruni et al., 2020; and Osińska et al., 2025). Empirical research confirms that systemic corruption, institutional fragility, and political instability significantly impede progress in human development. A study by Naanwaab (2018) emphasizes that across Asian nations demonstrate that bureaucratic inefficiency often distorts the allocation of public budgets, diverting essential funds away from the social sector. Furthermore, restrictions on economic freedom markedly hinder social mobility and innovation, particularly within middle-income countries. The divergent paths of a progressive Vietnam compared to a stagnant Myanmar provide compelling empirical evidence that institutional quality plays a central role in national development. Despite the strategic importance of this issue, a significant gap remains in the existing literature. Previous ASEAN-centric studies have often been restricted to partial analyses or have utilized static estimation techniques that are susceptible to endogeneity bias, such as those conducted by Dizon et al. (2021); and Hung et al. (2024) to date, there is a paucity of

research that simultaneously integrates macroeconomic indicators and institutional dimensions within a dynamic framework.

This study seeks to address this gap by providing a comprehensive analysis of human development dynamics within the ASEAN region. The novelty of this research lies in the application of first difference GMM (FD-GMM) and system GMM (SYS-GMM) estimators to mitigate the endogeneity bias inherent in institutional variables, such as government effectiveness and economic freedom, while capturing both short- and long-run HDI persistence. Specifically, this study aims to: (1) measure the level of inequality between countries using the Williamson Index; (2) map development classification patterns using Klassen typology; and (3) estimate the effect of economic growth, inflation, government effectiveness, and economic freedom on HDI using Arellano-Bond dynamic panel data regression. The structure of this article is as follows: Section II describes the data sources and methods; Section III presents the analysis of results and empirical discussion; and Section IV summarizes the findings and provides policy recommendations.

2. RESEARCH METHODS

2.1. Data

This study employs an explanatory quantitative approach to analyze the structural dynamics of human development (HDI) within the ASEAN region. This research design was specifically selected for its robustness in testing hypothesized cause-and-effect relationships between macroeconomic indicators, institutional variables, and the HDI. We utilize a panel data structure that integrates time-series and cross-sectional data, facilitating a comprehensive analysis of inter-country heterogeneity, a dimension often obscured in purely time-series frameworks. Details of the variables and data sources are presented in Table 1.

Table 1. The Description of Variables

Variables	Description	Source
Human Development Index (HDI)	A composite index that measures average achievements in three basic dimensions of human development: a long and healthy life, knowledge, and a decent standard of living. (Index).	UNDP Human Development Reports
Economic Freedom (EF)	The degree of individual freedom to engage in economic activity, including the size of government, legal system, strong money, international trade, and regulation (Index)	World Bank
Economic Growth (IHSPE)	The increase in the economy's production capacity as measured by real GDP (%)	World Bank
Inflation (IHSCPI)	Percentage change in the Consumer Price Index (%)	World Bank
Government Effectiveness (IHSGEP)	Perceptions regarding the quality of public services, independence from political pressure, quality of policy formulation, and government credibility (Scale 0-100).	Heritage Foundation

The dataset comprises secondary data retrieved from reputable international institutions to ensure empirical validity and reliability. The research population encompasses 10 ASEAN member countries, such as Indonesia; Malaysia; Singapore; Thailand; Philippines; Vietnam; Brunei Darussalam; Myanmar; Cambodia; and Laos. The observation period spans from 2018 to 2023, a timeframe strategically chosen to capture the socio-economic volatility characterizing the pre-pandemic, intra-pandemic, and post-pandemic eras. To ensure statistical normality in the data distribution, this study applies the inverse hyperbolic sine (IHS) transformation to the variables of economic growth, inflation, and government effectiveness. Unlike traditional logarithmic transformations, the IHS method is particularly advantageous as it effectively processes zero or negative values without losing observations (Bellemare & Wichman, 2020). Furthermore, as this research relies exclusively on aggregate macro-level secondary data and does not involve direct human or animal subjects, formal ethical clearance was not required.

2.2. Analysis Method

2.2.1. Williamson Index Modification

To address the first research objective regarding disparities in human development quality, this study utilizes a modified Williamson Index. Originally pioneered to evaluate regional development gaps, the index

is applied here to assess inequality across ASEAN member states. The mathematical formulation is defined as follows:

$$VwHD = \sqrt{\frac{\sum (HDI_i - HDI_A)^2 (f_i/n)}{HDI_A}} \quad (1)$$

Here, $VwHD$ denote Williamson human development inequality index; HDI denote human development index of country (i); HDI_A denote average of HDI across the ASEAN region; f_i is total population of country (i); and n is aggregate population of the ASEAN region.

The Williamson Index produces an index value greater than zero and less than one. An index value of zero indicates no disparity in the quality of life among ASEAN countries, while a value greater than zero indicates inequality. A higher index value reflects greater disparity in the quality of life of ASEAN citizens.

2.2.2. The Klassen Typology

The Klassen typology analysis is employed to examine the specific characteristics of human development across ASEAN member countries. This framework categorizes nations based on two primary indicators, absolute HDI achievement and the relative growth of the HDI compared to the ASEAN average. According to this typology, the regional landscape is divided into four distinct categories: (1) Quadrant I represents high HDI countries and fast HDI growth; (2) Quadrant II represents high HDI countries and slow HDI growth; (3) Quadrant III represents low HDI countries and fast HDI growth, and (4) Quadrant IV represents low HDI countries and low HDI growth. The classification matrix is illustrated in Figure 2 as follow:

HDI (y)	HDI growth (r)	
	Quadrant II $(y_i > y) \text{ and } (r_i < r)$	Quadrant I $(y_i > y) \text{ and } (r_i > r)$
	Quadrant IV $(y_i < y) \text{ and } (r_i < r)$	Quadrant III $(y_i < y) \text{ and } (r_i > r)$

Figure 2. The Classification of Klassen Typological of Country

Here, this quadrant shows a HDI growth rate of country i (r_i); HDI growth rate of ASEAN region (r); HDI rate of country i (y_i); HDI rate of ASEAN region (y).

2.3. Model Specification

To capture the temporal dynamics of human development, this study utilizes panel data regression, which integrates time-series and cross-sectional data. This approach is particularly effective for describing the behavioral evolution of the observed units throughout the study period. The dynamic panel model, as pioneered by Arellano and Bond (1991), incorporates the lagged dependent variable as an independent variable. While this captures persistence, it introduces endogeneity, which renders traditional fixed-effects and random-effects estimates biased and inconsistent. To address this, the Generalized Method of Moments (GMM) is applied. This study employs both first-difference GMM (FD-GMM) and system GMM (SYS-GMM), the latter being an extension developed by Blundell and Bond to improve efficiency (Juanda & Junaidi, 2012). The structure of the dynamic panel data equation in this study is as follows:

$$y_{i,t} = \delta y_{i,t-1} + \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + u_{it} \quad (2)$$

Here, $y_{i,t}$ represents the observation for unit i in period time (t); $\delta y_{i,t-1}$ is the lagged dependent variable, x represents the vector of predictor variables, and u_{it} denotes the error term.

In alignment with the data normalization strategy, the inverse hyperbolic sine (IHS) transformation is applied to economic growth (PE); inflation (CPI); and government effectiveness (GEP) to accommodate potential zero or negative values. Consequently, the final econometric model estimated in this study is as follows:

$$HDI_{i,t} = \alpha + \delta_1 HDI_{i,t-1} + \delta_2 EF_{it} + \delta_3 IHS(PE_{it}) + \delta_4 IHS(CPI_{it}) + \delta_5 IHS(GEP_{it}) + u_{it} \quad (3)$$

2.3.1. Arellano-Bond GMM Method

Following by Arellano & Bond (1991) using the Arellano-Bond GMM estimation method is utilized to produce unbiased, consistent, and efficient estimates by transforming the data to remove fixed effects. The estimator is mathematically represented as follows:

$$\hat{\delta} = \left[(N^{-1} \sum_{i=1}^N Z_i \Delta y_{i,t-1}) \widehat{W} (N^{-1} \sum_{i=1}^N Z_i \Delta y_{i,t-1}) \right]^{-1} \left[(N^{-1} \sum_{i=1}^N Z_i \Delta y_{i,t-1}) \widehat{W} (N^{-1} \sum_{i=1}^N Z_i \Delta y_{i,t-1}) \right] \quad (4)$$

where, Z_i represents the matrix of valid instruments; $\widehat{W}$ denotes the unbiased and consistent weighting matrix ($W_{(L \times L)}$); and L denotes the number of variables instruments.

2.3.2. SYS-GMM Estimation Method

To further enhance the estimation, the system GMM is employed. This method addresses endogeneity and dynamic bias, particularly in panels characterized by a large number of countries (N) and a small time period (t) by utilizing internal instruments derived from lagged differences and levels. The one-step estimator system ensures that the orthogonality conditions between the instruments and the error terms are satisfied.

$$\frac{\partial J(\delta)}{\partial \delta} = 2 \left[(N^{-1} \sum_{i=1}^N Z_{sys} \Delta y_{i,t-1}) \widehat{W} (N^{-1} \sum_{i=1}^N Z'_{sys} \phi_i) \right] + 2 \left[(N^{-1} \sum_{i=1}^N Z_{sys} \phi_{i,-1}) \widehat{W} (N^{-1} \sum_{i=1}^N Z'_{sys} \phi_i) \right] = 0 \quad (5)$$

With Z_{sys} is matrix instrument, the one step estimator system can be seen in the following Eq. (6):

$$\hat{\delta} = \left[(N^{-1} \sum_{i=1}^N Z_{sys} \phi'_{i,t-1}) \widehat{W} (N^{-1} \sum_{i=1}^N Z'_{sys} \phi_i) \right]^{-1} \left[(N^{-1} \sum_{i=1}^N Z_{sys} \phi'_{i,-1}) \widehat{W} (N^{-1} \sum_{i=1}^N Z'_{sys} \phi_i) \right] \quad (6)$$

To ensure that the dynamic panel GMM model adheres to the criteria of validity and consistency, two primary diagnostic stages are conducted, namely, first, Arellano-Bond test for serial correlation, this test detects the presence of serial correlation in the residuals. While the AR(1) statistic is expected to be significant (rejecting H_0), the model is considered robust and free from higher-order autocorrelation if the AR(2) probability value is non-significant (accepting H_0); and second, Sargan test (instrument validity), this test verifies the validity of the instruments through over-identifying restrictions. An instrument set is deemed valid if the Chi-square probability value exceeds the significance threshold (typically 0.05 or 0.10), indicating that the null hypothesis of instrument validity is accepted.

2.3.3. Estimation Robustness test

The validity of the GMM estimator is further confirmed by comparing it against baseline models. Specifically, the coefficient of the lagged dependent variable should ideally fall between the estimates produced by pooled least squares (POLS) and the fixed effects (FE) model. This is a critical prerequisite because POLS typically yields upward-biased (overestimated) coefficients, whereas FE tends to produce downward-biased (underestimated) results. The GMM coefficient positioned between these two bounds indicates that the model has successfully corrected for dynamic panel bias.

3. RESULTS AND DISCUSSION

3.1. Result

Table 2 presents the descriptive statistics for the research variables analyzed in this study, based on a balanced panel dataset of ten ASEAN member states from 2018 to 2023. On average, the human development index (HDI) for the region reached 0.7439, signifying a medium-to-high level of human development. However, the variables for government effectiveness (IHSGEP) and economic freedom (EF) exhibit relatively large standard deviations, reflecting substantial heterogeneities in institutional quality and economic policy frameworks across the sampled nations. During the observation period, Singapore recorded the maximum HDI value of 0.9630 in 2023, while Cambodia recorded the minimum value of 0.5830 in 2019.

Table 2. Result of Descriptive Statistics

Statistic	HDI	EF	IHSPE	IHSGEP
Mean	0.7439	63.5516	1.2899	4.5671
Maximum	0.9630	89.7000	2.9737	5.2983
Minimum	0.5830	42.2000	-3.1811	2.0382
Std. Dev.	0.1151	10.2585	1.7179	0.7433

Furthermore, between 2018 and 2023, Singapore consistently maintained the highest scores for both government effectiveness (5.2983) and economic freedom (89.70). In contrast, inflation and economic growth rates displayed significant volatility across time and between countries, capturing the dynamic macroeconomic shifts during the study period. For instance, Brunei experienced sharp price fluctuations, with high inflation in 2022 (6.38%) followed by significant deflation in 2023 (-5.29%), reflecting susceptibility to global shocks and domestic policy adjustments. Additionally, Myanmar's negative economic growth in 2021 highlights the severe impact of domestic political instability, which was further exacerbated by the economic pressures of the COVID-19 pandemic.

Table 3. Result of Panel Unit Root test in First Difference

Variables	Adj. <i>t</i> -statistic	Prob.
Δ HDI	-12.857	0.000
Δ EF	-6.5838	0.000
Δ IHS(PE)	-25.042	0.000
Δ IHS(GEP)	-15.382	0.000
Δ IHS(CPI)	-7.3622	0.000

Prior to estimating the dynamic System GMM model, it is imperative to conduct panel unit root tests to verify data stationarity. This diagnostic step, performed using the Levin, Lin & Chu (LLC) method, ensures that the mean and variance of the variables remain constant over time, thereby mitigating the risk of spurious regressions that could result in biased or invalid parameter estimates. Under the LLC framework, the null hypothesis assumes the presence of a unit root (non-stationarity), therefore, data are considered non-stationary if the p-value exceeds the 0.05 significance threshold. Initial results indicated that while HDI, IHS(PE), and IHS(GEP) were stationary at their levels, the FE and IHS(CPI) variables contained a unit root. To achieve stationarity, these variables were transformed to the first difference level. As summarized in Table 3, the adjusted *t*-statistics for all study variables are negative and statistically significant at the 1% level. This confirms that all series are integrated of order one, $I(1)$, or zero, $I(0)$, ensuring they are stationary and valid for use in the dynamic model estimation.

3.1.1. Human Development Disparities in ASEAN

The disparities in human development across ASEAN member states are quantitatively assessed using the Williamson Index, a robust metric for evaluating regional inequality. As outlined by (OSHIMA, 1986), index values below 0.35 signify low inequality, while values between 0.35 and 0.50 indicate moderate disparity, and those exceeding 0.50 represent high inequality.

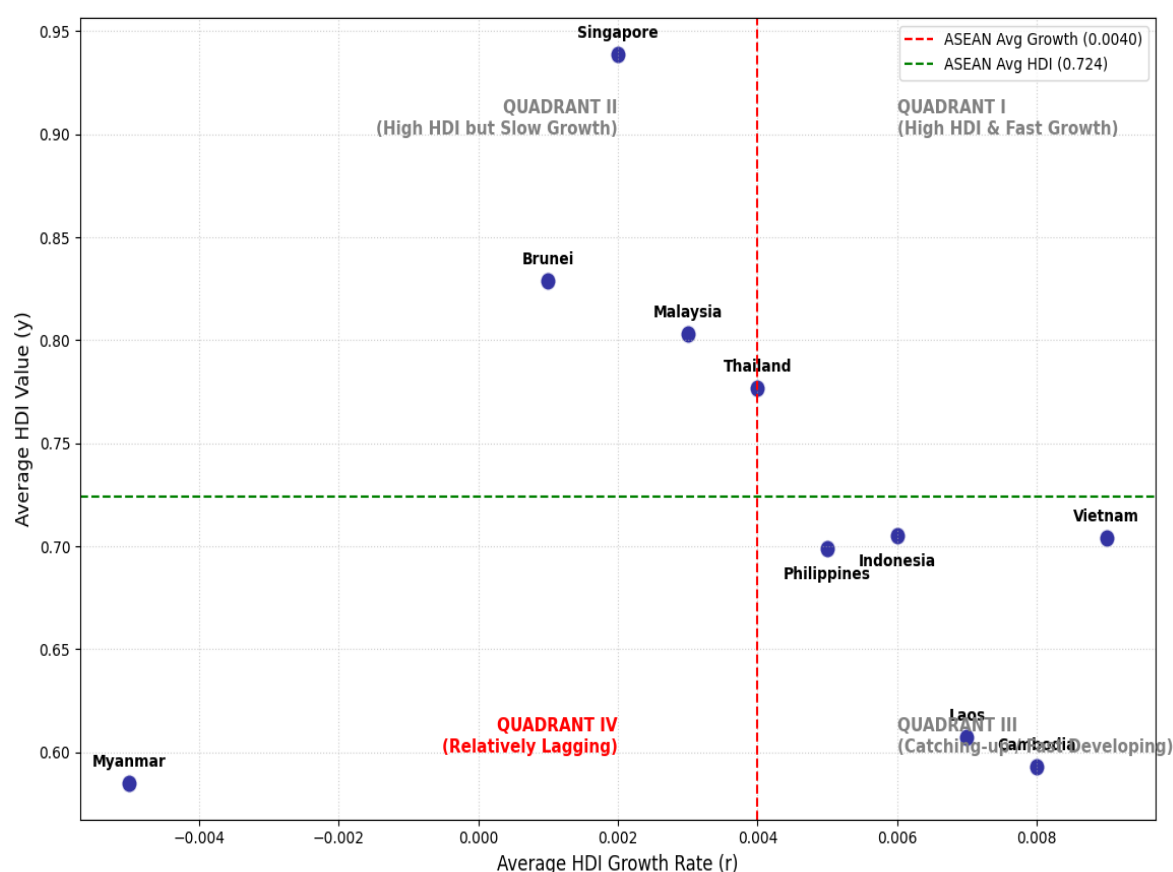
Table 4. Williamson Index of Human Development in ASEAN Region, 2018 – 2023

Year	Weighted Average HDI (HDI_A)	Williamson Index (V_w)	Interpretation
2018	0.7208	0.0791	Low inequality
2019	0.7238	0.0789	Slightly decreasing (convergence)
2020	0.7228	0.0797	Rise (initial impact of the pandemic)
2021	0.7196	0.0815	Peak of inequality
2022	0.7282	0.0790	Start recovery
2023	0.7366	0.0784	Downward trend
Mean	0.7253	0.0794	

The average Williamson Index for ASEAN during the 2018–2023 period was approximately 0.0794, firmly categorizing the region as having low overall disparity. Despite this, the index fluctuations highlight the significant impact of global crises. Between 2020 and 2021, the index peaked at 0.0815, indicating a period of divergence caused by the asymmetric impacts of the COVID-19 pandemic. During this time, nations with superior health infrastructure, such as Singapore, demonstrated greater resilience, whereas developing nations like Myanmar and Cambodia experienced stagnation or regression in their quality-of-life indicators. From 2022 onward, a trend toward convergence emerged, with the index declining to 0.0784 by 2023. This recovery was largely driven by accelerated HDI growth in populous member states, including Indonesia, Vietnam, and the Philippines, effectively narrowing the development gap with more advanced economies in the region.

3.1.2. Classification of Human Development in ASEAN

To further examine these regional characteristics, Klassen Typology is employed to categorize ASEAN countries based on two primary dimensions: absolute HDI achievement and relative HDI growth. This framework segments the region into four distinct quadrants, as visualized in Figure 3 as follow:

**Figure 3.** Klassen Typology of the HDI in ASEAN 2018-2023

The mapping of human development in ASEAN reveals a clear polarization during the 2018–2023 period, showing several findings, namely, (1) quadrant II (high HDI, slow growth), this quadrant includes founding member states, specifically Singapore, Brunei, Malaysia, and Thailand that have attained development maturity with "high" to "very high" HDI scores. However, these nations are currently experiencing a slowdown in growth rates, suggesting a "ceiling effect" or developmental saturation; (2) quadrant III (developing/catching-up), comprised of Indonesia, Vietnam, the Philippines, Cambodia, and Laos, this group exhibits progressive dynamics. These nations are on a distinct "catching-up" trajectory, characterized by HDI growth rates that consistently exceed the regional average. Among them, Vietnam is notable for having the fastest growth acceleration; and (3) quadrant IV (relatively lagging), currently occupied by Myanmar, this quadrant represents an outlier trapped by both low HDI achievement and negative growth. Driven by domestic political instability, Myanmar faces a "double trap" that further distances it from the broader regional development trajectory.

3.1.3. Determinants of Human Development in ASEAN

This study utilizes a dynamic panel data model to analyze the relationship between the HDI and its hypothesized determinants: economic freedom, government effectiveness, inflation, and economic growth. To ensure robust results, two estimation techniques within the GMM framework were employed, first-difference GMM and system GMM.

Table 5. Estimation of FD-GMM and SYS-GMM Approach Parameters

Dep. Variables = HDI				
Variables	FD-GMM	SYS-GMM	FE	POLS
	(1)	(2)	(3)	(4)
$\delta\text{HDI}_{i,t-1}$	0.4574*** (0.0509)	0.6853*** (0.0339)	0.1878 (0.1023)	0.7077*** (0.1314)
EF	-0.0012 (0.0010)	-0.0019** (0.0009)	0.0012 (0.0032)	0.0018 (0.0011)
IHS(PE)	-0.0045 (0.0053)	0.0192** (0.0085)	-0.0187 (0.0124)	0.0168 (0.0104)
IHS(GEP)	0.0092 (0.0158)	-0.0047 (0.0055)	-0.0035 (0.0024)	-0.0057 (0.0035)
IHS(CPI)	-0.0359 (0.0443)	-0.0561 (0.0589)	0.0276 (0.1633)	-0.0070 (0.0043)
Constant	0.6577* (0.3447)	0.5979* (0.4137)	0.4595 (0.3242)	0.0560 (0.0424)
N	40	50	50	50
Wald test	1944.70***	1734.35***		
Arellano-Bond AR(1)	-2.1832**	-3.4151**		
Arellano-Bond AR(2)	-0.1349	-0.0872		
Sargan test	23.823***	12.983		

Note: ** and *** represent significance at 5% and 1% levels respectively

As presented in Table 5, the FD-GMM model is statistically adequate, as evidenced by a Wald test is significant. The results demonstrate that human development is highly persistent, with last year's HDI performance exerting a strong and significant influence on current levels. However, under this approach, the independent variables, economic freedom, economic growth, government effectiveness, and inflation failed to show statistically significant effects. This lack of significance suggests that the FD-GMM method may be insufficient for capturing the nuanced impacts of these determinants in this specific dataset. Consequently, the SYS-GMM method was implemented to achieve more precise and accurate estimations. Meanwhile, the findings from the SYS-GMM approach. While government effectiveness ($p=0.390$) and inflation ($p=0.341$) remained statistically non-significant, the analysis revealed that economic freedom and economic growth have a significant impact on the Human Development Index in the ASEAN region. These findings underscore the importance of leveraging a dynamic framework to properly identify the drivers of human development progress.

To ensure the reliability of the FD-GMM and SYS-GMM estimates, this study performs a series of rigorous diagnostic tests, including the Arellano-Bond test for serial correlation and the Sargan test for instrument validity. The Arellano-Bond diagnostic results confirm the absence of second-order serial correlation in the residuals. While the AR(1) test yielded significant probability values, which is expected in dynamic panel models, the AR(2) test showed insignificance, indicating that the model is free from higher-order autocorrelation issues. Furthermore, the Sargan test results showed insignificant probabilities, verifying that the instrument set used in the over-identifying restrictions is valid and exogenous, supporting the consistency of the SYS-GMM parameters.

The SYS-GMM model demonstrates superior estimation efficiency compared to the First-Difference GMM (FD-GMM). This is evidenced by the statistically significant coefficients for economic freedom and economic growth captured in the SYS-GMM estimation, which remained undetected in the FD-GMM framework. The Sargan test for instrument validity and subsequent robustness checks, this study concludes that SYS-GMM is the most robust estimator for explaining the phenomena under investigation. The diagnostic evaluations were used to compare the two estimators. Regarding the AR(2) consistency criteria and the unbiasedness test, determined by the coefficient position of the lagged HDI variable ($\delta\text{HDI}_{i,t-1}$), both models performed adequately. However, a critical divergence emerged in the Sargan test. The FD-GMM model failed to satisfy the instrument validity assumption, suggesting that its instruments are correlated with the error term. Conversely, the SYS-GMM model successfully satisfied all diagnostic criteria: parameter consistency, instrument validity, and unbiasedness.

The robustness of the estimator is validated by comparing the lagged HDI coefficient across different models. The SYS-GMM coefficient of 0.6853 correctly falls between the FE (lower bound) and POLS (upper bound) estimates. This positioning confirms that the dynamic panel bias has been effectively corrected, providing a reliable foundation for the subsequent elasticity and long-run impact analysis. The model's dynamic nature allows the derivation of long-run effects, representing the cumulative impact of macroeconomic and institutional changes over time.

Table 6. Result of Short and Long-run Elasticity

Dep. Variable = HDI				
Variables	Short-run	p-value	Long-run	p-value
	(1)	(2)	(3)	(4)
EF	-0.00193**	0.036	-0.00613**	0.039
IHS(PE)	0.01926**	0.024	0.06121**	0.043
IHS(GEP)	-0.00478	0.390	-0.01521	0.369
IHS(CPI)	-0.05614	0.341	-0.17839	0.308

Note: ** represent significance at 5% levels respectively

Table 6 report the result of variable relationships demonstrates that economic growth exerts a positive and significant impact on human development. Notably, the estimated coefficient increases from 0.01926 in the short run to 0.06121 in the long run. This finding confirms that the welfare benefits of economic expansion are cumulative, as consistent growth gradually strengthens the fiscal capacity to invest in health and education infrastructure. Conversely, the economic freedom variable exhibits a statistically significant negative effect, which intensifies from -0.00193 in the short run to -0.00613 in the long run. This unexpected negative relationship suggests that in certain ASEAN contexts, rapid market liberalization without adequate social safety nets may inadvertently hinder equitable human development. Meanwhile, variables such as government effectiveness and inflation do not show significant impacts within this specific observation period, likely due to the overbearing influence of the global pandemic on regional institutional performance.

3.2. Discussion

The primary objective of this study is to analyze the determinants of human development and to understand the dynamics of regional mobility within the framework of Klassen typology. Our empirical findings reveal a distinct pattern: economic growth serves as the primary engine of development, with a dominant long-run effect. In contrast, economic freedom presents significant challenges to developmental equity, while governance and inflation factors exhibit statistical neutrality. These results

provide a robust answer to the fundamental question of how the ASEAN countries can successfully "move up the ladder" toward higher development tiers.

The finding that economic growth exerts a significant positive effect validates the hypothesis that the expansion of aggregate output is an absolute prerequisite for human development. However, a more nuanced scientific interpretation lies in the disparity between short-run and long-run coefficients: the long-run impact is three times greater than that of the short run, signaling the presence of significant accumulation mechanisms and time lags. This provides empirical evidence that the conversion of national income into measurable improvements in public health and education is not an instantaneous process. Incremental increases in GDP per capita require a "trickle-down" period to translate effectively into accessible and high-quality public infrastructure. Within the context of Klassen typology, this implies that vertical mobility moving from a "Lagging" region to a "Rapidly Developing" region necessitates steady-state conditions or consistent growth sustained over more than a decade. A temporary or fluctuating economic surge is insufficient to bridge this gap. These findings align with extant literature emphasizing that sustainable growth is the cornerstone of permanent poverty eradication and long-run human capital enhancement (Abdillah et al., 2024; Farzana et al., 2024; Hasanah et al., 2025; Kurniawan, 2024; Sirén, 2024; Sutikno, 2020). In the absence of such consistency, narrowing regional disparities remains difficult, as human capital formation is a reciprocal and inherently time-consuming process (Cui et al., 2024; Huda & Istiana, 2024; and Maulana et al., 2025).

Furthermore, contrary to the widely adopted neoliberal hypothesis, our data indicate that economic freedom has a negative correlation with the Human Development Index in the ASEAN context. We interpret this counterintuitive result as a reflection of institutional unpreparedness. In many developing regions, market liberalization that lacks the balance of robust social safety nets tends to trigger wealth concentration among elite groups. This concentration exacerbates inequality and impedes equitable access to basic services. Consequently, our findings highlight a critical policy trade-off, pursuing market efficiency without mature governance can severely distort social welfare outcomes (Dagohoy et al., 2025; Kowalewska et al., 2023; Lukman et al., 2023; and Malik, 2025). This challenges the narrative that free markets lead inherently to prosperity and supports the critical view that without inclusive political institutions and regulations to protect vulnerable populations, economic freedom may prove counterproductive to human development (Badowska & Szkultecka-Dębek, 2023; Cui et al., 2024; Feruni et al., 2020; Guo et al., 2025; Kowalewska et al., 2023; and Osińska et al., 2025;).

The statistical insignificance of government effectiveness and inflation during the 2018–2023 period warrants further scholarly examination. The neutrality of government effectiveness can be attributed to the magnitude of the COVID-19 pandemic—an unprecedented exogenous shock that likely overwhelmed the adaptive capacities of even the most robust bureaucracies. During this crisis, health and education systems across all member states faced systemic failures, rendering variations in governance quality temporarily irrelevant in explaining short-run HDI fluctuations (Ahmed, 2022; Aluko & Ngubane, 2024; Aminah et al., 2021; Lantion et al., 2023; Lukman et al., 2023; and Song & Tong, 2022;). Similarly, the insignificance of Inflation suggests that moderate price stability, while important for fiscal health, is not a primary driver of human development when compared to structural real growth factors. This indicates that in the ASEAN region, HDI progress is dominated by substantive structural transformations rather than short-run monetary fluctuations or administrative capacity alone (Astusi et al., 2025; Cahyanti & Fevriera, 2020; Islam, 2022; Maisya et al., 2025; Suprpto et al., 2022; and Wahyudi et al., 2023).

4. CONCLUSIONS

This study provides a comprehensive analysis of the determinants of the human development index across ASEAN member states for the period 2018–2023. By employing Klassen typology, the research identifies persistent and unequal development patterns throughout the region. However, the system GMM estimates reveal that human development is inherently persistent; past developmental successes serve as a significant determinant of current achievements, suggesting that progress in the quality of life is a cumulative process. Empirically, economic growth is identified as the primary driver of welfare improvements, with its impact intensifying in the long run. A notable and counterintuitive finding is the significant negative effect of economic freedom on HDI during the period studied. This suggests that during

the COVID-19 pandemic, reliance on free-market mechanisms alone was insufficient to protect public welfare. Instead, active state interventions such as mobility restrictions and targeted social assistance were essential for preserving human life and health, even when such policies necessitated a temporary reduction in economic freedom scores. Conversely, government effectiveness and inflation did not yield statistically significant effects, likely due to the overwhelming magnitude of the exogenous crisis shock and the success of localized subsidy policies in stabilizing domestic purchasing power

Based on these findings, this study proposes two strategic policy frameworks. First, in the short-run, ASEAN governments should prioritize flexibility over rigid market-driven approaches during periods of crisis. Prompt fiscal interventions are necessary to safeguard the health and education sectors from external shocks. Second, in the long-run, temporary social assistance programs initiated during the crisis should be institutionalized into permanent, universal social protection systems. This transition is crucial for shielding the population's quality of life from future economic uncertainties and ensuring regional resilience. This study acknowledges certain limitations. First, the observation period was relatively short and heavily influenced by pandemic-related anomalies; therefore, generalizing these results to periods of conventional economic stability should be done with caution. Second, the use of country-level aggregate macro data may obscure internal socio-economic inequalities within individual member states. Future research is encouraged to extend the temporal scope to include post-recovery data and incorporate variables such as digital infrastructure to further enrich the literature on regional development.

Acknowledgment: The authors express their gratitude to the Institute for Research and Community Service, Universitas Jambi, and the Faculty of Economics and Business, Universitas Jambi, for their support.

Authors Contribution: conceived and designed the experiments; E.U., F.Z., F.R.A. performed the experiments; F.R.A. analyzed the data; F.Z. contributed reagents/materials/analysis tools; E.U., F.Z., F.R.A. wrote the paper. F.Z., F.R.A." Authorship must be limited to those who have contributed substantially to the work reported.

Conflict of interest: The authors declare no conflict of interest.

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