

Effectiveness of governance vs social development: a multivariate approach to countries' classification

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Abstract: Effective governance is pivotal in fostering social development and economic growth in modern societies. This paper explores the intricate relationship between social progress and government administration quality, aiming to identify the critical determinants influencing countries' social progress. We hypothesise that effective governance exerts a comprehensive influence on countries' social progress and vice versa, not only at the level of partial correlation. Drawing on the Social Progress Index (SPI) and Worldwide Governance Indicators (WGI), we employ discriminant analysis to understand how different dimensions of government effectiveness contribute to social development (Androniceanu & Georgescu, 2023).

The study finds that several factors significantly influence social progress, including Voice and Accountability, Political Stability, Control of Corruption, Regulatory Quality, and Government Effectiveness. By analysing data from 167 countries, we classify nations into high, medium, and low social progress groups based on SPI scores. The discriminant analysis model achieves an accuracy of 92.2% in classifying countries, indicating the robustness of the approach. Furthermore, multivariate Wilk's Tests of Significance reveal that variables related to water and sanitation, access to basic knowledge, access to information and communications, environmental quality, personal safety, and access to advanced education are determinants of social progress. The discriminant functions derived from the analysis

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provide insights into the relative importance of these variables in determining countries' social progress levels.

Our findings underscore the importance of effective governance in driving countries' social development outcomes. By identifying key factors that contribute to social progress, policymakers can design targeted strategies to enhance governance effectiveness and promote sustainable societal advancement. The study contributes to the existing literature by providing empirical evidence of the relationship between government efficiency and social development on a global scale.

Keywords: social development, governance efficiency, discriminant analysis, canonical variables, classification.

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Introduction

Effective governance is a fundamental prerequisite for developmental progress and is pivotal in fostering economic growth and social progress. On the other hand, the modern world faces numerous challenges in social development, necessitating a comprehensive and balanced approach from governments.

Achieving social development in countries depends on various factors, with one of the key components being the effectiveness of public governance. Establishing links between social development components and government administration quality has become exceedingly pertinent for many nations today.

As several authors describe (Pimenta, 2014; Sen, 1999; Krishnakumar, 2008), social development is a complex and multifaceted process encompassing various dimensions such as education, healthcare, economic growth, social justice, and cultural dynamics. These components are interlinked and influence one another, forming a complex network of relationships. Understanding this interaction is crucial for devising effective strategies and policies for social development.

Understanding the connections between various facets of social development and the effectiveness of government administration is crucial. Achieving harmonious and sustainable societal development requires targeted education, healthcare, and social welfare efforts and a comprehensive governance approach that fosters coordination and integration across policies.

Investigating these connections opens the door to developing effective governance strategies to improve the quality of life and societal well-being, as discovering the main factors that affect social progress could lead to better public policies and strategies designed by governments. From this perspective, this research aims to identify and analyse the main factors that influence the countries' social progress not only on partial correlations but also on the level of latent factors representing complex relationships among components of social development and governance effectiveness (Mishchuk et al., 2023).

We hypothesise that effective governance exerts a comprehensive influence on countries' social progress and vice versa, not only at the level of partial correlation. Our objective is to empirically substantiate this hypothesis and identify the critical determinants of the social development of countries.

The main research questions are:

Q1: Could different dimensions of governmental effectiveness explain the level of countries' social development?

Q2: What causes influence countries' level of social development in this context?

1. Literature review

Understanding the relationship between governance efficiency and social development ultimately informs policymakers and stakeholders in implementing strategies to enhance governance effectiveness and promote sustainable societal advancement.

Social progress depends on state effectiveness, which refers to the capacity of a government to efficiently and successfully fulfil its responsibilities in maintaining peace and security and providing essential services to its citizens. Moreover, state effectiveness is crucial for promoting human happiness as it creates an environment of stability, security, and prosperity. Effective governance improves well-being by providing peace, security, and essential services such as healthcare, education, and infrastructure (Helliwell et al., 2022).

Empirical research on governance efficiency is crucial as it provides tangible evidence of the effectiveness of governance structures and policies in fostering social development (Gani, 2011; Terziev, 2019; Stokemer, 2014; Keser et al., 2021; Azam, 2021; Androniceanu et al., 2023). Examining real-world data and outcomes, recent research (Keser et al., 2021; Azam, 2021) offered valuable insights into how governance practices impact societal progress dimensions and well-being.

Several researchers have reported that political stability and government effectiveness positively correlate with economic growth in developing countries. Meanwhile, voice, accountability, and corruption negatively impact those countries' development due to particular levels of democracy indicators (Gani, 2011; Rothstein & Teorell, 2008).

In a recent paper, Keser (2021) investigated the enduring connection between the involvement of country-level governance and national development using data from the founding nations of the Cooperation Council of Turkish-speaking States (including Azerbaijan, Kyrgyzstan, Kazakhstan, and Turkey). In this analysis, the Worldwide Governance Indicators (WGI) were employed as the independent variables, while the Human Development Index was the dependent variable. Significant causation was observed between the indicators of country-level governance, specifically Voice and Accountability and Government Effectiveness, and the national development process (Keser, 2021).

The recent growth in research on "good governance" and the quality of government institutions has been propelled by empirical findings that show that such institutions may hold the key to understanding economic growth and social welfare in developing and transition countries. However, Rothstein D. and Teorell J. (2008) argue that a critical issue still needs to be addressed: what quality of government means at the conceptual level.

Another article (Azam, 2021) empirically explores the impact of governance indicators along with some macroeconomic variables on the economic growth of 14 Latin American and Caribbean countries. The results disclose that corruption has a significantly inverse effect on growth, while political stability and government effectiveness positively impact the long run. Empirical findings demonstrate the need for good governance, where corruption needs to be miniaturised. At the same time, government effectiveness and political stability should be strengthened to boost economic growth and improve social welfare (Azam, 2021).

Despite a certain number of scientific works attempting empirical assessments of individual dimensions of government efficiency and economic and sustainable development, this area of research remains fragmented. In particular, there is no single approach to selecting dependent and independent variables, and empirical studies are dedicated to specific groups of countries within narrow dimensions of social and economic development.

In the existing literature, government efficiency on the country level is often measured through various quantitative and qualitative indicators (Helliwell et al., 2022; Keser et al., 2021), including economic indicators (e.g. GDP growth rates, government spending as a percentage of GDP, etc.); public services delivery (healthcare, education, infrastructure etc.); transparency and accountability (transparency indices, corruption perception indexes, and measures of accountability mechanisms, etc); regulatory environment (the ease of doing business, regulatory burdens, innovation, and private sector development, etc.); environmental sustainability indicators.

To the best of our knowledge, most empirical studies on the relationship between government efficiency and social development at the country level are based, one way or another, on approaches that involve grouping countries based on a particular criterion (typically the level of economic development).

Given the diversity of approaches and methods used by authors in empirical articles in this research direction, we emphasise the need to ensure the scalability of empirical results in the context of cross-country comparisons. Thus, it is necessary to utilise global data from leading organisations (such as the World Bank, UN, etc.) and a combination of data analysis methods. Doing this will help overcome the limitation of using standard country classifications as a grouping criterion and minimise the likelihood of obtaining results that can only be explained by regional peculiarities.

Many studies (Egbo & Bartholomew, 2017; Dellaportas, 1983) suggest that discriminant analysis classifies countries based on socio-economic data by maximising differences between groups and minimising within-group differences,

using variables like mortality rate, access to electricity, and factor endowment and categorising nations into distinct clusters or classes.

Empirical research shows an attempt to use discriminant function analysis to classify 68 randomly selected countries according to their respective economic status (Weak or Strong) on World Bank website data (Egbo & Bartholomew, 2017). The following economic indicators were used as independent variables: GDP, mortality rate, inflation rate and access to electricity. It showed that the mortality rate and access to electricity contributed most to linearly discriminate within the group (economy status) for the two levels (weak or strong).

G. Dellaportas (1983) used data from 62 countries representing various levels of development. Several mental, economic, nutritional, demographic, cultural and health indicators were used for discriminant analysis based on a priori classification of each nation to one of three levels of development.

A multivariate approach is often employed in measuring socio-economic development to develop indicators for classifying countries worldwide and uncover latent relationships among various spheres of economic development (Milenković et al., 2014; Abayomi & Pizarro, 2013).

2. Research methodology

According to the findings of the global non-profit initiative - the Social Progress Imperative - social progress is elucidated as the societal capacity to adequately address its populace's fundamental needs (Harmacek et al., 2022). To operationalise the measurement of social progress, the Social Progress Imperative introduces the Social Progress Index (SPI), a metric designed to assess the efficacy of society in providing its constituents with elements deemed truly significant to their well-being. The Social Progress Index© (SPI) rigorously measures a country's performance on many aspects of social and environmental performance relevant to governments at all levels of economic development. It enables an assessment of not just absolute country performance but relative performance compared to a country's economic peers (Harmacek et al., 2022). The SPI allows a country's success in economic progress to be assessed through improved social outcomes (figure 1).

Figure 1. Social Progress Index Framework



Source: (Harmacek et al., 2022)

The Worldwide Governance Indicators (WGI) have been formulated to evaluate overarching trends in the perception of governance dynamics across diverse countries and temporal spans.

The WGI encapsulates six comprehensive governance indicators for 200 countries and territories: 1. Voice and Accountability, 2. Political Stability and Absence of Violence/Terrorism, 3. Government Effectiveness, 4. Regulatory Quality, 5. Rule of Law, 6. Control of Corruption.

In addition to these variables, we use in our analysis components of SPI: 1. Nutrition & Basic Medical Care, 2. Water & Sanitation, 3. Shelter, 4. Personal Safety, 5. Access to Basic Knowledge, 6. Access to Information & Communications, 7. Health & Wellness, 8. Environmental Quality, 9. Personal Rights, 10. Personal Freedom & Choice, 11. Inclusiveness, 12. Access to Advanced Education.

Therefore, we aim to find empirical functions linking two cross-country datasets describing the effectiveness of governance efficiency (1 – WGI data) and social development (2 – SPI data). In doing so, our goal is to achieve generalised and scalable conclusions regarding the possibility of a multi-variable classification of countries by the level of social development. Conducting empirical analysis from this perspective will provide us with answers to our research questions.

The discriminant analysis technique, pioneered by R. A. Fisher in 1936, is used for the multivariate examination of group distinctions. It is beneficial for explanatory purposes when the researcher aims to (a) describe, summarise, and comprehend the differences between or among groups, (b) determine the most effective continuous variables that characterise group distinctions, (c) outline the dimensionality of group differences akin to how factor analysis delineates the dimensionality of continuous variables, (d) assess theories employing stage concepts or taxonomies, and (e) scrutinise the nature of group distinctions after multivariate analysis of variance (MANOVA) (Borgen & Seling, 1978).

Linear discriminant analysis can effectively find the most potent linear regression combination, resulting in a robust estimate of slope in grouped data linear regression (Atkinson & Cox, 1977). Discriminant Analysis determines which variables discriminate between two or more occurring groups, and the primary goal is to identify the variables that best differentiate between predefined groups (Bartholomew, 2010).

A discriminant analysis enables the search for the linear equations that maximise group differences (1):

$$D_m = a + \sum_{i=1}^n b_i x_i \quad (1)$$

where D_m - is the categorical variable, specifically group membership, the b_i are the weights applied to the variables x_i , the a is a constant reflecting the interception of the regression line, m - group number.

The discriminant analysis aims to form a linear equation for each group that maximises the differences between the weighted group means. In the ANOVA paradigm, the weights are chosen to maximise the ratio of the between-groups sum of squares to the within-groups sum of squares. In effect, variables on which the groups differ are generally weighted more heavily, and those variables on which the groups are similar receive smaller weights. Nevertheless, the technique emphasises group differences and deemphasises similarities (Betz, 1987).

In addition to information about discriminant weights, a discriminant analysis usually includes a canonical structure matrix, that is, a matrix of the correlations of each variable with each function; these correlations are known as canonical variate correlations or as discriminant loadings (Bray & Maxwell, 1982). These loadings are conceptually similar to factor loadings (Huberty, 1984) and can, therefore, be used to interpret the dimensionality of group differences (Borgen & Seling, 1978). Some statisticians contend that these loadings are more stable on cross-validation than are discriminant weights and, thus, may be safer to interpret.

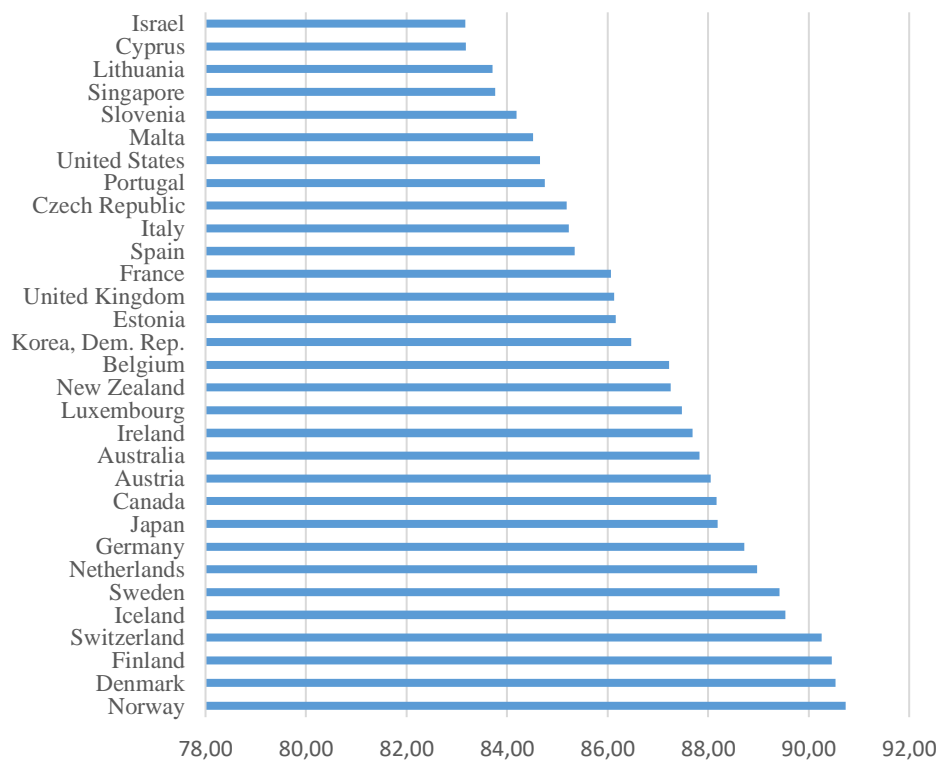
Discriminant analysis is related to canonical correlation analysis. Both methods are part of the broader class of multivariate statistical techniques and share similar mathematical and conceptual foundations. Canonical correlation analysis examines the relationship between two sets of variables, seeking the maximum correlation between linear combinations of variables from each set. On the other hand, discriminant analysis is specifically designed to study group differences and predict group membership based on multiple predictor variables.

In canonical correlation analysis, the goal is to understand the relationship between two sets of variables, while in discriminant analysis, the focus is on examining the extent to which multiple predictor variables are related to a categorical criterion, such as group membership. Both methods are potent techniques providing insights into group separation and relationships between sets of variables and valuable research tools, allowing for a deeper understanding of complex relationships within data.

3. Research results and discussions

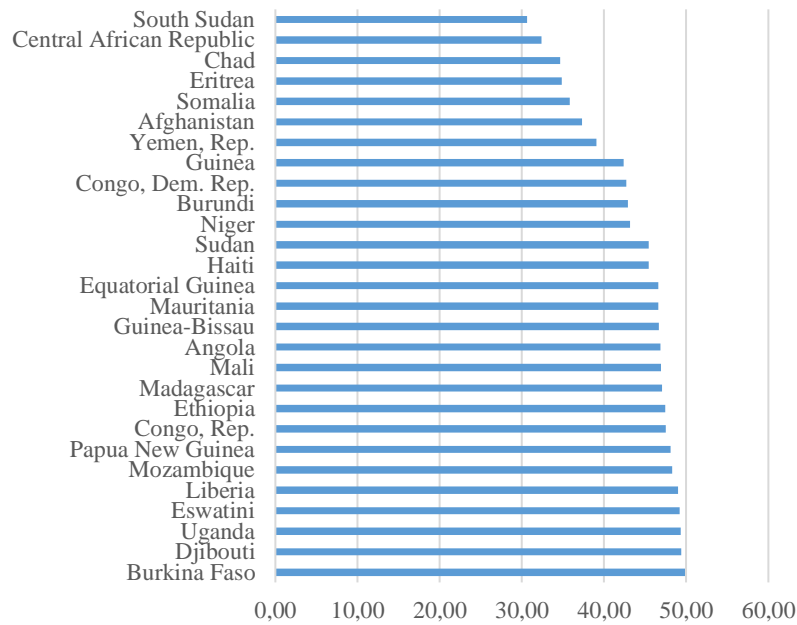
The Social Progress Index (SPI) is a significant variable for gauging global social progress levels. It underscores the disparities in social development among nations, prompting a comprehensive exploration of the various levels and factors shaping social progress. Figure 2 portrays the countries leading in social progress based on SPI values, whereas Figure 3 illustrates nations that lag or are considered outliers regarding social progress.

Figure 2. Top 30 countries by SPI score 2022



Source: Authors' contribution based on SPI data

Figure 3. Countries by SPI score 2022 lower than 50



Source: Authors' contribution based on SPI data

Frequency analysis on SPI (table 1) indicates that 21% of countries demonstrate heightened scores in the SPI between 80-90. Simultaneously, a quarter of countries display SPI values falling within the interval of 60-70. Additionally, a significant 35,3% of countries within the examined cohort are distinguished by SPI scores that do not surpass the threshold of 60.

Table 1. Frequency table of Social Progress Index 2022
(*K-S d=0,066; p> 0,20; Lilliefors p<0,10*)

Category	Count	Cumulative count	% of all cases	Cumulative % of all
30<x≤40	7	7	4,2	4,2
40<x≤50	21	28	12,6	16,8
50<x≤60	31	59	18,6	35,3
60<x≤70	41	100	24,6	59,9
70<x≤80	28	128	16,8	76,6
80<x≤90	35	163	21	97,6
90<x≤100	4	167	2,4	100,0

Source: Authors' calculations

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Among the 167 countries as valid observations (the size of the dataset used for analysis), the mean SPI score of 66,04 represents the average level of social progress worldwide as the measure of the distribution of SPI scores (table 2).

Table 2. Descriptive statistics SPI 2022

	SPI
Valid N	167
Mean	66,04
Median	67,02
Mode	70,7
Frequency	2
Minimum	30,65
Maximum	90,74
Lower	52,97
Upper	78,21
Range	60,09
Std.Dev.	14,91
Coef.Var.	22,58

Source: Authors' calculations

The central tendency in social progress is on the level of a median SPI score of 67,02; SPI is bimodal with a mode score of 70,7. A standard deviation of 15 indicates the extent of variability or dispersion in the dataset. A coefficient of variation of 22,58% indicates a moderate level of relative variability in the dataset. In this context, the entire range of possible values on the scale has been utilised, suggesting substantial variability in the SPI scores across the dataset. A range of 60,09 covers a broad spectrum of potential social progress levels, indicating considerable diversity among the countries or entities being assessed. Therefore, in the context of an SPI scale from 0 to 100, a range of 60,09 would likely be viewed as significant, reflecting the broad range of social progress levels captured in the dataset. The lower quartile boundary indicates that 25% of the countries' SPI scores lie under 52,97, while the upper quartile boundary (78,21) indicates the value below which 75% of the countries' SPI scores lie.

This underscores the imperative of classifying the countries into distinct groups based on their SPI scores (tabl. 3). This categorisation is essential to facilitate a more nuanced analysis of the determinants contributing to effective governmental administration in social development.

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Table 3. Countries groups by SPI score 2022

Group by SPI level	Countries
1 High (SPI>70)	Norway, Denmark, Finland, Switzerland, Iceland, Sweden, Netherlands, Germany, Japan, Canada, Austria, Australia, Ireland, Luxembourg, New Zealand, Belgium, Korea Dem. Rep., Estonia, United Kingdom, France, Spain, Italy, Czech Republic, Portugal, United States, Malta, Slovenia, Singapore, Lithuania, Cyprus, Israel, Latvia, Greece, Croatia, Slovak Republic, Chile, Costa Rica, Uruguay, Poland, Barbados, Argentina, Hungary, Romania, Bulgaria, Serbia, Trinidad and Tobago, Mauritius, Armenia, Montenegro, Georgia, Moldova, Ukraine, Albania, Malaysia, Kuwait, Panama, Jamaica, Russian Federation, Ecuador, Belarus, Brazil, Bosnia and Herzegovina, Suriname, Kazakhstan, Mexico, Peru, United Arab Emirates.
2 Medium (50<SPI≤70)	South Africa, Colombia, Thailand, Tunisia, Dominican Republic, Sri Lanka, Paraguay, Vietnam, Bhutan, Maldives, Oman, Philippines, Jordan, Kyrgyz Republic, Mongolia, Bolivia, Fiji, Indonesia, Turkiye, Lebanon, Qatar, Uzbekistan, Bahrain, Botswana, China, Algeria, Guyana, West Bank and Gaza, Ghana, El Salvador, Morocco, Saudi Arabia, Iran, Islamic Rep., Azerbaijan, Sao Tomé and Príncipe, Gabon, Namibia, Honduras, Nicaragua, Guatemala, India, Nepal, Timor-Leste, Egypt, Arab Rep., Venezuela, RB, Kenya, Senegal, Iraq, Turkmenistan, Bangladesh, Tajikistan, Cambodia, Benin, Tanzania, Gambia, Malawi, Libya, Cote d'Ivoire, Nigeria, Lesotho, Solomon Islands, Rwanda, Zimbabwe, Comoros, Zambia, Syrian Arab Republic, Togo, Myanmar, Cameroon, Pakistan, Lao PDR, Sierra Leone.
3 Low (30<SPI≤50)	Burkina Faso, Djibouti, Uganda, Eswatini, Liberia, Mozambique, Papua New Guinea, Congo, Ethiopia, Madagascar, Mali, Angola, Guinea-Bissau, Mauritania, Equatorial Guinea, Haiti, Sudan, Niger, Burundi, Congo, Dem. Rep., Guinea, Yemen, Rep., Afghanistan, Somalia, Eritrea, Chad, Central African Republic, and South Sudan.

Source: Authors' calculations

On the contrary, we aim to evaluate the suitability of the classification in assessing the level of socio-economic development in countries within the framework of government administration effectiveness. Below, we present the discriminant analysis results to examine the relationship between variables set constructed from SPI components, WGI, and countries' memberships in particular groups from Table 3. The analysis aimed to obtain discriminant functions for each group of countries classified above.

We used the General Discriminant Analysis (GDA) module of StatSoft STATISTICA 12.0 to conduct a discriminant analysis, taking into account the indicators related to the quality of government management (as shown in Table 4). This analytical approach helps identify the factors contributing to socio-economic

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development among various indicators of governance quality. As a result, our research explores the complex relationships between social progress indicators and governance efficiency.

Table 4 helps to evaluate the performance of the discriminant analysis model in classifying countries into different groups. The percentages of correct classifications indicate the model's accuracy, while the classification counts offer insight into the distribution of observations across different groups; in general, the correctness of classification is 92,2%.

Table 4. Classification Matrix
Classifications: Rows (Observed) Columns (Predicted)

Group	Percent Correct	1 group p=0,40	2 group p=0,43	3 group p=0,16
1 Hight	92,5	62,0	5,0	0,0
2 Medium	91,7	1,0	66,0	5,0
3 Low	92,9	0,0	2,0	26,0
Total	92,2	63,0	73,0	31,0

Source: Authors' calculations

In the context of discriminant analysis, Multivariate Wilk's Tests of Significance for variables are used to assess the overall contribution of predictor variables to the discrimination between groups (Table 5).

Table 5. Multivariate Wilk's Tests of Significance
(Sigma-restricted parameterisation for Effective hypothesis decomposition)

Effect	Value Wilk's	F	Effect df	Error df	p
Intercept	1		0		
Voice and Accountability	1		0		
Control of Corruption	0,994	0,46	2	147	0,63
Rule of Law	0,977	1,70	2	147	0,19
Regulatory Quality	0,953	3,66	2	147	0,03
Government Effectiveness	0,954	3,51	2	147	0,03
Political Stability No Violence	0,996	0,32	2	147	0,73
Voice and Accountability	1		0		
Nutrition & Basic Medical Care	0,995	0,36	2	147	0,7
Water & Sanitation	0,932	5,36	2	147	0,006
Shelter	0,995	0,38	2	147	0,69
Personal Safety	0,957	3,30	2	147	0,04
Access to Basic Knowledge	0,912	7,11	2	147	0,001
Access to Information & Communications	0,956	3,40	2	147	0,04

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Effect	Value Wilk's	F	Effect df	Error df	P
Health & Wellness	1,000	0,03	2	147,0	0,97
Environmental Quality	0,929	5,59	2	147,0	0,005
Personal Rights	0,975	1,86	2	147,0	0,16
Personal Freedom & Choice	0,993	0,51	2	147,0	0,6
Inclusiveness	0,985	1,15	2	147,0	0,32
Access to Advanced Education	0,879	10,14	2	147,0	0

Source: Authors' calculations

As is seen from Table 5, the statistically significant variables (with significant F-value and $p < 0,05$) in this test are deemed essential at the variable level for discriminating between the groups of countries as two variables from the WGI data set (*Regulatory Quality, Government Effectiveness*) and five variables from the SPI components dataset (*Water and Sanitation, Personal Safety, Access to Basic Knowledge, Access to Information and Communications, Environmental Quality, Access to Advanced Education*).

For each group, we have the discriminant functions' coefficients (Table 6) that involve understanding each predictor variable's contribution to the differentiation of particular groups.

**Table 6. Classification (discriminant) Functions for Rank SPI
(Sigma-restricted Parameterization)**

Effect	Function coefficients		
	1 group High SPI	2 group Medium SPI	3 group Low SPI
Interception	-217,77	-174,46	-138,08
Voice and Accountability	-27,39	-26,89	-26,67
Control of Corruption	9,1	7,82	7,50
Rule of Law	-10,05	-7,47	-4,19
Regulatory Quality	6,43	3,43	4,47
Government Effectiveness	-8,64	-5,81	-8,04
Political Stability No Violence	-10,30	-10,85	-10,73
Nutrition & Basic Medical Care	1,35	1,33	1,25
Water & Sanitation	0,38	0,38	0,17
Shelter	0,03	0,01	0,05
Personal Safety	0,62	0,46	0,46
Access to Basic Knowledge	0,49	0,39	0,20

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Effect	Function coefficients		
	1 group High SPI	2 group Medium SPI	3 group Low SPI
Access to Information & Communications	0,32	0,29	0,15
Health & Wellness	-0,13	-0,12	-0,13
Environmental Quality	0,85	0,72	0,79
Personal Rights	1,23	1,20	1,09
Personal Freedom & Choice	0,81	0,88	0,85
Inclusiveness	0,33	0,26	0,22
Access to Advanced Education	-0,92	-1,10	-0,96

Source: Author's contribution

The discriminant function analysis results yielded a model (a system of equations representing linear combinations of initial values - Table 6). The absolute values of coefficients in discriminant analysis represent the magnitude of the contribution of each predictor variable to the differentiation of groups. These coefficients, also known as discriminant weights, are derived from the discriminant analysis and indicate the relative importance of each in contributing to group differences. The results provide grounds to assert that the countries' classification on the level of SPI is significantly dependent on such WGI indicators (with high absolute values of discriminant function weights) as *Voice and Accountability*, *Political Stability No Violence*, *Control of Corruption* and *Rule of Law*.

The high enough interceptions in each group's equation mean that many unobserved or latent factors exist that are not included in group discriminant equations.

In addition to providing information about discriminant weights, a discriminant analysis usually includes a canonical/factor structure matrix, that is, a matrix of the correlations of each variable with each function; these correlations are known as canonical variate correlations or as discriminant loadings (Bray & Maxwell, 1982).

Table 7. Chi-square tests with Successive Roots Removed

Roots	Eigenvalue	Canonical R	Wilks' Lambda	Chi-Sqr.	df	p-value
0	5,54	0,92	0,094	376,09	22	0
1	0,63	0,62	0,61	77,52	10	0

Source: Author's contribution

The first canonical correlation coefficient (0,92), is highly statistically significant ($p < 0,01$) with acceptable eigenvalue (5,54) and Wilks' Lambda (0,094). That is why the canonical discriminant model without root removal should be considered. To provide meaningful interpretation, we examine how roots correlate with the variables from the initial set. These correlations are called loadings of canonical factors or structural coefficients (Table 8).

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Table 8. Factor Structure Matrix Correlations Variables - Canonical Roots

Variable	Roots	
	Root 1	Root 2
Interception	0	0
Access to Advanced Education	0,39	0,27
Water & Sanitation	0,37	0,20
Environmental Quality	0,39	0,15
Access to Basic Knowledge	0,42	0,22
Personal Rights	0,42	0,06
Access to Information & Communications	0,32	-0,05
Rule of Law	0,39	0,27
Personal Safety	0,57	-0,27
Regulatory Quality	0,60	-0,42
Government Effectiveness	0,53	-0,36
Inclusiveness	0,58	0,09

Source: Author's contribution

Each canonical root is characterised by two weighted sums corresponding to the data set. The greater the absolute value of the canonical weight of a factor, the more significant the contribution of the corresponding variable to the canonical root (table 9).

Table 9. Means of Canonical Variables

Group	<i>Root 1</i>	<i>Root 2</i>
G_1:1	-2,53	0,44
G_2:2	0,84	-0,86
G_3:3	3,91	1,15

Source: Author's contribution

The means of canonical roots (variables) for each group indicate that the first canonical root describes in a better way the factor structure for countries with high and low SPI.

Standardised coefficients (table 10) represent the factor structure coefficients after standardisation and indicate the change in standard deviations of the discriminant function for a one-standard-deviation increase in the predictor variable. In summary, standardised canonical discriminant function coefficients provide insights into the relative importance of predictor variables in discriminating between groups, while standardisation ensures comparability across variables.

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**Table 10. Standardised Canonical Variables
(Canonical Discriminant Function Coefficients)**

Variable	Roots	
	1	2
Interception	0,00	0,0
Access to Advanced Education	-0,09	-0,1
Water & Sanitation	0,21	0,2
Environmental Quality	-0,64	0,2
Access to Basic Knowledge	0,31	0,8
Personal Rights	-0,19	-1,1
Access to Information & Communications	0,07	0,1
Rule of Law	0	0
Personal Safety	0,10	-0,2
Regulatory Quality	0,26	-0,6
Government Effectiveness	0,00	0,2
Inclusiveness	0,21	0,3
<i>Eigenvalue</i>	0,42	-0,3
<i>Cum.Prop</i>	0,23	-0,4

Source: Authors' contribution

The table presents each predictor variable's canonical discriminant function coefficients across two discriminant function roots (Roots 1 and 2). These coefficients indicate each variable's relative contribution to the SPI level indicated by countries' group membership (High, Medium, Low). The eigenvalue means that 42% of SPI variance could be explained by Root 1. In this case, Root 1 explains a higher proportion of variance than Root 2.

So, we have obtained a global social development model considering governance effectiveness indicators. The coefficients of the canonical root equations determine the weight of each indicator in each of the canonical roots. It can be asserted that the level of social progress of each country included in the analysis in general is determined by the following: Access to Advanced Education, Water and Sanitation, Environmental Quality, Access to Basic Knowledge, Personal Rights, Access to Information & Communications, Rule of Law, Personal Safety, Regulatory Quality, Government Effectiveness, Inclusiveness.

4. Conclusions

This study examined the intricate interplay between governance effectiveness and social development, aiming to move beyond partial correlations to explore their comprehensive influence. Our research questions revolved around understanding the role of various dimensions of governmental effectiveness in shaping countries' social development levels and identifying the underlying causes influencing social progress in this context.

Addressing our first research question, the analysis revealed compelling evidence supporting the hypothesis that different governmental effectiveness dimensions are significant determinants of countries' social development. Through rigorous examination, we found that regulatory quality, government effectiveness, and access to essential services emerged as critical factors influencing social development across nations. These findings underscore the importance of effective governance mechanisms in driving holistic social progress, highlighting the need for policymakers to prioritise reforms to improve regulatory frameworks, enhance government institutions, and ensure equitable access to essential services.

Turning to our second research question, our investigation elucidated the multifaceted causes influencing countries' levels of social development within the context of governance effectiveness. Political stability, transparency, accountability, and the provision of essential knowledge and services emerged as critical determinants shaping social progress trajectories. This comprehensive understanding of the underlying causes provides valuable insights for policymakers and stakeholders seeking to formulate targeted interventions to foster inclusive and sustainable development.

The results assert that the countries' SPI levels significantly depend on public administration in such areas as a) citizens' participation in selecting their government, as well as freedom of expression, freedom of association, and free media. It reflects the degree of democratic governance and civil liberties within a country; b) the likelihood of political instability and violence within a country. It considers factors such as politically motivated violence, terrorism, civil war, etc.; c) anti-corruption policies' effectiveness, public officials' integrity, and the prevalence of bribery and embezzlement; d) the independence of the judiciary, the impartiality of law enforcement, and the enforcement of legal decisions.

In conclusion, our study contributes empirical evidence that effective governance is pivotal in driving countries' social progress and vice versa, transcending partial correlations. By addressing our research questions, we have shed light on the intricate relationship between governance effectiveness and social development, emphasising the need for integrated policy approaches that address governance deficiencies while promoting inclusive development outcomes. Further research could delve deeper into specific governance mechanisms and policy interventions to advance global efforts towards achieving equitable and sustainable social development.

Conflict of interest

The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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