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Rethinking Public Sector Performance in Developing Economies: A Musgravian Capability Approach

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Abstract

The multidimensional PPP index is introduced in public sector performance (PSP) through different dimensions of developing economies under one empirical model. The paper, drawing on Musgrave's functional theory of public finance and Sen's capability approach, not only considers the common indicators of government efficiency and corruption but also adds macroeconomic stabilization and social outcomes to them. Panel data for a 30-year span were obtained with the help of World Development Indicators (WDI), which the study heavily relied on for the primary sources. Besides getting through Principal Component Analysis (PCA) seven sub-dimensional indices (administration education health, infrastructure distribution stabilization, and economic performance), the authors also put these into two principal (Opportunity and Musgravian) and finally into a single overall performance index. In the quantitative analysis, these two major types of performances (macroeconomic development/transition and the provision of social opportunity) seem to be the two most different areas. The health and infrastructure dimensions turned out to be more powerful explanatory elements So showing that the health care outcomes and access to digital connectivity are playing a more pivotal role to public sector performance. In contrast, the macroeconomic dimensions exhibited relatively insignificant connections indicating potential differences in the structure of developing economies. With this research, the paper shows a practical example of how one might construct a multidimensional index using PCA, which minimizes discretion/subjectivity related to aggregation methods and at the same time produces statistically valid weights to the variables.

Keywords: Public Sector Performance, Principal Component Analysis, Governance, Human Development, Musgrave Functions, Developing Economies.

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1. Introduction

The role of the public sector in advancing economic progress, social welfare, institutional stability has been at the heart of development economics and public finance literature for many years. Governments are expected to provide efficient administration and high-quality institutions, as well as to promote equal income distribution, macroeconomic stability, human capital enhancement, and infrastructural development. Therefore, measuring public sector performance (PSP) continues to be an area of growing interest to policymakers, international bodies, and scholars who want to uncover the reasons behind cross-country differences in developmental achievements.

Until recently, public sector efficiency had mainly been judged by a single set of indicators on governance aspects like administrative efficiency, control of corruption, quality of regulation, and institutional effectiveness (Kaufmann & Kraay, 2010). Although governance indicators can give us good insights into the strength of the institutions, they often overlook other aspects of the activities that the state undertakes in support of development and social welfare. In a lot of developing economies for example, raising the level of governance does not mean that the state will be able to do more with redistribution, macroeconomic policies, or human development

Only one or two dimensions of public sector performance are addressed by most of the available literature and they mostly stick to a very narrow definition and measurement of this concept. Governance quality and institutional effectiveness have been the focus of most of the studies in this area (Kaufmann & Kraay, 2010), whereas many other authors have concentrated their efforts more on fiscal efficiency or on public expenditure outcomes (Afonso et al., 2005). Though these methods have proven quite insightful their limitations are evident in the sense that they often exclude from consideration development dimensions like social mobility, equity between people, and stability at the macroeconomic level.

For example, Afonso et al. (2005) proposed a public sector performance and efficiency model using public administration education health infrastructure income distribution, economic stability, and economic performance indicators. They showed the value of bringing together different aspects of state operations into one structure. Still, the subsequent literature on the topic mainly focuses again on governance and institutional variables, while the social and economic functions of the state have been left aside.

Such constraint of attention is even more critical in the situations of developing economies as they have a number of features, such as structural diversity, weak institutions poverty macroeconomic instability, and insufficient infrastructures, all at the same time.

That means, one-dimensional public sector performance assessment could yield incomplete or misleading pictures. A multidimensional setup to public sector outcome that incorporates all dimensions mentioned above is an important step towards uncovering public sector effectiveness at different levels.

PCA is considered as a standard multivariate method for composite index derivation as it reduces the dimension space to the smallest possible level but retains the maximum amount of the information present in the original variables. It is not only very different from equal-weighting aggregation methods but also the biggest reason it works is in generating weights based upon a covariance matrix and how variance is accounted for by different factors. Nardo et al. (2005); Nicoletti et al. (1999) used as a tool in their research for measurement of multidimensional welfare.

This paper, given these factors, uses PCA techniques in building a multi-dimensional Public Sector Performance index for developing countries. We have combined the opportunity dimension

and the Musgravian state functions in a single hierarchical system. In particular, seven sub-dimensions of public service provision are considered in the paper namely: administration education health infrastructure distribution, stabilization and economic performance. These dimensions will be, through their interrelation, grouped into two major levels: opportunity dimension and Musgravian dimension; the combination of these two dimensions finally gives a general measure of the Public Sector Performance index on which sampled economies will be compared.

This study brings significant additions to the literature. Initially, by combining welfare-focused and socio-economic aspects of state performance with governance approaches within a single setup, the paper goes beyond traditional governance-oriented analyses. Then, the research develops an implementation of Musgrave's fiscal setup theory in a comprehensive cross-cultural environment. Doing so enriches the theoretical background for public sector evaluation. Further, by using opportunity dimensions related to Sen's capability theory, the research opens up the definition of what forms effective state action to cover more than just administrative efficiency. In fact, the choice to use principal component analysis (PCA) offers an objective statistical approach to indexing as compared with the more subjective methods of weighting indices that are commonly applied. On top of this, the research Mainly helps in expanding the knowledge base of underdeveloped countries where the paper illustrates how the state performance characteristics differ in various dimensions at the national level.

Remainder of the study is organized as follows. Second section provides an overview of the theoretical and empirical works on public sector performance and the construction of composite and multidimensional indicators.

Section three is devoted to introducing data collection, the choice of variables and methodology description. The outcomes of the analysis with interpretations are covered in section four. Last section offers a summary and policy recommendations.

To conduct a case empirical exercise, we have selected and analyzed annual data of developing countries for the years 1996-2022. Most the variables are sourced through the World Bank's World Development Indicators database. Some of them have been extracted also from the standardized World Income Inequality Database (SWIID). Subsequently PCA has been performed to construct overall PSP index.

2. Theoretical and Empirical Literature Review

2.1 Conceptualizing Public Sector Performance

Public sector performance has been one of the main topics of public finance, development economics, governance studies, and to some extent, institutional economics. The term generally captures that government is able to deploy resources effectively, deliver public goods and services, keep inflation in check, reduce inequality, and raise levels of society's welfare. Although, topic is extremely critical, the literature has not reached one universally accepted definition or measurement setup for assessing public sector performance.

Richard Musgrave outlined a set of three fundamental economic government functions in his classical work called *The Theory of Public Finance* (1959). Allocation is broadly about delivering public goods in a cost-effective manner and fixing market failures. Distribution is connected with narrowing disparities and encouraging the well-being of people socially through redistribution. Lastly, the function of stabilization deals with keeping prices and the economic system steady through employment levels and sustainable economic growth. Sen (1999) was the one that

developed the capability approach under this new direction. Sen says that the measurement of development should not simply rely on income growth, but on how capabilities and freedoms of individuals get expanded. The contribution of Sen's approach, as a perspective of the evaluation of public sector through this structure was to link governmental performance with human well-being and opportunity expansion quite a bit.

But institutional economics further enriched the debate by highlighting the crucial role played by governance, bureaucratic quality, legal systems, and the overall performance of institutions in bringing about changes in economic and social conditions. North (1990) was one of those who saw institutions as "the rules of the game" that not only shape economic relationships but also dictate the developmental outcomes for the long run.

2.2 Governance and Institutional Perspectives

Many studies look at how the quality and characteristics of governance in a nation affect the efficiency and performance of the public sector. One of the most widely recognized systems for measuring the quality of governance is the Worldwide Governance Indicators (WGI) which were introduced by Kaufmann and Kraay (2010). These indicators evaluate a range of variables like government efficiency, fighting corruption, upholding the rule of law, quality of regulation, political stability, and transparency and democracy of a nation among other things.

Mauro (1995) for instance, revealed that corruption greatly impacts economic growth and public investment efficiency negatively. Rajkumar and Swaroop (2008), then again, showed that public spending can bring improved development levels in a country where governance and institutions function effectively. In general, the quality of governance as a determinant of development has been highlighted by authors like Acemoglu et al. (2001). It is argued that the governance indicators tend to miss the differences that exist among developing economies. This might not even completely capture one of the most crucial aspects for delivering welfare-enhancing results that are often a characteristic of developing countries, that is, state capacity (Andrews, 2010).

2.3 Public Sector Performance and Efficiency Literature

The public sector performance (PSP) and public sector efficiency (PSE) research areas have greatly grown due mainly to the attempts of empirical researchers to measure state effectiveness using composite indicators and efficiency measurement approaches. The most well-known paper among these is the one written by (Afonso et al., 2005), who put forward a detailed model of PSP and PSE about industrialized nations.

In 2013, they again did a similar kind of research, but this time focusing on the Latin American countries. Herrera and Pang (2005) are also among these scholars who have carried out an efficiency study on public expenditure at the level of developing economies and found that there is a considerable waste of resources in the health and education sectors. They argued that quality of institutions and governance are accountable for this difference. (Gupta & Verhoeven, 2001) examined public expenditure efficiency in the African continent and reported that some of the countries who made a relatively good level of public expenditure were not translated it to satisfactory developmental results. They stated that governance problems and institutional inefficiencies could undermine public expenditure's productivity.

2.4 Human Development and Ability Focused Literature

A third branch of literature that has developed around human development outcomes as an indirect measure for evaluating the efficiency of public services, in particular, has been identified. The

Human Development Index (HDI) proposed by the UNDP (Conceição, 2020) not only revolutionized the measurement of development by aggregating income, education, and life expectancy into a single index, but also gave a significant boost to the development literature on human rights. Human development scholars based on Sen's capability approach advocate that governments should be judged by their ability not just to fulfill basic needs of the society.

Anand and Ravallion (1993) found that governments' investments in social areas lead to increases in people's life expectancy and general wellbeing. Baldacci et al. (2008) for instance also pointed out that social expenditure leads to success in areas of education and health mainly for extremely poor countries. The link between education and economic growth has also been well established. Barro (1996) highlighted that education is one key driver of productivity and long-term economic development.

Bloom and Canning (2000) pointed out that health gains quite a bit contribute to productivity and economic performance. Recent literature highlights the emerging role of ICT access and Internet technologies as the new dimensions of development and the role of government in enhancing their people's skills and knowledge in this digital age. The Bank (2016) said access to the Internet and digital connectivity are very important factors in increasing productivity, public service delivery, and economic participation.

2.5 Distribution, Inequality, and Welfare

The distributive aspect of the public sector is an essential part of welfare economics and taxation literature. Kuznets (2019) first raised the idea of economic growth leading to increasing inequality, which after a long period of time leads to decreasing inequality ("Inverted-U curve," in Kuznets terminology). Atkinson (2015) work also argued that inequality erodes unity of society, weakens the economy's resilience, and harms future welfare outcomes.

Stiglitz (2012) pointed that extreme inequality causes loss of trust among citizens, a decrease in production efficiency, and undermines democratic institutions. Ravallion (2012) has pointed that when inequality exists, the economic growth is not as effective in reducing Poverty. Also, Ferreira and Ravallion (2011) argued that if governments aim to bring about a welfare improvement, they have to look first at the redistribution of income and the alleviation of poverty as major means.

2.6 Macroeconomic Stabilization and Economic Performance Literature

The state's ability to ensure macroeconomic equilibrium forms another fundamental element reflecting its efficiency. Fischer (1993) provided a convincing argument that macroeconomic disturbances hinder capital formation resulting in low economic expansion and investments. Easterly and Fischer (2001) demonstrated that inflation disproportionately hits the poor and increases inequality and social disintegration. (Barro, 1996) found that a stable macroeconomic environment fosters a long run growth, while Okun (1970) explained how unemployment brings about deteriorating social welfare situations as more people get affected or fall into poverty and the cost for the state for social welfare spending goes up.

While analyzing macroeconomic stabilization, it is important not to be limited to only economic factors but also consider other dimensions of society like political, cultural etc.

2.7 Composite Indices and Principal Component Analysis in Development Research

In development economics, governance studies, and welfare analysis, the construction of comprehensive indices has turned out to be an effective instrument for conveying the essence of a multidimensional issue. They can be helpful as a means of synthesizing the large set of indicators

into a compact summary. Nardo et al. (2005) showed that if the weights of a composite indicator are given arbitrarily, it may be an arbitrary choice and often means a biased or even misleading picture.

PCA technique is a popular data analysis method for building composite indexes where it is used to identify a set of latent variables that account for the largest possible amount of variation in the original data, without assuming a particular distribution. PCA generates the new weights by using the covariance between the original variables as a basis and by maximizing the variance of the new variables. Nicoletti et al. (1999) used PCA to construct indices of competition across the OECD member countries, while Filmer and Pritchett (2001) employed the technique to construct wealth indices at the household level in development studies

2.8 Research Gap and Contribution of the Study

Many public sector performance assessments have been based on governance-centered or narrow efficiency indicators without recognizing the wider dimensions such as public welfare or stabilization that the state is responsible for delivering through its economic intervention. Secondly, it is still rare to find academic works that put Together Musgrave's allocation, distribution and stabilization concepts as different functions into a single multidimensional empirical analysis setup.

Taking on all these challenges, this paper will develop a comprehensive index of public sector performance consisting of five dimensions namely, the quality of governance, public provision of opportunities, the results of the distribution, capacity of stabilization, and economic performance of the public sector, which are arranged in a common hierarchical system. The study will use Musgrave's theory of government functions together with Sen's capability view through the use of PCA-based weighting of the underlying indicators, so contributing both to the theory and the approach of the public sector performance literature.

3. Research Methodology

3.1 Research Design and Analytical Framework

Present research proposes development of multi-indicator Public Sector Performance (PSP) index for developing economies based on Principal Component Analysis (PCA).

Sources of way are the theoretical ideas of Richard Musgrave's functional theory of public finance and Amartya Sen's capability approach. Public sector performance is interpreted as a multi-faced concept that integrates such as governance quality, opportunity provision for social development, distributive justice, macroeconomic stabilization, and economic performance.

Unlike typical governance-centered structures that largely emphasize on institutional efficiency, the current research goes beyond that by including a wider spectrum of aspects of the public sector performance like this seven:

1. Administration
2. Education
3. Health
4. Infrastructure
5. Distribution
6. Stabilization

7. Economic Performance

These seven aspects of public sector performance are further rolled up to form two main categories:

- **Opportunity Dimension**

Administration Education Health, Infrastructure

- **Musgravian Dimension**

Distribution Stabilization Economic Performance

In turn, the two major dimensions are merged to form an overall multi-dimensional Public Sector Performance (PSP) index.

The multi-layered model presented in the paper is an elaboration of the multi-dimensional public sector evaluation setup originally put forth by Afonso et al. (2005). The current study goes one step further by the inclusion of capability-oriented and governance-related measures.

3.2 Data and sample selection

Our research uses annual time series of panel data from a collection of developing country economies throughout 1996-2022. The exact list of these developing countries is contained in Appendix 1. The chosen timeframe permits the study of long-term and structural changes in the variables such as quality of governance, development of society, macroeconomic stability, and welfare.

Table 1: Data Sources and Variables

Variables	Full Names of Variables	Description	Data Sources
Admn	Administration	Control of corruption, burden of government regulations, Shadow economy	SWIID
Edu	Education	Quality of Math and Science, primary enrollment	SWIID
Hlth	Health	Life expectancy, mortality rate	WDI
Pinfr	Public Infrastructure	Quality of overall infrastructure, individuals using Internet, mobile telephone subscriptions	SWIID
Dstb	Economic Distribution	Poverty rate, Gini index	WDI
Stab	Stablization	Stability of GDP growth (coefficient of variance), inflation (10-year average)	WDI
Eprf	Economic Performance	GDP growth (10-year average), Unemployment rate (10-year average), GDP per capita (10-year average)	WDI
Oppo	Opportunity Index	Composite index of Admn + Edu + Hlth + Pinfr	Derived from Admn, Edu, Hlth, Pinfr
Musgravian	Economic Performance Index	Composite index of Dstb + Stab + Eprf	Derived from Dstb, Stab, Eprf
PSP	Public Sector Performance Index	Overall PSP index, calculated as (Oppo + Musgravian) / 2	Derived from Oppo and Musgravian

Primary use of databases was done to get the information needed, mostly through World Bank World Development Indicators database (WDI). Governance and institutional indicators were augmented with governance-related dataset from the world's best sources. Infrastructure-related variables were taken from the standardised databases like the Standardized World Inequality Income Database (SWIID) and other international-related databases. Using secondary data that can be compared internationally raises the dependability and consistency of the country-level comparison.

3.3 Variables Selection and Theoretical Justification

The variables selected have been guided through theoretical aspects, results of previous works, and availability of data. Each of those indicators reflects a particular factor influencing state performance and collectively they form the multidimensional aspect of public sector effectiveness.

3.3.1 Administrative Dimension

The dimension refers to the level of institutional capacity and governance. For this, the researchers have employed four indicators:

1. Control of corruption (ccrp)
2. Bureaucratic quality (bgr)
3. Quality of judiciary (judi)
4. Shadow economy (shd)

Research on governance usually identifies anti-corruption programs, effective bureaucracies, and high judiciary performance as major elements supporting a well-functioning public administration (Kaufmann & Kraay, 2010; Mauro, 1995). States with a high-quality level of their institutions tend to have a greater potential for implementation, delivering, and executing the public service so that enhances productivity outcomes. A shadow economy factor was included to reveal the weaknesses and inefficiencies of regulation. Normally, a bigger underground sector implies weak governance, poor monitoring, and limited state capacity (Schneider & Enste, 2000).

In this way, these factors describe the governing and institutional aspect of the performance of the state in the public sector.

3.3.2 Educational Dimension

How good is the state when it comes to improving human capital and expanding access to education? Two variables were drawn:

1. Secondary school enrollment (pren)
2. Quality of mathematics and science education (qmns)

Degree of education and educational quality are considered as the key factors determining sustained economic growth and human development (Barro, 1996; Hanushek & Woessmann, 2008). Access to education is measured by enrollment whereas quality indicators are aimed at assessing the efficiency of a given education system in contributing to the development of human capital through knowledge and skills. Both these types of measures (quantity and quality) enable the authors to present a more thorough analysis of the performance of the educational system.

3.3.3. Health Dimension

Apart from the health indicators the public sector's ability in healthcare delivery and public health is also considered under the dimension.

1. Life expectancy (lfexpc)
2. Mortality rate of infants (mortr)

The public sector's health services delivery results and population well-being have long been measured with health outcome indicators. The healthcare literature has repeatedly showed the relationships between healthcare delivery, productivity, and development outcomes (Bloom & Canning, 2000). Life expectancy indicates overall health situation and the degree, while infant mortality indicates the extent of, healthcare infrastructure, nutrition and public health systems' deficiency.

The two indicators are among the commonly used tools in human development and welfare-based studies (Conceição, 2020).

3.3.4 Dimension of Infrastructure

The public sector's capacity to provide infrastructure, both physical and digital, that promote economic and social development through it is the focus of this dimension. Three indicators form this set:

1. Quality of overall infrastructure (qovrl)
2. Mobile phone subscriptions (mobs)
3. Individuals using internet (indn)

Developing infrastructure is one of the major aspects behind productivity, connectivity, and efficiency in delivering services. As a result, traditional infrastructure indicators have been complemented with more and more digital infrastructure measures reflecting the increasing importance of technological connectivity in developing economies (Bank, 2016). Introducing mobile subscription and internet use as indicators highlights the present-day concept of digital inclusion as an indispensable aspect of the government's ability to perform its functions and the effectiveness of the public sector.

3.3.5 Dimension of Distribution

Musgrave's function of distribution of government is brought forth through this dimension. These two indicators have been chosen:

1. Poverty headcount ratio (pov)
2. Gini coefficient (gini)

The topics of poverty and inequality as welfare concerns are among the most debated in developmental economics. The government is responsible for implementing policies to reduce income differences and enhancing the level of social inclusion (Atkinson, 2015; Stiglitz, 2012). The paper uses both measures simultaneously to capture the absolute and the relative aspects of lack of welfare.

3.3.6 Dimension of Stabilization

Stabilization dimension measures how a country is able to retain macroeconomic stability. Two variables were used in the calculation:

1. Stability of GDP growth (sgdp)
2. Inflation rate (inft)

A country's economic and welfare outcomes very much depend on its macroeconomic stability. Fischer (1993) revealed how a surge in inflation and the presence of unstable growth have the tendency to discourage investment productivity long-term development negatively, etc. So the paper has made use of ten-year averages and coefficients of variation for macroeconomic indicators to diminish the effects of short-term fluctuations and cyclic distortions. This method makes comparisons of a country's medium-term stabilization performance to another more meaningful.

3.3.7 Dimension of Overall Economic Performance

The dimension of overall economy performance refers to evaluation of the country's macroeconomic performance at the broadest level. Three indicators have been employed:

1. GDP growth (gdpt)
2. Unemployment rate (unmpt)
3. GDP per capita (gpct)

Such indicators together portray the performance of a system, the situation in a labor market, and the potential for generation of income. The policies of the government about the creation of employment and the promotion of economic growth work as the core pillars of its work (Barro, 1996). GDP per capita is a sign of the level of income and productivity whereas unemployment reflects a country's labor market inefficiencies and loss of welfare.

3.5 Normalizing of Data

Different scales and units of the selected indicators made it impossible for the indicators to be compared directly. So, the normalization of variables before PCA estimation was inevitable. In agreement with the generally accepted principles in composite index building (Nardo et al., 2005) all variables have been standardized by applying the z-score method:

- X_i represents the original value of the variable,
- $\bar{X}$ denotes the sample mean, and
- σ indicates the standard deviation.

Through normalization, the paper ensures that even variables measured in quite different units can be reliably analyzed together. Variables like inflation unemployment shadow economy, infant mortality, poverty, and inequality that signify the occurrence of something undesirable have also been adjusted so that the higher levels of public-sector performance can be identified from lower ones.

3.6 Principal Component Analysis (PCA)

We used PCA for building the PSP index, a principal component technique of multivariate analysis used both for reducing dimensions and creating a composite indicator. It works by taking a large number of interdependent variables and transforming them into a smaller set of independent ones (components) that retain as much of the variation of the original data as possible.

The first principal component is expressed as:

$$PC_1 = w_1X_1 + w_2X_2 + w_3X_3 + \dots \dots w_nX_n$$

where:

- PC_1 represents the first principal component,
- X_i denotes standardized variables,
- and w_i represents statistically derived weights (factor loadings).

For elimination of scale differences and making the indicators measured in different units comparable, all variables were standardized before the estimation. Principal Component Analysis (PCA) was conducted independently for each group of dimensions to be able to retain conceptual meaningfulness and generate statistical weighted sub-indices of administration education health, infrastructure distribution stabilization, and economic performance. Principal component 1 was retained in the construction of the index since its factor loadings show the underlying information structure and it explains the largest percentage of variance. The number of components to be

included in the final component solution was determined following the Kaiser method where components with factor eigenvalues higher than one were statistically considered significant.

3.6.1 PCA Suitability Tests

The fit of PCA was assessed by computing KMO test which checks sampling adequacy and by checking indicators' intercorrelation. The correlation matrices showed that there are many correlations between governance social infrastructural, and macroeconomic variables so that PCA method is suitable for reducing the number of variables. For instance, the administration cluster gave an eigenvalue above one which explained over 53% of the variance implying that there was a significant latent institutional structure.

Also health poverty, infrastructure, and governance indicators' correlation patterns reflected that different aspects were consistent with each other theoretically. Even with some indicators having relatively low levels of sampling adequacy measures, they were kept for their theoretical role of capturing multi-dimensionality of public sector performance.

3.7 Public Sector Performance Indices Construction

PCA predicted scores from the first factor were employed in the building of the sub-indices for each of the dimensions. The resulting sub-indices were then combined into the wider categories of opportunity and Musgravian performance in the building of the overall public sector performance index. The opportunity level measures the government's efficiency in administrative work, educational accessibility, health outcomes, and infrastructural development whereas Musgravian performance relates to the government's distribution, stabilization, and economic performance functions.

That's why, the final Public Sector Performance index not only captures various aspects of state effectiveness across the globe but also presents an effective multidimensional measure of public sector performance.

4. Results and Discussion

Table 2: *Descriptive Statistics*

Variable	Obs	Mean	Std. dev.	Min	Max
Ccrp	1,484	-.43	.596	-1.672	1.662
Bgr	656	3.28	.568	1.848	4.991
Judi	656	3.36	.906	1.450	5.820
Shd	5,424	-.00012	.013	-.079	.044
qmns	656	3.67	.829	1.875	5.887
Pren	647	89.80	8.724	21.4	101.7
lfexpc	1,498	69.32	6.437	80.116	80.116

Source: *Author's calculations using Stata 17 based on WDI data*

Table 2 contains a few descriptive statistics on indicators used in the creation of multidimensional public sector performance (PSP) index. The other table is in Appendix 2. The summary statistics expose a great deal of variation across the sampled developing countries, Because of this the application of dimensional reduction methods like Principal Component Analysis (PCA) is justifiable.

Cross-country changes are visible in the governance indices. The average for control of corruption (ccrp) indicator is negative ($M = -0.437$, $SD = 0.596$), which is a sign that institutional quality is still relatively low in a significant share of the sampled ones. Also, the mean values for measures of governmental and judicial efficiency (gcr, and judi) show dispersion at the national level indicating that there are very large differences in institutional features between the sample countries. Variations are also apparent in the shadow economy indicator (shd), implying that the level of the informal economy or the regulatory quality varies across countries.

Education indexes present quite good results. Pre-secondary school enrollment (pren) indicator has a high mean ($M = 89.81$). But, the big difference between minimum and maximum values suggests a rather large degree of inequality in access to education in economies. Variation is a sign of discrepancy between the results. Also, for the measure of the quality of primary education in math and science (qmns) the variability remains moderate, which shows that the country's development of education resources and quality of education are quite uneven. Health indexes show a stronger trend of similarity. An average number of 69 years' life expectancy (lfexpc) while a big change in infant mortality (mortr) is noticeable. The former shows a country level in health and life expectancy, while the latter may be a manifestation of health inequity within countries.

Infrastructure indicators show considerable physical and digital connectivity differences amongst the countries. Subscriptions to mobile networks (mobs) and the usage of internet (indn) have shown quite high variance that illustrates differences in technological penetration and progress of digital transformation between countries. Same here, for the overall infrastructure quality indicator (qovrl), the national level variances are rather considerable. Musgravian dimensions are heterogeneous, as well. For example, differences in poverty levels (pov), income inequality (gini), etc. show that differences in economic and social outcomes exist within and between the sampled developing countries. In several sampled countries, the variability for inflation (inft) indicator is very sharp and this indicates strong macroeconomic instability. Also, for GDP growth stability (sgdp), unemployment (unemp) and GDP per capita (gpctc) variation are rather high and this underlines how structurally diverse the sample is.

It is the presence of substantial variation in the area of country governance, social opportunities and macroeconomic indicators that gives a strong argument for a multidimensional approach to studying the public sector (Afonso et al., 2005; Rajkumar & Swaroop, 2008). The literature review also shows that differences in the level of institutional efficiency, the provision of public services and access to infrastructure are major underlying variables in explaining national differences in public sector effectiveness. Finally, the empirical evidence through this presentation of descriptive statistics supports the concept of a multielement heterogeneous character of the performance of government activities in developing countries and the empirical reason to develop the multidimensional PSP index is well based.

For correlation analysis, the variables within each concept have significant relationships and support the use of PCA for dimensionality reduction and latent index creation. Governance indicators show positive relationships between corruption control, bureaucratic quality and judicial quality, pointing to institutional effectiveness as a consolidated pattern among countries; education indicators show positive relationships between school enrollment and educational quality, show complementarity between educational access and educational quality.

4.3 Principal Component Analysis and Validation Results

PCA was used within each sub-dimension to develop the multidimensional setup from the seven four-item sub-dimensions. The appropriateness of using PCA was assessed via the Kaiser-Meyer-Olkin measure of sampling adequacy, the eigenvalues, scree plots and variance accounted for.

Table 4: *Principal Component Analysis of PSP Dimensions*

Dimension	KMO	Eigenvalue	Variance Explained
Administration	0.553	2.156	53.89
Education	0.500	1.230	61.49
Health	0.500	1.875	93.74
Infrastructure	0.618	1.908	63.60
Distribution	0.500	1.208	60.39
Stabilization	0.500	1.030	51.49
Economic Performance	0.540	1.193	39.77
Opportunity	0.517	2.188	54.69
Musgravian	0.495	1.097	36.58
Overall PSP	—	1.551	77.56

Source: *Author's estimations using Principal Component Analysis*

4.3.1 The Administrative Aspect

A set of administrative quality indices, corruption control, bureaucracy quality, judicial quality, and shadow economy were used to construct the administrative dimension. The first principal component had an eigenvalue of 2.156 and accounted for roughly 53.89% of the total variances, satisfying the criterion set by Kaiser (Kaiser, 1960). But, the KMO statistic of 0.553 still means that the sampling adequacy for PCA is acceptable. Corruption control and judicial quality had more noticeable factor loadings, suggesting that institutionally the rule of law and judicial system effectiveness as well as anti-corruption measures are fundamental ingredients of administration performance in developing countries.

The shadow economy, due to its very heterogeneous nature of informal economic sectors in different countries, contributes less to the overall loading and so was considered relatively a weaker factor. The moderate alignment of the administrative dimension with earlier references on governance suggests that the quality of institutions often differs very drastically among developing countries, First and foremost due to such factors as different political systems, different regulatory capacities, or other unofficial ways of getting things done, which is exactly the point Kaufmann and Kraay (2010) made when they emphasized political/institutional environments to be at the core of development success stories.

4.3.2 Education Aspect

To compute the dimension of education, secondary school enrollment plus mathematics and science education quality were used. The highest component explained only 1.230 and roughly accounted for 61.49%, which meant that both variables were not so different from each other since the main difference in educational provision is not so large. Despite the value of the KMO statistic was 0.50, this is a very low value if we had a larger number of variables but in this case is still acceptable with relatively a small number of indicators included.

4.3.3 Health Aspect

Two health-related indicators were life expectancy and infant mortality. The first principal component yielded an eigenvalue of 1.875 and accounted for approximately 93.74% of total variance. So this dimension was one of the very strongest PCA structures produced by the study.

Given it was life expectancy that decreased while infant mortality was on the rise the inverse relationship was quite a strong one to confirm that, the health indicator is not just self-contained but is also internally consistent in its measurement, this way, the health dimension's use as the third component within public sector performance assessment of the core dimensions cannot be overemphasized. The high consistency levels in education and health dimensions match with those of the human development literature that stress that education, health, and their combination are major drivers of overall welfare (Conceição, 2020; Sen, 1999).

4.3.4 Infrastructure Dimension

The infrastructural aspect combined all infrastructure-related issues including overall infrastructure quality, internet access, and number of mobile subscriptions. Principal Component 1 gave out an eigenvalue of 1.908 and accounted for around 63.60% of the variation. The KMO value of 0.618 showed that the sample is adequate. Since mobile subscriptions and internet usage are more loadings, it shows digital access is one of the key performance indicators for contemporary infrastructures. These are examples of why digitalization has become so significant in the development strategies of the public sector nowadays (Bank, 2016).

4.3.5 Distribution Dimension

The distribution dimension was measured by poverty level as well as income disparity indicators. The first principal component had an eigenvalue of 1.208 which is roughly the square root of the number of variables and explained the 60.39% of total variance. The indicators both revealed about the same loading, suggesting that the two concepts of poverty and inequality together determine distribution performance among various countries. The concept captures the Musgravian distributive function.

4.3.6 Stabilization Dimension

The stability dimension was built upon inflation and GDP growth fluctuation indicators. The first Principal Component showed an eigenvalue of about 1 and captured roughly 51.49% of the total variance.

Given that macroeconomic factors fluctuate widely and are very different in character across developing countries, the results are still meaningful from the theoretical point of view. The nearly perfect balanced loading implies that regulating inflation and maintaining a stable economic growth together enable a country to build up macroeconomic stability capacity.

4.3.7 Economic Performance Dimension

The economic performance dimension covered GDP growth rates, the level of unemployment, and GDP per capita. The first principal component generated an eigenvalue of 1.193 and approximately 39.77% of the total variation is accounted for by this component. In comparison with the social dimensions, the economic performance construct's explanatory power was weaker here. The major factors influencing the latent variables were GDP per capita and unemployment whereas the growth rate of GDP was the weakest one in that aspect.

The economic performance dimension having a structure that is quite unlike one another is in harmony with development economics literature showing that GDP growth, unemployment, and income levels do not progress evenly all over the world (Barro, 1996).

4.4 Construction of Opportunity and Musgravian Dimensions

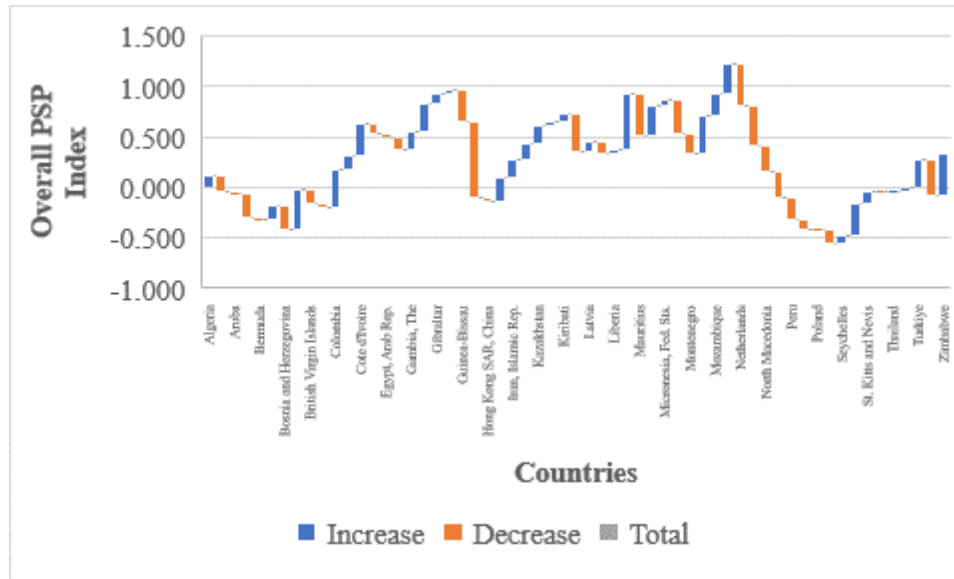
The opportunity dimension integrated administration, education, health, and infrastructure. The first principal component produced an eigenvalue of 2.188 and explained approximately 54.69% of total variance. Education, health, and infrastructure demonstrated comparatively stronger contributions to the latent opportunity structure, whereas administrative performance exhibited relatively weaker integration. This finding suggests that human development and infrastructure provision constitute the primary foundations of opportunity generation across developing economies. The Musgravian dimension combined distribution, stabilization, and economic performance indicators. The first component explained approximately 36.58% of total variance.

Although the explanatory power remained comparatively lower, the dimension was retained because of its strong theoretical grounding in Musgrave's functional classification of public finance.

4.5 Construction of the Overall PSP Index

The final PSP index was constructed by aggregating the opportunity and Musgravian dimensions through PCA. The first principal component generated an eigenvalue of 1.551 and explained approximately 77.56% of total variance. The complete and comprehensive result table is attached in appendix 3.

Figure 1: Public Sector Performance index of Sample Countries



This strong explanatory power indicates that opportunity provision and Musgravian public sector functions jointly constitute a coherent multidimensional structure of public sector performance. Since PCA scores are standardized latent component scores, positive index values represent above-average performance relative to the sample mean, whereas negative values indicate comparatively weaker public sector performance.

Table 3: Top 10 performing countries with respect to PSP Index

Country	Overall PSP Index
Maldives	0.546
Zimbabwe	0.415
Brazil	0.380
Colombia	0.367
Morocco	0.365
South Sudan	0.322
Cote d'Ivoire	0.322
Nauru	0.300
Mexico	0.293
Germany	0.286

The final PSP scores reveal substantial multidimensional heterogeneity across countries. Economies such as Maldives, Brazil, Colombia, Morocco, and Zimbabwe exhibited relatively stronger overall PSP performance, although their strengths emerged from different combinations of opportunity and Musgravian dimensions. For example, the Maldives showed a remarkably good opportunity provision but at the same time, Musgravian outcomes were quite weaker which points to the inequality in the provision of social opportunities compared to the management of macroeconomic welfare.

Also, some countries were found to have relatively good Musgravian results even without a good opportunity structure. Because of this further supporting that public sector performance is in fact non-unidimensional. The results were one of the major revelations of the research that the different parameters of a good state namely governance social development, fairness in distribution, stabilization capability, and general economic performance may in fact change independently of each other in the developing economies. Yet, countries like Honduras Niger Lao PDR, and Mauritius were found to score lower PSPs, which showed the absence/deficiency of multiple state functions in different countries. But, these results are to be understood on comparison rather than a normative reference, as PCA setup actually calculates performance using relative comparison to the sampled economies.

The multidimensional asymmetries across countries found during the research add weight to the previous doubts about one-dimensional governance indicators that usually miss out the delicate interplay among institutional excellence, wellbeing supply, and macroeconomic handling (Andrews et al., 2017).

5. Conclusion

Through the integration of quality of governance, availability of social opportunities, fairness of distribution, economic stabilization, and economic performance dimensions in one analytical system, this current research has built a multidimensional measure of public sector performance (PSP) for developing countries. By employing Richard Musgrave's functional theory of public finance and drawing upon Amartya Sen's capability model, the paper has extended A lot beyond governance-based measures as conventional tools in evaluating the work of public sector entities.

Principal Component Analysis (PCA), were employed in the creation of seven sub-indices viz. administration education health, infrastructure distribution stabilization, and economic performance. Opportunity and Musgravian indexes were finally used for making the overall PSP index. Through the study, the researchers have managed to show the tremendous diversification of multidimensional characteristics among the economies examined. Their analysis of the quantitative data also showed that public sector functions develop in an uneven way across governance, socio-economic development indicators, distribution of welfare, and financial performance categories. Some of the nations fared quite well along lines of opportunity-enhancing dimensions like health, education, and infrastructure, while still performing relatively poorly in distributive or stabilization functions

To wrap things up, the authors of the paper are of the view that the effectiveness of public sector of countries still lagging behind in development should be measured through a holistic approach, i.e. a simultaneous use of various indicators for good quality governance, the creation of opportunities for social improvement, the sharing of gains (distribution), and finally, macroeconomic stability. Relying solely on governance-based instruments can cause wrong pictures about country effectiveness, the extent of government development support, and other such issues.

6. Policy Recommendations

Considering the findings of empirical analysis, the policy measures suggested by the author are like this:

6.1 Reinforcing Governance and Administrative Capacity

Administrative dimension had shown problems related to corruption control, bureaucratic quality, and judicial efficiency; So, Governments of these countries should initiate institutional reforms and digitization focused on enhancing transparency, accountability, and regulatory effectiveness.

6.2 Increasing the Quality and Availability of Education

Governments should pay attention to both increasing the number of students who enroll in schools and developing the curriculum of mathematics and science, providing in-service teacher trainings, and investing in digital learning facilities to raise the quality of such education.

6.3 Extending the Coverage of Primary Healthcare Programs

Governments must upgrade primary health care systems, child and maternal health services, and vaccine programs, and make health care available in underdeveloped districts by reducing under-five mortality rate and increasing life expectancy.

6.4 Allocating Resources for Digital and Physical Infrastructure

Results indicate that countries in development should work towards the expansion of the internet connectivity, enhancement of digital inclusion, and upgrading highways and electricity supplies, to lift the productivity and the ability to deliver public services to the citizens.

6.5 Advocating Inclusive Distribution Policies

Given that poverty and inequality strongly influence public sector functioning, governments can effectively target the poor through poverty reduction programs, progressive taxation, and social protection measures that in particular benefit vulnerable groups.

6.8 Introducing Multidimensional Assessment Structures

Last but not least, decision-makers should shift their focus from mere governance evaluations to the use of broad assessment systems that also consider the issues of governance, human development, distribution of benefits, and macroeconomics stability. These holistic methods may become more helpful guides for making and executing public sector reforms and development plans.

Conflict of Interest

The authors showed no conflict of interest.

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