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Developing an Inclusive Growth Index: Socio-Economic Determinants and Macroeconomic Perspectives for Pakistan

Humna Ahsan[1], Zahid Iqbal[2], Azra[3], Muhammad Ghulam Shabeer[4]

[1,2] Department of Economics, Forman Christian College University, Lahore, Pakistan
[3] Lecturer in Economics, Kohat University of Science and Technology, Kohat, Pakistan
[4] Department of Economics, University of Management and Technology, Lahore, Pakistan

Abstract

This study developed an inclusive growth index and explored the major determinants of inclusive growth in Pakistan. The index for inclusive growth is constructed using principal component analysis utilizing twenty-four different socio-economic variables grouped under seven dimensions of inclusive growth: economic growth, productive employment, infrastructure endowment, human capabilities, income inequality, gender equity, and governance. Empirical estimation was performed using data from 1980 to 2022. The results show that inflation, domestic investment, and foreign direct investment are significant determinants of inclusive growth in Pakistan

Keywords: Inclusive Growth, Domestic Investment, Foreign Direct Investment, Financial Deepening, Principal Component Analysis

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Corresponding author's email: imgshabeer@gmail.com

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1. Introduction

Inclusive growth has become an important policy priority in development research and practice. It encompasses poverty alleviation, sustained development, and including historically excluded groups in economic opportunities and decision-making (Asian Development Bank, 2011). However, economic expansion alone may not generate sustained welfare improvements when its benefits are distributed unequally across the population. Developing economies have experienced widening inequalities alongside periods of rapid economic growth. In Asia, for instance, gross domestic product (GDP) grew by approximately 7% on average during 1990–2012; however, the benefits of this expansion were not distributed equally between richer and poorer groups (Kang, 2015). Therefore, although a higher growth rate is important for economic progress, growth alone is insufficient to alleviate poverty (Ali & Son, 2007).

Recognition that economic growth can bypass vulnerable segments of society has intensified the debate about making growth more inclusive. Unequal access to the benefits of expansion can further concentrate wealth among groups that are already economically advantaged. Mohazzam and Atif (2012) described inclusive growth in terms of the relationship between microeconomic and macroeconomic determinants of development. Accordingly, inclusive growth emphasizes poverty reduction alongside equality of opportunity, including access to markets, resources, and an equitable institutional environment for individuals and businesses. Ianchovichina and Lundström (2009) further argued that inclusive growth must be sustained over time. Similarly, the productive-employment approach emphasizes poverty reduction through participation in economic activity rather than relying exclusively on direct income redistribution (Ianchovichina & Lundström, 2009).

This concept emerged as development thinking moved beyond the assumption that greater equity would necessarily follow economic expansion. Subsequent research recognized that growth with equity is both feasible and an important component of development (Ranieri & Ramos, 2013; Shepherd et al., 2020). Consequently, inclusive growth has acquired increasing prominence in development policy debates. In Pakistan, economic expansion has not consistently translated into broadly shared improvements in living standards, despite expectations that its benefits would trickle down to lower-income groups. Market failures and unequal access to opportunities may constrain how growth benefits are distributed. Therefore, poverty and income inequality must be addressed alongside economic expansion so vulnerable segments of the population can participate in, and benefit from, development (Asghar & Javed, 2011; Ravallion, 2004).

This study draws policymakers' attention to pro-poor development and the macroeconomic determinants of inclusive growth by constructing a composite index using principal component analysis (PCA). The index incorporates income and non-income dimensions, including education and health outcomes, to reflect the multidimensional nature of inclusiveness. In addition, the study uses multiple linear regression to assess whether conventional macroeconomic variables explain variation in the constructed inclusive growth index. The proposed index integrates 24 indicators across seven economic and social dimensions, providing a multidimensional perspective on inclusive growth in Pakistan from 1980 to 2022. Its main contribution is bringing these indicators into a single framework and examining associations with selected macroeconomic variables. However, the index should be interpreted as a measurement approach whose transferability depends on the availability, comparability, and coding of its underlying indicators. The remainder of the paper is structured as follows. Section 2 reviews the relevant literature, while Section 3 presents the theoretical framework. Section 4 describes the data sources and empirical methodology. Section 5 discusses the empirical findings, and Section 6 presents the conclusions and policy implications.

2 Literature Review

A substantial body of literature examines inclusive growth in European and Asian economies. However, relatively fewer studies focus directly on its measurement and macroeconomic determinants in Pakistan (Ali, 2007; Ali & Son, 2007; Anwar et al., 2019; Asghar & Javed, 2011; Asif et al., 2019; Aslam et al., 2021; Ghouse et al., 2022; Munir & Ullah, 2018; Siegmann & Majid, 2021;

Tirmazee & Haroon, 2015; Zulfiqar et al., 2016). These contributions provide an important foundation but also demonstrate the need to clarify how different dimensions of inclusiveness are measured and combined. Sissons et al. (2019) found that inclusive growth concerns were largely sidelined in English cities. Similarly, the literature on devolution suggests that subnational institutional arrangements may influence the extent to which economic growth becomes inclusive (Ayers et al., 2017; Etherington & Jones, 2016; Tomaney, 2016).

Research on inclusive growth emphasizes that the gains from economic expansion must be distributed more equitably if improvements in aggregate economic performance are to translate into broad social progress Ghulam, 2021b, 2021a, 2024; Gul et al., 2022; Huang et al., 2023; Muhammad et al., 2024; Shabeer, 2022; Shabeer et al., 2024a, 2024b; Shabeer & Rasul, 2024b, 2024a; Zain et al., 2024; Zubair et al., 2024). Ali (2007) highlighted the importance of macroeconomic stability and structural change for inclusive development. In addition, researchers have developed alternative approaches to defining and measuring inclusiveness through social opportunity functions and composite indices (Ali & Son, 2007; Anand et al., 2013; Munir & Ullah, 2018).

The China–Pakistan Economic Corridor (CPEC) and Pakistan's trade relationship with China have been discussed as potential contributors to inclusive growth. Asif et al. (2019) examined whether trade with China could make Pakistan's growth more inclusive. In addition, Osabohien et al. (2021), examining West African countries, reported a positive association between agricultural trade and inclusive growth, whereas the association with foreign direct investment was statistically insignificant. These findings suggest that the distributional effects of international integration may differ across economic settings. Inclusive growth gained prominence in development research amid concerns that rapid economic expansion could coexist with persistent inequality and social deprivation. In this context, inclusive growth extends beyond narrowly defined pro-poor growth by incorporating non-income dimensions and opportunities for participation in the growth process.

Despite substantial contributions to the literature, uncertainty persists regarding the conceptual boundaries of inclusive growth and the selection of suitable indicators for a composite index. Its measurement requires attention to both participation in economic expansion and the distribution of opportunities and benefits. Related approaches examine indicators such as employment-to-population ratios (Ramos et al., 2013) and the share of employed people living below the poverty line (McKinley, 2010). However, a multidimensional index must also capture non-income outcomes and institutional conditions (Chou & Huque, 2016). The Asian Development Bank (ADB) has proposed an inclusive growth measurement framework combining indicators and weighted scores (Asian Development Bank, 2011). Similarly, Ali and Son (2007) developed the social opportunity function approach, which draws on the Opportunity Index (OI) and the Equity Index of Opportunity (EIO). Principal component analysis (PCA) offers an alternative way to combine multiple correlated indicators into a composite measure (Mohazzam & Atif, 2012). Therefore, selecting and weighting indicators are central methodological decisions in measuring inclusive growth.

Existing research identifies innovation, gender equality, education, health, and institutional quality as important dimensions of inclusive growth. Bresson et al. (2015) examined innovation, growth, and income distribution using a panel of OECD and non-OECD countries. Drawing on measures related to income equity and social mobility, their analysis highlighted differences in the inclusiveness of growth across country groups. Similarly, Asongu and Kodila-Tedika (2015) emphasized the role of institutions in shaping the quality of growth in developing economies. Aslam et al. (2021) examined institutional quality alongside social and digital inclusion in a panel of 83 countries. Their findings indicated that institutional quality was associated with inclusive growth in higher-income countries, whereas the relevance of social and digital inclusion differed across income groups. In addition, Adedeji et al. (2013) emphasized that economic growth is unlikely to remain inclusive without access to health and education.

Adedeji et al. (2013) found that periods of rapid growth in African countries were accompanied by improvements in average education and health opportunities, underscoring the need to expand

access to essential services while addressing inequality. Similarly, Klump and Cabrera (2007) examined education in relation to pro-poor growth and highlighted the potential role of knowledge, cognitive skills, health, and participation in expanding productivity and employment opportunities for disadvantaged groups. Ali and Son (2007) examined access to health and education across income groups and investigated changes in the distribution of these opportunities through the social opportunity function. Their approach defines more inclusive growth in terms of improvements in average opportunities as well as their equitable distribution. Although opportunities for primary and secondary education increased in their analysis, their distribution remained unequal, as reflected in the opportunity curve and the Equity Index of Opportunity.

Gender equality is another significant dimension of inclusive growth. Zveglich and Rodgers (2012) discussed how unequal access to labour-market opportunities can limit women's participation in economic expansion and its benefits. Their analysis also considered the relationship between women's education, marital characteristics, and employment decisions in Asian labour markets. Therefore, gender-related indicators are essential when assessing whether economic opportunities are broadly accessible. Swamy (2010) examined financial inclusion and inclusive growth in India. The findings highlighted the relevance of financial inclusion, savings, the credit-to-GDP ratio, and per capita income. In addition, the study suggests assessing financial-sector development in terms of access to financial services and the distribution of economic opportunities.

In Pakistan, relatively few studies have examined inclusive growth as a multidimensional development outcome. Policymakers have frequently treated aggregate economic growth as a solution to broader development problems; however, the available evidence indicates that its gains may not reach all population groups. Asghar and Javed (2011), for example, reported that economic expansion was not consistently accompanied by equitable opportunities. Therefore, when assessing inclusiveness, efficiency and equity need to be examined jointly. Asghar and Javed (2011) are among the pioneers who discussed growth in the context of inclusiveness. Based on empirical evidence, the authors concluded that although opportunities for education and employment increased over time, they were largely inequitable. Only a few benefited from growth in the country, while the majority were excluded from its benefits. Similarly, Tirmazee and Haroon (2015) examined growth inclusiveness in Pakistan and found that growth was not inclusive. This study used the social mobility index and income equity index, along with principal component analysis, to validate the results.

Mohazzam and Atif (2012) found that economic growth leads to better education, improved health services, and increased employment opportunities in the U.S., showing that the overall impact of economic growth was inclusive because it generated active human capital and skilled labor. The authors cautioned that to make growth inclusive and pro-poor, public expenditure should focus on Pakistan's health and education sectors. The literature shows that inclusive growth remains conceptually and empirically contested, particularly regarding measurement (Chou & Huque, 2016). **Alth**ough previous studies have assessed aspects of inclusive growth in Pakistan, comparatively limited attention has been devoted to constructing a composite measure that integrates several economic and social dimensions and then examining its macroeconomic correlates (Asghar & Javed, 2011; Asif et al., 2019; Munir & Ullah, 2018; Tirmazee & Haroon, 2015). Accordingly, this study contributes to that line of inquiry by constructing an index and assessing the roles of inflation, domestic investment, foreign direct investment, and financial deepening.

3 Theoretical Framework

This section presents the conceptual framework underlying the socioeconomic indicators used to construct an inclusive growth index for Pakistan. Although inclusive growth is widely discussed, no universally accepted operational definition exists. Therefore, the selected indicators should reflect both economic expansion and the distribution of opportunities and development outcomes. According to the Asian Development Bank's framework, inclusive growth involves two closely related objectives: (1) achieving sustained economic growth and (2) ensuring equitable access to opportunities. Important dimensions include productive employment, economic infrastructure, education, health, basic utilities, social protection, governance, and institutional capacity

(Alexander, 2015; Asian Development Bank, 2011; McKinley, 2010). Based on these variables, this study constructs an Inclusive Growth Index. Figure 1 shows the theoretical framework of the different dimensions of inclusive growth used in this study.

Figure 1 illustrates the key drivers of inclusive growth. We develop our theoretical framework based on Vellala et al. (2014), who consider economic growth a prerequisite for inclusive growth. In addition to their theoretical model, our model shows how infrastructure development drives economic growth. Economic growth improves employment productivity. Better, more productive employment opportunities help reduce income inequality, which positively affects human capabilities, as measured by health and education. On the other hand, improved governance would lead to better gender parity, triggering a trickle-down effect on the country's growth and further enhancing human capabilities. All these effects lead to inclusive growth. Figure 1 explains the key drivers.



Figure 1: Key Drivers of Inclusive Growth

The first dimension of inclusive growth is economic growth, represented by GDP per capita growth and value added in agriculture and industry. Growth in per capita output is important for expanding economic opportunities; however, its contribution to inclusiveness also depends on how economic gains are distributed across sectors and population groups. In addition, changes in agricultural and industrial value added help capture shifts in the economic structure. Productive employment is another core dimension because the opportunities generated by growth depend partly on different sectors' ability to create jobs. Accordingly, the framework considers employment in agriculture, industry, and services as indicators of labor-market participation in economic activity.

Infrastructure indicators include mobile subscriptions, electricity consumption (kWh per capita), road density, telephone connections, and railway lines. Adequate infrastructure is important for economic activity, market access, and sustainable economic growth. In Pakistan, transportation and communication networks are particularly relevant to the connections between markets, producers, and households (Saeed, 2010). Road infrastructure catalyzes employment, growth, and economic activity. Therefore, it is an important element of the government's poverty reduction strategy. Similarly, an effective railway system facilitates trade, reduces transportation costs, and promotes rural development and national integration. About mobiRegardingbscription, the numbser of subscribers has increased in recent years owing to advancements in the telecommunications industry.

It is equally important to examine non-income dimensions of inclusive growth, including health and education. Limited access to essential services can constrain human capabilities, reduce opportunities for productive employment, and prevent disadvantaged groups from participating fully in economic development (Adedeji et al., 2013; Ali & Son, 2007). The education indicators

included primary and secondary school enrollment rates and pupil–teacher ratios. The pupil–teacher ratio is a good measure of the overall quality of an education system because it reflects teachers' workload, resource allocation in public schools, and the attention students are likely to receive from teachers. Health indicators include variables such as life expectancy at birth, under-five mortality rate, and immunization. These variables measure a country's overall quality of life and indicate potential returns on investment in human capital.

Gender parity and income equality are also relevant dimensions for inclusive growth. To measure these areas, indicators such as gender parity are considered in two main areas of social and economic life, namely primary and secondary education and labor force participation, while the Gini Coefficient is used as a measure of income inequality. Sex parity was further estimated as the female-to-male ratio for the indicator. Governance is another significant indicator of inclusive growth. This study used the Asian Development Bank's initial recommendation for measuring governance, which uses the ratios of revenue and public investment to GDP. Both indicators play an important role in promoting the government's inclusive growth agenda. The revenue-to-GDP ratio is a barometer of government success in mobilizing domestic sources of finance (McKinley, 2010). Similarly, the ratio of public investment to GDP indicates the government's willingness to invest in development. For low-income and lower-middle-income countries, governments need to increase public investment to provide essential economic and social services.

4 Data and Research Methodology

4.1 Data Sources

The study uses annual time-series data covering 1980–2022. Data were compiled from multiple secondary sources, including issues of the Pakistan Economic Survey, the World Bank's World Development Indicators database, the State Bank of Pakistan, the Asian Development Bank, Penn World Tables, and the Handbook of Statistics on Pakistan's Economy. These sources provide the socioeconomic indicators used to construct the composite index and the macroeconomic variables included in the regression model.

4.2 Analytical Framework

The empirical analysis follows two stages. First, principal component analysis is used to construct a composite inclusive growth index. Second, the resulting index is specified as the dependent variable in a multiple linear regression model with conventional macroeconomic explanatory variables. This sequence permits an examination of the association between the multidimensional index and selected macroeconomic factors.

4.3 Index Construction

To construct the index, twenty-four socio-economic variables were used. The selected variables were normalized before conducting the empirical analysis. Normalization is the process of adjusting the values measured on different scales to a notionally common scale (usually prior to averaging). This study used standardization with z-scores. Standardization converts the variables to a common scale with a mean of zero and a standard deviation of one. The z-score was computed as follows:

$$Z_{ij} = \frac{Xij - Mj}{S_j} \quad \textbf{(1)}$$

where X_{ij}= the value of the i_{th} indicator in the j_{th} region; M_j= the mean value of the i_{th} indicator; and S_j= the standard deviation of the i_{th} indicator. After standardization, principal component analysis was conducted in SPSS to construct the inclusive growth index. The following procedures describe assessing the correlation structure, extracting and rotating components, and calculating the composite score.

4.3.1 Sampling Adequacy

The Kaiser–Meyer–Olkin (KMO) statistic evaluates sampling adequacy by comparing the magnitudes of observed and partial correlations. Values range from 0 to 1, with higher values

indicating that the correlation patterns are more suitable for dimension reduction. However, KMO evaluates the correlation structure rather than establishing the substantive validity or time-series properties of the resulting index.

The Kaiser-Meyer measure of sampling adequacy is given by

$$KMO_j = \frac{\sum_{i \neq j} r_{ij}^{\ 2}}{\sum_{i \neq j} r_{ij}^{\ 2} + \sum_{i \neq j} \mu_{i\,j}^{\ 2}} \quad \textbf{(2)}$$

The correlation matrix is R= [r_{ij}], and the partial correlation matrix is U= [μ_{ij}]

4.3.2 Correlation Matrix

Principal component analysis requires sufficiently correlated indicators. Bartlett's test of sphericity assesses the null hypothesis that the correlation matrix is an identity matrix. Rejection of this hypothesis supports the presence of relationships among the indicators that can be summarized by principal components.

If the null hypothesis is rejected, a degree of correlation is expected among the variables. The statistics are based on a chi-square transformation of the determinant of the correlation matrix. Because this test is sensitive to sample size, Knapp and Swoyer (1967) and Tabachnick and Fidell (2001) suggested using this test along with the KMO measure.

Bartlett test uses the following formula of the chi-square distribution

$$\chi^2 = -\left(n - 1 - \frac{2p+5}{6}\right) \times \ln|R| \quad \textbf{(3)}$$

Where |R| denotes the determinant of the correlation matrix. If the variables are highly correlated, the determinant |R|≈0. Where "P" is the number of variables, "n" is the number of observations, and "R" is the correlation matrix.

Under the null hypothesis of no correlation, the Bartlett test follows a chi-square distribution with degrees of freedom: $\left[p\ x\ \left(\frac{p-1}{2}\right)\right]$ (4)

Table 1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.788**
Bartlett's Test of Sphericity	Chi Square	1610.006
	Df	276
	Sig.	0.000

Source: by the author

Table 1 reports a Kaiser–Meyer–Olkin statistic of 0.788 and a statistically significant Bartlett's test of sphericity ($p < .001$). These results indicate that the indicators share sufficient correlations for PCA. However, the tests do not independently establish the validity of each component's substantive interpretation; interpretation must also draw on the underlying indicators and their loadings.

4.3.3 Extracting Principal Components

The next stage involved extracting principal components from the standardized indicators. Each eigenvalue indicates the amount of variance represented by a component. The first component accounts for the largest share of variance, as shown in Table 2. The number of retained components was assessed using the scree plot and the eigenvalue> 1 criterion.

Table 2: Total Variance Explained

Component	Initial Eigenvalues		
	Total	% of variance	Cumulative %
1	15.127	63.027	63.027
2	2.693	11.223	74.250
3	1.854	7.727	81.977
4	1.348	5.617	87.594
5	0.707	2.947	90.541

Source: by the author

Table 2 presents the variance explained by the extracted components. Four components have eigenvalues greater than 1; together, they account for 87.594% of the variation in the 24 standardized indicators. The first component alone explains 63.027% of the total variance. Therefore, the first component captures most of the common variation, although the remaining retained components provide additional information.

4.3.4 Correlations Among Components

Correlations among the saved component scores were examined to assess their relationships. The reported absence of correlations among these components supported the choice of an orthogonal rotation strategy. Nevertheless, the substantive meaning of the rotated components must be considered when interpreting their contributions to inclusive growth.

4.3.5 Component Rotation

Varimax rotation was applied because the extracted components were treated as orthogonal. This rotation facilitates the interpretation of factor loadings by redistributing explained variance among the retained components while preserving the total variance accounted for by the rotated solution.

4.3.6 Factor Scores and Loadings

The rotated component matrix provides factor loadings that indicate the strength and direction of the relationships between the observed indicators and each component. Higher absolute loadings indicate stronger associations, while the signs of loadings should be interpreted in relation to the substantive meaning and coding of each indicator. In this analysis, infant mortality, life expectancy, primary and secondary enrolment, telephone connections, electricity consumption, road density, gender parity in education, immunization, railway lines, employment in agriculture and services, the revenue-to-GDP ratio, agricultural value added, health expenditure, mobile subscriptions, and labor-market gender parity were strongly associated with the first component. The remaining variables were distributed across the other retained components.

4.3.7 Composite Index Calculation

The final stage of index construction combines the retained component scores into a composite measure. The weight assigned to each component reflects its share of the total variance explained by the retained components. The non-standardized index (NSI) is therefore calculated as follows:

NSI= (individual variance of component 1/total variance) *factor score 1 + (Individual variance of component 2/Total variance)*Factor score 2 + (Individual variance of component 3/Total variance)*Factor score 3 + (Individual variance of component 4/ Total variance)* factor score 4 **(5)**

NSI = (63.027/87.594)*Factor score 1 + (11.223/87.594)*Factor score 2 + (7.727/87.594)*Factor score 3+ (5.617/87.594)*Factor score 4 (6)

Finally, the composite score is rescaled using the following min–max transformation:

Standardized Index = (NSI – Minimum of Standardized index) / (Maximum of NSI – Minimum of NSI)

4.4 Multiple Linear Regression Model

The constructed inclusive growth index is then used as the dependent variable in a multiple linear regression model. The explanatory variables are (i) foreign direct investment (FDI), (ii) financial deepening, (iii) inflation, measured by the consumer price index, and (iv) domestic investment. Foreign direct investment can support growth through capital formation, trade, and technology transfer; however, its distributional consequences depend on whether investment is accompanied by broader social progress (Deloitte, 2015). Domestic investment is represented by gross fixed capital formation. Financial deepening is measured by domestic credit to the private sector as a percentage of GDP. These indicators permit the analysis of relationships between the composite measure and selected dimensions of macroeconomic activity.

4.5 Sample Adequacy for the Indicator Set

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.788**
Bartlett's test of Sphericity	Approx. Chi Square	1610.006
	Df	276
	Sig.	0.000

Source: by the author

Table 3 repeats the KMO and Bartlett's test results presented in Table 1. These statistics provide evidence regarding the correlation structure of the indicators used in PCA. The subsequent analysis considers the communalities, explained variance, and rotated component loadings.

Table 4: Extraction Method: Principal

Communalities		
	Initial	**Extraction**
Health Expenditure	1.000	.873
Mobile Subscribers	1.000	.907
Electricity Consumption	1.000	.978
Road Density	1.000	.989
GDP Per Capita	1.000	.678
Employment in Agriculture	1.000	.890
Employment in industry	1.000	.834
Employment in Services	1.000	.932
Agriculture Value Added	1.000	.904
Industry Value Added	1.000	.762
Primary Enrollment	1.000	.981
Secondary Enrollment	1.000	.974
pupil/teacher Ratio	1.000	.753
GPI Primary	1.000	.879
GPI Secondary	1.000	.921
Railways Line	1.000	.925
Mortality Rate Infant	1.000	.993
Life Expectancy	1.000	.988
Gini Coefficient	1.000	.699

Communalities		
	Initial	Extraction
Education Expenditure	1.000	.901
Gender parity in labor	1.000	.530
Immunization	1.000	.888
Telephone Lines	1.000	.972
Revenue/GDP	1.000	.874

Source: by the author

Table 4 presents the communalities for the 24 observed indicators, showing the share of each variable's variance represented by the retained components. The eigenvalue criterion, reported separately in Tables 2 and 5, identifies four components with eigenvalues greater than 1. Therefore, interpret the communalities and eigenvalues as distinct features of the PCA results.

Table 5: Extraction Method: Principal Component Analysis

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.127	63.027	63.027	15.127	63.027	63.027	13.670	56.958	56.958
2	2.693	11.223	74.250	2.693	11.223	74.250	3.364	14.018	70.976
3	1.854	7.727	81.977	1.854	7.727	81.977	2.153	8.971	79.947
4	1.348	5.617	87.594	1.348	5.617	87.594	1.835	7.647	87.594
5	.707	2.947	90.541						

Source: by the author

Table 5 reports the distribution of variance across the 24 possible principal components, including the variance explained before and after rotation. The four retained components account for 87.594% of total variance. Although rotation changes the distribution of explained variance across individual components, it does not change the cumulative variance explained by the retained solution.

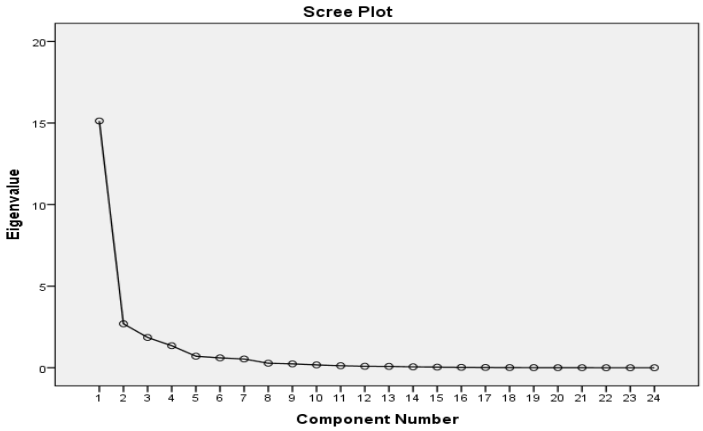


Figure 2: Scree Plot Graph**.**

Figure 2 illustrates the eigenvalue pattern across the extracted components. The first four components exceed the eigenvalue threshold of 1, while the curve becomes comparatively flat for subsequent components. Therefore, the scree plot provides supplementary visual support for retaining four components.

Table 6: Extraction Method: Principal Component Analysis

Component Matrix				
	Component			
	1	**2**	**3**	**4**
Mortality Rate Infant	-.994			
Life Expectancy	.989			
Primary Enrollment	.988			
Telephone lines	.985			
Secondary Enrolment	.971			
Electricity Consumption	.967			
Road Density	.946			
GPI Primary	.933			
GPI Secondary	.931			
Immunization	.921			
Railway lines	-.888			
Employment In Agriculture	-.887			
Employment In services	.844			
Revenue/GDP	-.831			
Agriculture Value Added	-.817			
Health Expenditure	-.795			
Mobile Subscribers	.707			
Gender Parity In Labor	.678			
Employment In industry		-.753		
pupil/teacher Ratio		-.711		
GDP Per Capita			-.650	
Industry Value Added		.521	-.644	
Gini Coefficient			.550	
Education Expenditure				.699

Source: by the author

Table 6 presents the component loadings, which describe the correlations between the original indicators and the extracted components. Interpret their magnitudes and signs alongside the conceptual definitions of the corresponding indicators.

Table 7: Extraction Methods: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization (Rotation converged in 6 iterations)

Rotated Component Matrixa				
	Component			
	1	**2**	**3**	**4**
Road Density	.986			
Electricity Consumption	.974			
Mortality rate Infant	-.952			

Rotated Component Matrixa				
	Component			
	1	2	3	4
Employment In services	.952			
Life Expectancy	.951			
Primary Enrollment	.948			
Immunization	.929			
Employment In Agriculture	-.925			
Telephone lines	.924			
GPI Secondary	.897			
GPI Primary	.896			
Agriculture Value Added	-.895			
Secondary Enrollment	.884			
Railway lines	-.776			
Revenue/GDP	-.687			.514
Health Expenditure	-.658			.568
Gender Parity In Labor	.580			
Indstry Value Added		-.865		
Mobile Subscribers		.805		
pupil/teacher Ratio		.677	.523	
Employment In industry			.807	
Gini Coefficient			-.705	
GDP Per Capita			.636	
Education Expenditure				.916

Source: by the author

Table 7 reports the rotated component loadings obtained using varimax rotation with Kaiser normalization. The 24 indicators are distributed across four retained components, with the first component containing the largest group of strongly associated indicators. The remaining components capture different combinations of indicators. Although high absolute loadings aid interpretation, individual indicators may also relate to more than one component, which should be considered when explaining the index's multidimensional structure.

4.1.1. **4.6 Regression Specification**

The multiple linear regression model with four explanatory variables is expressed as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots\ldots + \beta_k X_k + \mu \quad (7)$$

where y represents the inclusive growth index; X1 denotes foreign direct investment; X2 is domestic investment, measured by gross fixed capital formation; X3 represents financial deepening, measured by domestic credit to the private sector; and X4 denotes inflation.

5 Empirical Results

Table 8 presents the regression estimates for the macroeconomic determinants of inclusive growth. Domestic investment has a positive coefficient (0.024, p = .0002), whereas inflation has a negative coefficient (−0.018, p = .0399). Foreign direct investment is positively associated with the index (0.121, p = .0560); however, this coefficient is significant at the 10% level rather than the

conventional 5% level. Financial deepening has a negative but statistically insignificant coefficient (−0.010, p = .4372). These results can be discussed in relation to previous research on investment and inclusive growth (Anand et al., 2013; Aoyagi & Ganelli, 2015; Azam & Khattak, 2009). Therefore, the interpretation should distinguish statistically supported associations from results that do not meet the selected significance threshold. Given the time-series design, these coefficients should not be interpreted as causal effects without additional diagnostic evidence.

Interpretation and robustness considerations. The reported regression coefficients should be treated as associations rather than evidence of causality. In particular, the temporal properties of the series, possible structural breaks, residual autocorrelation, and overlap between the index components and explanatory variables require investigation before stronger claims are made. In addition, the PCA-based index could be compared with equal-weighted and alternative-component formulations to evaluate sensitivity to weighting decisions. These analyses are recommended as future validation steps; the present study reports no additional tests.

Table 8: Multi-linear regression model results for determinants of Inclusive Growth

Variables	Co-efficient	Std Error	t-Stat	Prob
FDI	0.121**	0.062	1.952	0.0560
Investment	0.024***	0.005	4.8	0.0002
Inflation	-0.018***	0.008	-2.25	0.0399
Financial deepening	-0.01	0.014	-0.714	0.4372

Source: by the author

6 Conclusion

This study considers inclusive growth both as a process and as an outcome: disadvantaged groups should be able to participate in economic expansion and benefit from the opportunities it creates. Its theoretical framework emphasizes reducing inequality, investing in human development, and improving gender equity. Accordingly, policymakers should consider measures that strengthen human capabilities alongside policies that support economic expansion, rather than relying exclusively on income transfers. The empirical findings show domestic investment is positively associated with the constructed inclusive growth index, while inflation is negatively associated with it. Foreign direct investment also has a positive coefficient, although it is significant only at the 10% level (p = .0560). However, financial deepening, measured by domestic credit to the private sector, has a negative coefficient that is not statistically significant. These findings are consistent with the need to consider both the pace and distribution of growth. Therefore, investment policies, macroeconomic stability, and equitable access to opportunities should be considered jointly when formulating an inclusive development strategy for Pakistan. Further research could assess the composite index's sensitivity to alternative weighting schemes, investigate its time-series properties, and compare the constructed measure with other established indices before drawing stronger causal or policy conclusions.

Policy relevance and future research. The index combines indicators of economic growth, productive employment, infrastructure, human capabilities, income inequality, gender equity, and governance. Consequently, it may inform discussion of policy priorities related to poverty reduction, decent employment, equitable access to education and health, and reduced inequalities, as reflected in the sustainable development agenda. Future studies could publish a reproducible annual series of index values, document indicator-level data sources and coding decisions, and compare the measure with established inclusive growth frameworks (Ali & Son, 2007; Asian Development Bank, 2011; McKinley, 2010). Such extensions would facilitate independent replication and comparative use without altering the present study's core research questions.

Ethical Statement: The study uses aggregate secondary macroeconomic and socioeconomic data and does not describe direct recruitment of human participants, interventions, or collection of identifiable personal information.

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Appendix

Dimension	Area of Index	Indicators	Source
	GDP per Capita	**GDP per capita growth (annual %)**	**WDI**
Economic Growth	Agriculture value added	Agriculture value added (% of GDP)	WDI
	Industry values added	Industry values added (% of GDP)	WDI
Productive Employment	Employment in agriculture	Employment in agriculture (% of total employment)	Economic Surveys of Pakistan
	Employment in industry	Employment in industry (% of total employment)	Economic Surveys of Pakistan
	Employment in services	Employment in Services (% of total employment)	Economic Surveys of Pakistan
Infrastructure	Mobile subscription	Mobile Cellular Subscriptions (per 100 people)	International Telecommunication union (ITU), WDI
	Road Density	Road Density (Km/100 sq km of land area)	For total length of roads is from Economic survey of Pakistan 2013-14 statistical appendix , table 13.1
	Electric power consumption	Electric power consumption Kwh per capita	WDI
	Rail Lines	Rail Lines (Total route km)	Economic survey of Pakistan
	Telephone Lines	Fixed telephone subscriptions (per 100 people)	International Telecommunication Union, World Telecommunication/ICT Development Report and database.
Health Capabilities	Education	Pupil teacher ratio (primary) Head count basis	WDI
		Primary school Enrollment (000) numbers	50 years of Pakistan in statistics. Economic Survey of Pakistan 2008-09 Statistical Appendix, Table 10.2 and Survey 2013-14, Table 10.2.
		Secondary school Enrollment (000) numbers	50 years of Pakistan in statistics. Economic Survey of Pakistan 2008-09 Statistical Appendix , Table 10.2 and Survey 2013-14 , Table 10.2

Dimension	Area of Index	Indicators	Source
		Government Expenditure on education (% of GDP)	Global economy.com and WDI.
		Mortality rate, under five (per 1,000)	WDI
		Life Expectancy at Birth , total (years)	WDI
	Health		Health and nutrition chapter 11 Economic survey of Pakistan 2013-14 Table 11.3 and Hand Book of statistics on Pakistan economy Table 11.9 Expenditure on health pg. 684-86, state bank of Pakistan.
		Government expenditure on health (% of GDP	
		Gender Parity in Primary education	Pakistan economic survey various issues
	Gender Participation	Gender Parity in secondary education	Pakistan economic survey various issues
		Gender parity in labor force participation.	
Gender Parity		Ratio of female to male labor force participation rate (%) (national estimate)	Pakistan Economic survey various issues
Inequality	Gini Co efficient	Gini Co-efficient	Economic survey of Pakistan 1999-2000 Chapter 4, Table 4.2 page no.49. Chapter 19 'poverty trends, causes and solutions' Table 19.4 Of Akbar Zaidi Book, survey 2002-03 page no.50 and WDI.
Governance	Revenue To GDP ratio	Revenue To GDP ratio	Pakistan Economic Survey various issues