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Reconstruction of the Islamic human development index in Indonesia through principal component analysis (PCA)

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ABSTRACT

This study examines the construct validity of the Islamic Human Development Index (IHDI) indicators proposed by Anto (2011) and Rama and Yusuf (2019) in the context of Indonesia's human development. Using Principal Component Analysis (PCA) and secondary data from 34 provinces in 2024, the study finds that two indicators the zakat to GRDP ratio and the Gini ratio were excluded due to high regional variability. Four principal components emerged, representing socio-religious aspects, quality of life, economic welfare, and social mobility, explaining 75.72% of the variance. The findings reveal that human development in Indonesia emphasizes spiritual, social, and economic balance but lacks full alignment with maqāṣid al-sharī'ah principles of equity and justice. Zakat, despite being a key Islamic economic pillar, remains empirically weak due to institutional and data limitations, highlighting the need to strengthen zakat governance for effective redistribution and welfare enhancement.

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1. Introduciton

For decades, the Human Development Index (HDI) has served as a primary measure for assessing a nation's quality of life and overall well-being (Alaimo & Seri, 2023). The growing prominence of HDI has also sparked extensive debate in the literature, concerning both its strengths and limitations (Martinez-Sermeño et al., 2025; Natoli et al., 2024). Numerous studies have attempted to address various methodological issues in HDI measurement, including the development of more accurate and representative composite indicators (Anto, 2011; Rama & Yusuf, 2019). In response to criticism that the HDI fails to account for inequality within countries, the UNDP introduced the Inequality-adjusted Human Development Index (IHDI), which incorporates inequality distribution across HDI dimensions. The evolution of the development concept is further reflected in the emergence of alternative measures, such as happiness, well-being, and quality-of-life indices. This shift highlights that development should not only be viewed from objective dimensions but also encompass subjective indicators (Zailani et al., 2022).

On this basis, particular attention has emerged from countries with predominantly Muslim populations, such as Indonesia, which possesses distinct social, cultural, and religious characteristics compared to Western nations. These differences often pose unique challenges in achieving comparable levels of human development. The 2021 United Nations report recorded Indonesia's HDI score at 0.705 relatively high for the world's largest Muslim majority nation yet still not fully representative and lagging behind several ASEAN countries such as Singapore and Malaysia (Suyono, 2022). This situation underscores the need for a deeper examination of how far the HDI can truly reflect the reality of human development in Muslim countries and why alternative measures, such as the Islamic Human Development Index (IHDI), have become increasingly relevant for consideration (Chapra, 2000; Hasan & Ali, 2018; Rama & Yusuf, 2019).

Oladapo and Ab Rahman (2018) stated that although the current HDI indicators are relatively comprehensive, they are not entirely suitable for measuring human development in Muslim-majority countries such as Indonesia. This is evident in the 2019 UNDP report, which shows that countries with predominantly Muslim populations tend to have lower HDI scores (Kamalu & Ibrahim, 2023). According to Viollani et al. (2022), the low HDI values can be explained by educational and economic levels that remain significantly behind those of Western nations. However, this issue is closely tied to a fundamental limitation of the conventional HDI its dimensions do not incorporate religious and socio-economic ethical values as integral components of human development (Anto, 2011). In response, several scholars have proposed a new index grounded in maqāṣid al-sharī'ah, encompassing five principal dimensions: faith (dīn), life (nafs), intellect ('aql), lineage (nasl), and wealth (māl) (Hasan & Ali, 2018; Rafsanjani, 2018; Rama & Yusuf, 2019). Nevertheless, the proposed IHDI framework remains largely conceptual, leaving empirical uncertainty as to whether these indicators can indeed form a representative composite index.

The relevance of this study can be observed through previous literature that has also focused on reconstructing and refining the Human Development Index. Luque et al. (2016) proposed a multi-criteria approach with a new normalization scheme to address the issue of substitutability among HDI components. Furthermore, Lai et al. (2014) employed weighted Principal Component Analysis (PCA) to measure human development dynamics across countries and found a strong correlation between the extracted principal components and the UNDP's HDI version. At the

national level, Ariawan (2006) demonstrated that PCA is effective in simplifying household socio-economic variables in Indonesia into a representative index. Similarly, Tinungki and Sunusi (2018) applied PCA and Sparse PCA to construct poverty indicators in Indonesia, while Rosyada and Utari (2024) utilized PCA to develop community welfare indicators in West Java.

Several previous studies have demonstrated the use and development of Principal Component Analysis (PCA) in validating various indices; however, there has been no evidence of its application in reconstructing the Islamic Human Development Index. Therefore, this study aims to examine the construct validity of the IHDI indicators developed by Anto (2011) and Rama and Yusuf (2019) in comprehensively representing the IHDI variables. To achieve this objective, the study employs Principal Component Analysis (PCA), which is recognized as an effective method for identifying latent structures and confirming relevant indicators in forming a composite index (Mishra et al., 2017). This research is expected to contribute to improving human development measurement in Muslim-majority countries in general, and in Indonesia in particular.

2. Literature Review (optional)

Human Development Index

The concept of the Human Development Index (HDI) was first introduced by the United Nations Development Programme (UNDP) through the Human Development Report in 1990, which has since been published annually. In this publication, human development is defined as "a process of enlarging people's choices," referring to the process of expanding individuals' opportunities in life. More specifically, UNDP identifies four key aspects of human development: productivity, equity, sustainability, and empowerment (Pramestry, 2022). The HDI serves as a measure of human development achievement based on several dimensions of quality of life that should be fulfilled, both physically and culturally (Rafsanjani, 2018). The HDI and other human development indicators function as essential tools for guiding effective and well-directed planning and policy implementation (Siswati & Hermawati, 2018).

However, a new issue has arisen within the HDI model formulated by UNDP its inability to accurately reflect the conditions of Muslim-majority countries such as Indonesia (Rama & Yusuf, 2019). Consequently, several Muslim scholars have sought to design a new measurement framework that can be applied specifically to Muslim-majority nations and more broadly to all countries in the world (Anto, 2011; Rama & Yusuf, 2019), which has come to be known as the Islamic Human Development Index (IHDI).

Islamic Human Development Index

The concept of development in Islam encompasses personal and spiritual growth, physical well-being, and societal progress, with the Qur'an providing the foundational framework for human advancement and its implementation reflected through the teachings of Prophet Muhammad (Ghazal & Zulkhibri, 2016). Islamic teachings emphasize social justice, inclusivity, and equitable resource distribution, which underpin normative approaches to development. Chapra (2008) proposes five essential elements in designing an Islamic welfare model that integrate economic stability, social justice, moral guidance, and institutional effectiveness, reflecting the broader ethical foundations of Islamic development rather than the structural dimensions of

classical maqāṣid al-sharī'ah. The classification of maqāṣid al-sharī'ah comprising dīn (faith), nafs (life), 'aql (intellect), nasl (lineage), and māl (wealth) originates from scholars such as Imam al-Ghazali and al-Syatibi, forming the fundamental objectives of Islamic law to ensure comprehensive human well-being. This classical framework was later adopted by contemporary scholars to construct Islamic development indicators, including the Islamic Human Development Index (IHDI) proposed by Anto (2011) and refined by ; Rama & Yusuf, 2019).

The Islamic Human Development Index (I-HDI) is a tool used to measure human development from an Islamic perspective (Rafsanjani, 2018). According to Islamic development principles, the ultimate objective of human development is *falah*, which denotes security and well-being in both this world and the hereafter. The five basic dimensions faith (*dīn*), life (*nafs*), intellect (*'aql*), lineage (*nasl*), and wealth (*māl*) originate from classical Islamic scholars such as Imam al-Ghazali and al-Syatibi, who classified the objectives of Islamic law to ensure comprehensive human welfare. These dimensions were later adopted and operationalized by contemporary scholars in constructing Islamic development indicators, including the I-HDI framework proposed by Anto (2011) and refined by ; Rama & Yusuf, 2019). Several studies have further explored this approach to develop composite indices that capture human development from an Islamic perspective (Amir-Ud-Din, 2014; Bedoui, 2019; Ghazal & Zulkhibri, 2016; Kasri & Ahmed, 2015). By integrating both spiritual and material aspects, I-HDI provides a comprehensive framework for assessing human well-being in Muslim-majority contexts.

Principal Component Analysis

Principal Component Analysis (PCA), introduced by Pearson (1901) and independently developed by Hotelling (1933), is a statistical technique used for data dimensionality reduction. This method transforms a set of correlated original variables into a smaller number of new variables that are independent, uncorrelated, and represent a lower-dimensional space, with minimal or negligible loss of information (Ma & Yuan, 2019; Mishra et al., 2017). The advantage of PCA lies in its ability to remove correlations among variables without eliminating the original variables themselves (Kusuma & Wibowo, 2018). The method generates a new dataset that is uncorrelated while retaining essential information from the original data (Idrees et al., 2022; Kanwal et al., 2023). Several studies have also implemented PCA to construct new indices. For instance, Ariawan (2006) employed PCA to develop a Socio-Economic Index in Indonesia based on household ownership of valuable goods. Idrees et al. (2022) demonstrated the use of PCA to form a Financial Liberalization Index in Pakistan. Similarly, Kanwal et al. (2023) applied PCA to develop a Composite Islamic Finance Index, combining various metrics reflecting the performance of the Islamic financial sector.

3. Research Method

The research employed a quantitative approach, with Principal Component Analysis (PCA) used as the data analysis technique to construct the Islamic Human Development Index (I-HDI). The data utilized were secondary data from 34 provinces in Indonesia for the year 2024, chosen based on data availability and recency to represent a more current condition. In constructing the index, the researcher used 16 different variables that were previously compiled by Anto (2011) and Rama & Yusuf (2019), which were then adapted by the researcher for use in forming the

Islamic Human Development Index in Indonesia. The 16 variables to be analyzed are as follows:

Table 1. Principal Component Analysis (PCA) Variables

Variable	Definition	Data Source
X1 (Zakat/GDRP)	Ratio of total collected zakat funds to the Gross Regional Domestic Product (GRDP) within a period, used to measure the contribution of zakat to the economy.	National Zakat Agency (BAZNAS) & Central Bureau of Statistics (BPS)
X2 (Crime Rate)	Number of recorded criminal acts per 100,000 population within a year, reflecting the level of public safety and order.	Central Bureau of Statistics (BPS)
X3 (Mosque/ Muslim Population Ratio)	Ratio of registered mosques to the total Muslim population, used as an indicator of availability of worship facilities.	Ministry of Religious Affairs
X4 (Life Expectancy)	Average estimated age a person is expected to live from birth, measured in years, reflecting the degree of public health.	Central Bureau of Statistics (BPS)
X5 (Unemployment Rate)	Percentage of the labor force without employment within a period.	Central Bureau of Statistics (BPS)
X6 (Democracy Index)	Index score measuring the quality of democracy in a region based on civil liberties, political rights, and democratic institutions.	Central Bureau of Statistics (BPS)
X7 (Poverty Rate)	Percentage of population living below the poverty line within a period.	Central Bureau of Statistics (BPS)
X8 (Average Expenditure)	Average per capita expenditure of residents per month.	Central Bureau of Statistics (BPS)
X9 (School/Population Ratio)	Ratio of total schools from primary to higher education, both public and private, to the total population of a region.	Central Bureau of Statistics (BPS)
X10 (Literacy Rate)	Index measuring community literacy in accessing, understanding, and utilizing information, including basic literacy, digital literacy, numeracy, and critical thinking skills.	Central Bureau of Statistics (BPS)
X11 (Fertility Rate)	Average number of children a woman is expected to give birth to during her reproductive age (usually 15–49 years) if she lives through her reproductive period and experiences age-specific fertility rates.	Central Bureau of Statistics (BPS)
X12 (Divorce Rate)	Ratio of recorded divorces to the population of a region within a year.	Central Bureau of Statistics (BPS)

Variable	Definition	Data Source
X13 (Infant Mortality Rate)	Number of deaths of infants under one year of age per 1,000 live births in a given year.	Central Bureau of Statistics (BPS)
X14 (Per Capita Income)	GRDP divided by the total population within a year.	Central Bureau of Statistics (BPS)
X15 (Economic Growth)	Increase in production of goods and services within an economy in a region over one year.	Central Bureau of Statistics (BPS)
X16 (Gini Ratio)	Level of inequality or unevenness in income or expenditure distribution among a population.	Central Bureau of Statistics (BPS)

Source: BPS, BAZNAS & KEMENAG, 2024.

After the principal components are formed, to ensure that the new variables are suitable for use, the next step is to test the model's validity by regressing the scores of each component against the Human Development Index (HDI) as a proxy for the Islamic Human Development Index (I-HDI), based on the rationale that I-HDI and HDI tend to have a high correlation (Anto, 2011; Rama & Yusuf, 2019). The model's suitability is assessed by examining the resulting R-squared (R^2) value; the closer it is to 1, the better the components derived from PCA explain the variation in the constructed index.

4. Result and Discussion

Results

The first step in conducting PCA is to test the adequacy of the data using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The KMO value is used to assess sample adequacy, where a value above 0.5 indicates that the data are suitable for PCA analysis. Meanwhile, Bartlett's Test examines whether correlations exist among variables, with a p-value < 0.05 indicating sufficiently strong correlations among the variables, allowing PCA to be performed (El Haqq et al., 2025). The results of these tests are presented in Table 2 below:

Table 2. KMO & Barlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Bartlett's Test of Sphericity		
	Approx. Chi-Square	df	Sig.
0,704	332,687	120	0,000

Source: processed using SPSS, 2025.

Based on Table 2, the Kaiser-Meyer-Olkin (KMO) value is 0.704, indicating that the data are adequate for further analysis using PCA. In addition, Bartlett's Test of Sphericity yielded a Chi-Square value of 332.687 with a significance of 0.000 < 0.05, which implies that there are significant correlations among the variables. Therefore, the data are deemed suitable for conducting principal component analysis in the next stage.

Next, to determine which variables meet the sample adequacy criteria, the Measure of Sampling Adequacy (MSA) in the Anti-Image Correlation matrix needs to be examined. Variables with MSA values above 0.5 are considered suitable to be retained, while variables with values

below 0.5 should be considered for removal (El Haqq et al., 2025). The results of the MSA test are presented in Table 3 below:

Table 3. Anti Image Correlation

Step I		Step II	
Variable Matrix	**Anti Image Correlation**	**Variable Matrix**	**Anti Image Correlation**
X1	**0.220[a]**	-	-
X2	0.684[a]	X2	0.679[a]
X3	0.596[a]	X3	0.710[a]
X4	0.892[a]	X4	0.867[a]
X5	0.662[a]	X5	0.708[a]
X6	0.751[a]	X6	0.818[a]
X7	0.805[a]	X7	0.875[a]
X8	0.654[a]	X8	0.676[a]
X9	0.764[a]	X9	0.751[a]
X10	0.574[a]	X10	0.617[a]
X11	0.890[a]	X11	0.850[a]
X12	0.535[a]	X12	0.557[a]
X13	0.820[a]	X13	0.796[a]
X14	0.577[a]	X14	0.623[a]
X15	0.576[a]	X15	0.723[a]
X16	**0.403[a]**	-	-

Source: processed using SPSS, 2025.

Based on Table 3. the first-stage MSA test shows that two variables, X1 (0.220) and X16 (0.403), have MSA values below 0.5. This indicates that these two variables do not meet the adequacy criteria and must be eliminated from the analysis, followed by a second-stage test. After eliminating the variables with the lowest MSA (X1 and X16), the second-stage results show that all remaining variables have Measure of Sampling Adequacy (MSA) values above 0.5. Therefore, PCA analysis can proceed using these 14 variables without any further elimination.

Once it is ensured that all remaining variables are suitable for analysis, the next step is to determine the number of principal components to be formed. This determination is based on eigenvalues and supported by the scree plot. Components with eigenvalues ≥ 1 are retained as they are considered capable of adequately explaining the variance in the data. The results of the eigenvalue calculations are presented in Table 4 below:

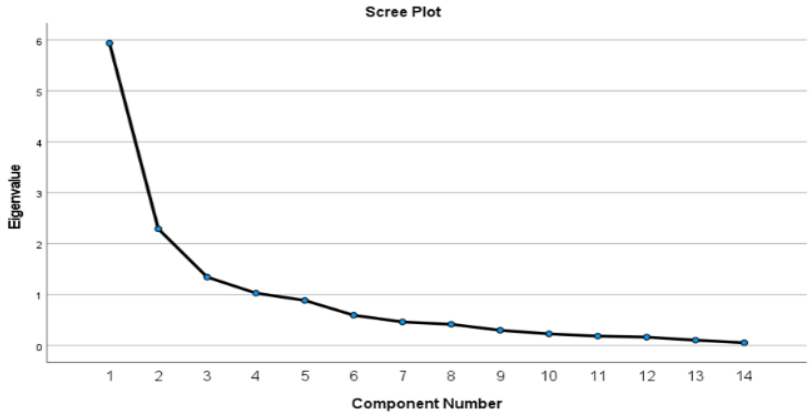
Table 4. Initial Eigenvalues

Component	Total	% of Variance	Cumulative %
1	**5,938**	**42,411**	**42,411**
2	**2,291**	**16,364**	**58,775**
3	**1,344**	**9,597**	**68,372**
4	**1,029**	**7,349**	**75,721**
5	0,886	6,326	82,047
6	0,595	4,251	86,299
7	0,463	3,308	89,607
8	0,417	2,977	92,584
9	0,299	2,139	94,722
10	0,229	1,636	96,358
11	0,185	1,322	97,680
12	0,165	1,177	98,857
13	0,105	0,750	99,607
14	0,055	0,393	100,000

Source: processed using SPSS, 2025.

The results in Table 4. indicate that there are four principal components with eigenvalues ≥ 1. The first component has an eigenvalue of 5.938, explaining 42.41% of the data variance. The second component explains 16.36%, the third 9.59%, and the fourth 7.93%. Cumulatively, these four components account for 75.72% of the total variance, which is considered sufficient to represent the information contained in the original variables.

In addition to using eigenvalues, the determination of the number of principal components can also be supported by scree plot analysis to identify the optimal number of components (Tinungki & Sunusi, 2018). The scree plot helps clarify the elbow point, indicating the optimal number of components to retain. The results of the scree plot are presented in Figure 1 below:



Source: processed using SPSS, 2025.

Figure 1. Scree Plot

Figure 1. presents the scree plot, illustrating the relationship between the number of components and their eigenvalues. An elbow point is observed at the fourth component, indicating that after this component, the eigenvalues decrease only slightly and remain relatively stable. This reinforces the previous calculation shown in Table 4.5, confirming that the optimal number of principal components for the analysis is four. Thus, the PCA in this study uses four principal components as the basis for constructing the Islamic Human Development Index (I-HDI).

After determining the number of principal components, the next step is to examine the communalities to assess the extent to which the variables are explained by the extracted components. High extraction values indicate that a variable contributes well to forming the principal components. Variables with extraction values > 0.5 are considered well represented by the selected principal components (El Haqq et al., 2025). The results of the communalities calculations are presented in Table 5. below:

Table 5. Communalities

Variabel	Initial	Extraction
X2	1,000	0,834
X3	1,000	0,762
X4	1,000	0,760
X5	1,000	0,757
X6	1,000	0,707
X7	1,000	0,716
X8	1,000	0,871
X9	1,000	0,742

Variabel	Initial	Extraction
X10	1,000	0,684
X11	1,000	0,759
X12	1,000	0,580
X13	1,000	0,926
X14	1,000	0,803
X15	1,000	0,701

Source: processed using SPSS, 2025.

Table 5 shows that all variables have high extraction values, all above 0.5. This indicates that the variables are well explained by the four extracted principal components. The variable with the highest extraction value is X13 (0.926), indicating the greatest contribution to the formation of the components. Meanwhile, the variable with the lowest extraction value is X12 (0.580), which is still above the minimum threshold and therefore remains suitable to be retained.

The next step is to examine the component matrix to determine the distribution of each variable across the extracted components. The factor loadings in this matrix indicate the strength of the relationship between each variable and the components, with higher loadings reflecting stronger associations. The highest loading for each variable will be selected to establish the relationship or correlation between the original variables and the newly formed components (Tinungki & Sunusi, 2018). The results of the component matrix are presented in Table 6. below:

Table 6. Component Matrix

Variable	Component			
	1	2	3	4
X2	0,398	**0,744**	0,332	-0,107
X3	0,525	-0,193	**0,639**	-0,202
X4	**-0,854**	-0,017	0,174	0,010
X5	-0,267	0,498	-0,076	**-0,657**
X6	**-0,779**	-0,287	0,097	0,090
X7	**0,780**	0,037	0,283	-0,164
X8	-0,637	**0,673**	0,019	0,110
X9	**0,765**	-0,207	0,028	0,338
X10	-0,519	-0,248	**0,563**	0,189
X11	**0,860**	-0,013	-0,080	-0,116
X12	-0,459	-0,159	**0,576**	-0,110
X13	**0,930**	0,202	0,140	0,023
X14	-0,462	**0,721**	0,107	0,243
X15	0,447	0,475	0,112	**0,513**

Source: processed using SPSS, 2025.

Table 6. the Component Matrix, presents the initial factor loading values of each variable on the extracted components before rotation. These values illustrate the strength of the relationship between the variables and the respective components, where higher loadings indicate a greater contribution of the variable in explaining the component. Based on the table, the first component is dominated by variables X7 (0.780), X9 (0.765), X11 (0.860), and X13 (0.930), which have high loading values, making the first component the strongest factor. The second component is primarily influenced by variables X2 (0.744), X8 (0.673), and X14 (0.721), with additional contributions from X5 (0.498) and X15 (0.475) showing moderate influence. In the third component, the prominent variables are X3 (0.639), X10 (0.563), and X12 (0.576). Meanwhile, the fourth component is largely influenced by X5 (-0.657) and X15 (0.513), although their

contributions are relatively smaller compared to the other components.

Overall, the Component Matrix results indicate the presence of four principal components. However, the pattern of relationships between variables and components is not yet clear as this represents the initial extraction. Therefore, an orthogonal rotation using the Varimax method is performed to obtain a simple structure, allowing each variable to clearly dominate one component. The results of this rotation are presented in Table 4.8 below:

Table 7. Varimax Rotated Component Matrix

Variable	Component			
	1	2	3	4
X2	0,612	-0,176	**0,615**	0,223
X3	**0,806**	0,241	-0,212	-0,096
X4	-0,538	**0,627**	0,148	0,235
X5	-0,018	-0,060	0,197	**0,845**
X6	-0,580	**0,601**	-0,083	0,048
X7	**0,799**	-0,242	-0,098	-0,100
X8	-0,413	0,199	**0,736**	0,344
X9	0,477	-0,349	-0,153	**-0,608**
X10	-0,126	**0,805**	0,039	-0,135
X11	**0,622**	-0,553	-0,201	-0,161
X12	0,014	**0,748**	-0,011	0,141
X13	**0,797**	-0,477	0,075	-0,240
X14	-0,258	0,158	**0,823**	0,186
X15	0,326	-0,283	**0,582**	-0,419

Source: processed using SPSS, 2025.

Table 7. presents the results of the Varimax component rotation, which aims to realign the component axes so that the relationship patterns among variables are clearer. The rotation results show that the first component is composed of variables X3, X7, X11, and X13, which have the highest loadings compared to other components in absolute terms. The second component consists of variables X4, X6, X10, and X12, which also exhibit strong correlations with this factor. The third component is formed by variables X2, X8, X14, and X15, which have significant contributions. Meanwhile, the fourth component is constructed from only X5 and X9, with fewer variables compared to the other components.

Based on the rotated component matrix results, variables with dominant factor loadings on each component are then grouped to form the main dimensions. This grouping serves as the foundation for constructing the Islamic Human Development Index (IHDI), which consolidates development indicators into four principal components. The details of the component formation are presented in Table 8. below:

Table 8. Formation of Principal Components

Component	Indicators	Percentage of Variance
1	X3 (Mosque/Muslim Population Ratio) X7 (Poverty Rate) X11 (Fertility Rate) X13 (Infant Mortality Rate)	42.41%
2	X4 (Life Expectancy) X6 (Democracy Index) X10 (Literacy Rate) X12 (Divorce Rate)	16.36%

Component	Indicators	Percentage of Variance
3	X2 (Crime Rate) X8 (Average Expenditure) X14 (Per Capita Income) X15 (Economic Growth)	9.59%
4	X5 (Unemployment Rate) X9 (School/Population Ratio)	7.34%
Cumulative Percentage		**75.72%**

Source: processed using SPSS, 2025.

Table 8. presents the results of grouping variables into four principal components based on the highest loadings in the rotated component matrix. The analysis shows that these four components are capable of explaining the dimensions of the Islamic Human Development Index (IHDI) to be constructed.

The first component contributes the most, explaining 42.41% of the variance, and consists of the indicators Mosque/Muslim Population Ratio (X3), Poverty Rate (X7), Fertility Rate (X11), and Infant Mortality Rate (X13). This component can be interpreted as the socio-religious dimension, reflecting the interrelation between religiosity, social welfare, and population dynamics.

The second component explains 16.36% of the variance and includes Life Expectancy (X4), Democracy Index (X6), Literacy Rate (X10), and Divorce Rate (X12). This component is referred to as the quality of life dimension, as it combines aspects of health, democracy, literacy, and family harmony.

The third component contributes 9.95% of the variance, consisting of Crime Rate (X2), Average Expenditure (X8), Per Capita Income (X14), and Economic Growth (X15). This component represents the economic welfare dimension, indicating the relationship between social conditions and economic achievements.

The fourth component accounts for 7.34% of the variance and comprises Unemployment Rate (X5) and School/Population Ratio (X9). This component can be categorized as the social mobility dimension, reflecting the link between access to education and employment opportunities that determine changes in social status.

Overall, these four principal components explain 75.72% of the cumulative variance, which is considered sufficiently representative in summarizing the information from the research indicators.

After the four principal components are formed, the next step is to examine the amount of variance explained by these components. The newly formed variables are then regressed against the Human Development Index (HDI) as a representation of the Islamic Human Development Index to be constructed, with the output as follows:

Table 9. R^2

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.837[a]	0,700	0,659	1,98331

Source: processed using SPSS, 2025.

Table 4.10 presents the results of the model adequacy test through regression between the four principal components derived from PCA and the Human Development Index (HDI). The correlation coefficient (R) of 0.837 indicates a very strong relationship between the PCA components and HDI. Furthermore, the R-squared value of 0.700 implies that 70% of the variation in HDI, used as a proxy for the Islamic Human Development Index (I-HDI), can be explained by the four extracted components. Therefore, the components derived from PCA can be considered sufficiently valid for use, as they account for more than half of the variation in HDI, even though approximately 30% of the variation is influenced by factors outside the model.

Discussion

The principal component analysis in this study produced four main dimensions of Islamic human development, which differ from the initial theoretical construct of five Maqasid al-Shariah dimensions. Two indicators, namely the ratio of zakat to GRDP and the Gini ratio, were eliminated due to their low contribution to the formation of the principal components. This was caused by excessive data variation across regions, indicating that these two variables are not yet strongly integrated with the broader spiritual and social dimensions. Empirically, zakat still faces institutional constraints and data limitations at the provincial level, while the Gini ratio tends to exhibit high variability across periods, rendering the variable statistically unstable for inclusion in the principal component analysis. This study differs from the previous works of Anto (2011) and Rama & Yusuf (2019), who only proposed a conceptual framework for constructing the IHDI. In contrast, this research empirically tests and reconstructs the IHDI using the most recent provincial data, thereby providing stronger evidence and refinement of the index's dimensional structure.

The PCA results reveal that the socio-religious, quality of life, economic welfare, and social mobility dimensions are not merely statistical clusters but reflect structural linkages within Indonesia's socio-economic context. The socio-religious dimension comprising mosque density, poverty, fertility, and infant mortality captures how religious infrastructure functions as a social support system that influences welfare outcomes, where mosques often serve as hubs for community aid, health counseling, and informal safety nets, thereby intersecting with demographic vulnerability. The quality of life dimension life expectancy, democracy index, literacy, and divorce rate integrates institutional and cultural aspects, as access to education and health services is shaped by governance quality and social cohesion at the household level. The economic welfare dimension crime rate, household expenditure, per capita income, and economic growth reflects the interplay between material well-being and social stability, where insecurity and crime frequently emerge from economic disparities and limited opportunities. Finally, the social mobility dimension unemployment and school/population ratio directly links human capital formation with labor absorption, showing that educational access only translates into upward mobility when labor markets can absorb skills. Thus, these four components represent grounded empirical relationships that align with Islamic development values and provide a theoretically meaningful reconfiguration of IHDI in the Indonesian context.

This integration aligns with Ahmad in Rafsanjani (2018), who asserts that development in Islam is based on four philosophical principles *Tauhid*, *Rububiyyah*, *Khilafah*, and *Tazkiyah* which guide humans so that well-being is measured not only by material achievement but also by morality and spiritual balance. The socio-religious dimension reflects Tauhid and Tazkiyah, where

spirituality becomes a moral strength for society. The quality of life and economic welfare dimensions reflect Rububiyyah, or divine order that leads to a just and harmonious life, while social mobility reflects Khilafah, the human responsibility to manage resources and create social equity. Although the classical maqāṣid al-sharī'ah framework distinguishes five objectives *dīn* (faith), *nafs* (life), *'aql* (intellect), *nasl* (lineage), and *māl* (wealth) the PCA results empirically consolidate these indicators into four components due to two interrelated reasons: (1) conceptual overlap among indicators and (2) institutional–contextual dynamics specific to Indonesia. Conceptually, indicators that are theoretically assigned to different maqāṣid dimensions such as poverty (*māl*) and infant mortality (*nafs*) tend to operate within the same social infrastructure when aggregated at the regional level. In Indonesia, religious institutions such as mosques serve not only as places of worship but also as spaces for social assistance, informal counselling, and community-based service provision, which functionally connect spiritual practices with welfare outcomes. This explains why mosque density, poverty, fertility, and infant mortality although normatively belonging to different maqāṣid categories statistically cluster into a single socio-religious component.

Chapra (2008) further strengthens these findings, emphasizing that development in Islam is multidisciplinary, involving the interconnection of economic, social, political, legal, and spiritual aspects. Development is a dynamic system where elements such as justice, welfare, resources, and human values influence each other. In this context, the four dimensions formed are not a deviation from the Maqasid al-Shariah concept, but rather a real representation of a living Islamic social system that adapts to the dynamics of modern society. Similarly, indicators that represent quality of life and economic well-being exhibit strong empirical co-movement because health outcomes, educational attainment, income levels, and household expenditure are shaped by the same institutional conditions, including public service delivery, governance, and market structure. In contrast, mobility-related indicators such as unemployment and school–population ratio form a distinct component because they reflect transitional mechanisms between human capital accumulation and labor absorption, not merely static welfare conditions. Therefore, the reduction from five maqāṣid dimensions to four empirical components should not be interpreted as a rejection of the classical Islamic framework, but as evidence of functional convergence of multiple norms within Indonesia's socio-economic environment. PCA identifies patterns of co-variation, not normative priority; thus, the four components reflect how Islamic development ideals are manifested in practice through institutional arrangements, demographic realities, and social structures, rather than strict doctrinal separation.

Furthermore, Sadeq (2016) explains that development without moral and ethical foundations is hollow development. According to him, Islamic economic development is a process of balance and sustainable progress to achieve human well-being, both material and non-material. It includes enhancing welfare, reorganizing socio-economic systems, and strengthening spirituality according to Islamic teachings. In the context of this study, the identification of four dimensions of the Islamic Human Development Index (I-HDI) reflects this perspective: true development in Islam cannot be separated from intertwined moral, spiritual, social, and economic values. Consequently, these findings reinforce that Islamic well-being does not merely mean increased economic figures, but also the growth of human values, moral balance, and spiritual sustainability.

5. Conlusions

This study concludes that the Islamic Human Development Index (IHDI) can be empirically reconstructed and validated through Principal Component Analysis (PCA) using officially published provincial data. The PCA results identify four core dimensions socio-religious, quality of life, economic welfare, and social mobility which together explain 75.72% of the total variance and demonstrate a strong empirical association with the Human Development Index ($R^2 = 0.70$). These four components represent a functional consolidation of indicators originally derived from the five objectives of maqāṣid al-sharīʻah (*dīn*, *nafs*, *ʻaql*, *nasl*, *māl*). In practice, several maqāṣid objectives operate jointly within the Indonesian socio-economic system, leading to empirical clustering. For example, indicators related to spirituality, demographic health, and household vulnerability tend to co-vary because religious and community institutions simultaneously influence moral behavior, social assistance, and welfare delivery. Therefore, the empirical shift from five theoretical dimensions to four components is not a normative deviation, but a contextual manifestation of how Islamic development ideals are expressed within institutional and demographic structures.

The theoretical implication of this finding is twofold. First, the study refines the IHDI by demonstrating that Islamic human development is not best measured through five isolated conceptual domains, but through four integrated clusters that mirror real operational dynamics in society. Second, if interpreted through the lens of four Islamic philosophical principles Tawhid, Rububiyyah, Khilafah, and Tazkiyah—the results suggest a potential reconstruction whereby the classical maqāṣid objectives merge into broader functional domains of spiritual cohesion, institutional order, economic stewardship, and social agency. This interpretation highlights the need to strengthen zakat governance and data reliability to reinforce *māl*-related welfare outcomes, while acknowledging that sustainable well-being in Islam encompasses spiritual, moral, social, and economic dimensions. Accordingly, this research provides an empirically grounded and theoretically coherent model of Islamic human development, offering guidance for future policy design and scholarly inquiry.

6. References

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