

Measurement Method for Islamic Human Development Index

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Abstract

The Islamic Human Development Index (IHDI) is calculated using various methods. This paper contemplates most elegant aggregation method for computing IHDI using a set of axioms. The old measure of IHDI taking a linear average and Bayesian Structural Equation Modelling (SEM) of the five dimensions indulges cross-country data. These two methods provide a powerful system to choose number of indicators for contemplating the relationship of latent variables. We propose an alternative aggregation measure, where IHDI is the inverse of the distance from the desirable level which is set by Foster-Greer-Thorbecke (FGT) deficiency measures. This measure, in addition to the above-mentioned methods, also satisfies multidimensional measures where responses are in ordinal form.

Keywords: *Islamic Human Development Index (IHDI), Linear Average, Bayesian Structural Equation Modelling (SEM), and Foster-Greer-Thorbecke (FGT) poverty measures*

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I. Introduction

Being of a multidimensional nature, human development gives different meanings to different people. Islamic jurisprudence too encompasses the meaning and purpose of human development, such as scientific advances, the value of religious beliefs and behavior, ethics, marriage and the importance of work, family, politics, and more.¹

All these determinants of human development can be classified into five groups, namely; Knowledge and values, skills, health, posterity and wealth distribution. Literature on this type of classification is found in the Islamic era where these dimensions played important roles for human development. Thus, achieving all of these is a process involving the whole person, including rational, spiritual, and socio-economic dimensions, and the whole process is characterized as human development based on Maqasid-al-Shariah (Mohammed B. Yusoff, 2011).

This is the birth of our proposed Islamic Human Development Index in terms of theoretical approach. Now the question is; can this theoretical approach to measure Islamic human development be applied to the analysis of sequential data in cross-country, states, districts, institutions, social groups, and religious groups? To answer this question, along with the concept and application of Islamic human development, we deliberately chose two Muslim higher educational institutions because the collection of primary data was an easy task in these institutions.

Therefore, to measure and enable the extent of Maqasid-al-Shariah-based human development at the microscopic level, a comparison was made between AMU and JMI by constructing an index according to the framework of the study. In this direction, one of the most important aspects of developing an index is to obtain dimensions. To derive the dimension, we employ indicators according to Salman Syed Ali and Hamid Hasan (2014). Nonetheless, we examined the robustness and applicability of our findings to replicate previous findings at a microscopic level.

We now evaluate the performance of our model with approaches traditionally used in applied literature. Given the lack of a commonly accepted method of aggregation, different studies summarize available information in many different ways, and often arrive at uneven conclusions even when analyzing the same data.

This study applies a new method for constructing the Maqasid-al-Shariah-based human development indices that summarize high dimensional data. Our method advances traditional literature on Islamic human development. Presumably, this is the first study in the Islamic human development literature to infer a dedicated multidimensional model with correlated indicators in the simplest way. We show that it improves classical methods for dimensional selection, and identification of true embryonic structure. Its empirical applicability has

¹ Ronald Inglehart et al. University of Michigan Institute for Social Research, World Values Surveys and European Values Surveys, 1999-2001, May 2004

been demonstrated by the present study. We infer the structure of Islamic human development index, and point out that this method succeeds in constructing explanatory indices.

II. Model Specification

On the empirical approach, it is necessary to specify the measurement instruments of the analysis. Observed data through measurement instruments are inspected and transformed into concise and explanatory genre for policies and further evaluation.

In this regard, taking indicators that are measurable for the five dimensions of human development, Anto (2011) worked in parallel with the United Nations Human Development Index (HDI) methodology in calculating IHDI. Therefore, he first normalized the data for each dimension and then, taking their arithmetic average from the sum of all dimensions. This method is simple, easy to understand, and has been studied extensively. The current method of IHDI observed by Anto may be the most comprehensive method, but is not entirely consistent and sufficient to measure Islamic human development. Anto, M. H. (2011)

Consequently, M. Fevzi Esen (2015) had explored the covariance framework of human development conditions by two approaches Bayesian Factor Analysis and Bayesian Structural Equation Modeling (SEM). These two methods provide a powerful system for selecting the number of indicators to propose the relationship of latent variables. They select adjusted / reduced parameters including hyper-parameters for prior distributions and number of indicators. As a result, the first approach is about the collection of proxy variables and is using quantitative models to focus on data collection and the second approach is to measure latent concepts that responses are either continuous or ordinal. Thus Bayesian SEM allows prior information to be used in terms of the properties of an underlying distribution. Methodologically, the reduction of parameters is a serious concern of this model. Therefore this model may not be compatible with the dominant concept of Islamic human development.

The main concept of Islamic human development analysis is that, all indicators have their own importance, so we cannot omit any indicator due to the measuring instrument used. Typically many observable indicators have patterns similar to the multicollinearity. They may be the ordinal variable and the cardinal variable at the same time. This type of problem is both an opportunity and a challenge in many empirical applications. The main question is how to condense the available information into explanatory sets.

By following the technique of distance inversion from the Maqasid-al-Sharia model determined by the Foster-Greer-Thorbecke (FGT) reduction measure in this study, I present a simple equilibrium framework in the presence of aforementioned opportunities and challenges.

Therefore, we first manipulated the primary data. After the collection and editing of the primary data about the five dimensions, we classified it into related facts to make comparisons and highlight important information. We categorized the data according to pre-determined characteristics such as attendance at religious services, attending regular prayer, whether or not abortion is appropriate, etc². On this information, we applied the Alkire and Foster (2007) methodology which was used by Salman Syed Ali and Hamid Hasan (2014) for unique measurement of IHDI. These measures are used as an appropriate alternative where survey responses are ordinal in nature.

We have explored 15 steps to calculate the Islamic Human Development Index through the FGT model which are the following:

Step-1: Choose units of analysis

Step-2: Choose dimensions (five)

Step-3: Choose attributes and their ranks for each dimension (here these were 27)

Step-4: To express *the distance of actual rank (answer of respondent) from the worst rank*³ for an attribute of corresponding dimension for a unit of the study, by:

$$AD_{ij}$$

Here, *i* for a unit of the study and *j* for an attribute.

Step-5: To get '*Total Distance from the worst*' by taking total of "*AD_{ij}*" in all attributes of corresponding dimension (row-wise) assuming equal weights for each unit of the study:

$$\begin{aligned} AD_{i145} + AD_{i146} + AD_{i147} + AD_{i148} &= cF_i \\ AD_{i155} + AD_{i177} + AD_{i179} + AD_{i180} + AD_{i183} + AD_{i184} + AD_{i185} + AD_{i188} + AD_{i189} &= cL_i \\ AD_{i172} + AD_{i175} + AD_{i182} + AD_{i248} &= cI_i \\ AD_{i203} + AD_{i203A} + AD_{i204} + AD_{i205} + AD_{i206} + AD_{i209} &= cPOS_i \\ AD_{i59} + AD_{i171} + AD_{i181} + AD_{i239} &= cPRO_i \end{aligned}$$

² *Ibn Ashur Treatise on Maqasid-al-Shariah (2006)*

³ Its worst rank is set by on prior information, see e.g. Salman Syed Ali and Hamid Hasan (2014)

Step-6: For setting first cut-off deficiency line, calculate mode value of “ AD_{ij} ” for an attribute of corresponding dimension (column-wise), symbolically;

$$S4_{ij}$$

Step-7: Site the first cut-off of deficiency line by taking total of above for all attributes of corresponding dimension (row-wise), symbolically;⁴

$$\begin{aligned} S4_{i145} + S4_{i146} + S4_{i147} + S4_{i148} &= DCPF_i \\ S4_{i155} + S4_{i177} + S4_{i179} + S4_{i180} + S4_{i183} + S4_{i184} + S4_{i185} + S4_{i188} + S4_{i189} &= DCPL_i \\ S4_{i172} + S4_{i175} + S4_{i182} + S4_{i248} &= DCPI_i \\ S4_{i203} + S4_{i203A} + S4_{i204} + S4_{i205} + S4_{i206} + S4_{i209} &= DCPPOS_i \\ S4_{i59} + S4_{i171} + S4_{i181} + S4_{i239} &= DCPPRO_i \end{aligned}$$

Step-8: Following the first cut-off of deficiency line, we compute *deprivation score* ‘ C_{ij} ’ of every unit of study in each dimension separately;

$$\begin{aligned} C_{ij} &= DCPF - cF_i \\ C_{ij} &= DCPL - cL_i \\ C_{ij} &= DCPI - cI_i \\ C_{ij} &= DCPPOS - cPOS_i \\ C_{ij} &= DCPPRO - cPRO_i \end{aligned}$$

Here, j is for a dimension.

Then we count the number of units of study those falling below from the first cutoff *in each dimension* following the conditions of:

If $C_{ij} > 0$, units of study is considered in deprive set

If $C_{ij} \leq 0$, units of study is not considered in deprive set

Step-9: To calculate the sum of *deprivation score* ‘ $\sum_1^q C_j$ ’ which is obtained by adding, total deprivation score for all deprived units of study of *a dimension* (those deprived according to first cut-off deficiency line) for all dimensions (column-wise).

Step-10: Following the above steps we go for second cut-off to obtain number of *finally* deprived units of study and separated all non-deprived data by subtracting the total of “ AD_{ij} ” from first cut-off and then add these all values for all dimensions assuming equal weights for every unit of study (row-wise) with the condition of:

If $c \leq 0$ for a unit of study, he/she is *not* considered in the set of deprived.

If $c > 0$ with the condition of *minimum three sets of brackets have value > 0* for a units of study, he/she is considered in the set of deprived, symbolically;

$$\begin{aligned} c_i &= (DCPF - cF_i) + (DCPL - cL_i) + (DCPI - cI_i) + (DCPPOS - cPOS_i) + (DCPPRO - cPRO_i) \\ &\text{Or} \\ c_i &= C1_i + C2_i + C3_i + C4_i + C5_i \end{aligned}$$

Step-11: Applied second deficiency line to number of dimensions to check how many units of study are *finally* deprived (q) and calculated *final* sum of deprivation score ($\sum_1^q c_j$) which is obtained by adding, total deprivation score for all *finally* deprived units of study (q) of *all dimensions* (column-wise).⁵

Step-12: To calculate the headcount index:

$$H = \frac{q}{n}$$

Here, q is the number of multi-dimensionally deprived units of study, and n is the total sample size.

Step-13: To calculate the intensity index (A) by dividing *final* sum of deprivation score from the number of total *finally* deprived units of study.

$$A = \frac{\sum_1^q c}{q}$$

Step-14: Calculated the adjusted headcount index (Mo) which shows a multidimensional deficiency in the index and which is observed by multiplying headcount index and average deficiency gap.

$$Mo = H.A$$

⁴ Here $DCPF_i$, $DCPL_i$, $DCPI_i$, $DCPPOS_i$ and $DCPPRO_i$ have constant values for every unit of study and numeric subscripts of AD_i and $S4_i$ denote question number in WVS 2010-12

⁵ Those deprived according to second cut-off deficiency line not first.

Here, M_o presents the proportion of units of study/respondents who reported deprivation in three or more dimensions. Thus, each index captures a certain amount of the overall variance of the attributes within the entity on the one hand and between the entities on the other at the same time.

Step-15: Getting sum of deprivation score ($\sum_1^q C_j$) for all deprived units of study of a *dimension* for all dimensions separately by following step 8 and 9, we calculated the contribution of dimension j to multidimensional deficiency in overall shortfall:

$$\text{Contribution}_j = \frac{\sum_1^q C_j / n}{M_o}$$

All of these indices are formulated using FGT deficiency measures to meet a number of meaningful and necessary policy implications. Furthermore, it allows researchers to examine relationships that are not directly measured by collapsing a large number of assumption-based attributes in some underlying indices.

III. Results

Based on all attributes of the respective dimensions, three indices have been prepared following the FGT method separately for AMU and JMI. The values of the indices were not the same due to the values of the attributes of the dimensions differed to each other. In addition, these composite indices were normalized in terms of distance from desirable levels in Islamic human development and determined the desired range and the forbidden range (0, 1) for each index.⁶

Therefore, by following the method we used the first cut-off deficiency line to measure the amount of deprivation scores ($\sum_1^q C_j$) which is obtained by adding the total deprivation score for all disadvantaged students of one dimension (disadvantaged according to the first cut-off deficiency line) to all dimensions in both institutions.

Additionally, to find out the total number of disadvantaged students in an institution, the analysis turned into a broader assumption. Because if it was assumed that the above procedure was appropriate for measuring the total disadvantaged students in the institute, then all the selected students would have become deprived. It would have been narrow minded approach. Thus, a flexible assumption has been applied that if a student is deprived of three or more dimensions, he or she will be considered among the disadvantaged students otherwise no. The rationale behind this is that if a student is disadvantaged in half of the total dimensions, then there are few opportunities for him to rise above the minimum threshold and become part of the non-disadvantaged students.

Following this situation, we computed ' q ', which is the number of students who are deprived of multi-dimensionally. It was about 166 out of 200 students for JMI while it was about 152 out of 200 for AMU. Thus, in total, only 14 students were additionally disadvantaged in JMI compared to AMU. In a more precise and condensed form, we can add this information in the direction of the headcount index (H) which is 83 percent for the JMI and 76 percent for the AMU indicating the incidence of deficiency in the sense of distance from a desirable level.

This means that 83 percent of the JMI population sample is disadvantaged in three or more dimensions. On the other side of the study, AMU has little difference from JMI in terms of headcount index (H). Since it covers a distance of 76 percent from the desirable level or in other words, we can say that 76 percent of the sample students at Aligarh Muslim University reported a decrease in three or more dimensions and 24 percent of the students in its sample population secured beneficial arrangements in two or more dimensions.

After successful compilation of the headcount index, the next objective is to estimate the sample's average deprivation at both institutions. To calculate this, first, we measured the final sum of deprivation scores ' $\sum_1^q c$ ', to achieve this score we added the total deprivation score in all dimensions to all disadvantaged students (q) in both institutions separately. For JMI it was ' $\sum_1^q c_{JMI} = 2913$ ' and for AMU it was ' $\sum_1^q c_{AMU} = 2559$ ' respectively. Secondly, based on this information, we constructed the deficiency intensity index (A) which shows the intensity of deficiency as the average depletion.

This is, in fact, the ratio of total individual deprivation scores ' $\sum_1^q c$ ' to total disadvantaged students ' q ' in an institution which is 17.54 percent for JMI and 16.83 percent for AMU. This means that the average

⁶ Here, the desired level and forbidding level (0, 1), describes the maximum level of Islamic human development. Here '0' represents the maximum desired level because if all indexes; namely, 'A,' 'H' and 'Wo' are '0', then it means there is no deficiency, and no one is deprived in the overall multidimensional index. This means the deprivation score for all students in all dimensions; namely, C, c (which is calculated by first and second cut-off deficiency line), is also '0'. If the deprivation score is '0', then the respective dimension has no contribution for keeping students of respective institute deprived in the overall multi-dimensional deprivation index.

disadvantaged students for Jamia Millia Islamia is 17.54 percent deprived of dimensions, whereas for Aligarh Muslim University, the situation is slightly different, and they were 16.83 percent deprived of dimensions. The next objective was to calculate the adjusted multi-dimensional deprivation index for the selected sample of both institutions.

The ‘Mo’ which represents a multidimensional deficiency, has been calculated by multiplying the headcount index (H) and the average deficiency gap (A). The adjusted deprivation index represents the proportion of students who reported a deficiency in three or more dimensions. Surprisingly, it is around 14.56 percent for JMI and 12.79 percent for AMU. As we observed, the average deficiency gap in percentage form is lower than that of the incidence of deficiency, indicating an overall fall from the desirable level.

However, one thing to note here is that there is a small difference between the scores in the two institutions. It should never be taken that the overall depletion calculated using the multi-dimensional deprivation index, intensity index and adjusted deprivation index is useless by any standard. We used this information to calculate the contribution of a dimension ‘j’ to multidimensional deficiency. By following the first cut-off of the reduction line, we calculated the deprivation score ‘C_j’ of every student in each dimension separately.

Then in each dimension the number of students falling below the first cut-off deficiency line is counted, if the condition of C_{ij} > 0, is successful, the students are considered in the disadvantaged set of students.

By following this procedure we calculated the sum of the deprivation score sum ‘∑₁^q C_j’ which is obtained by adding the total deprivation score for all disadvantaged students (those deprived according to first cut-off deficiency line and not of the second cut-off) in all dimensions at both institutions separately, then divided it by the total number of samples and the adjusted deprivation index.

Contribution of Dimension j to Multidimensional Deficiency

Dimensions	$\sum_1^q C_{jMIj}$	q_{JMI}	$\frac{\sum_1^q C_{jMIj} / n}{Mo_{JMI}}$	$\sum_1^q C_{AMUj}$	q_{AMU}	$\frac{\sum_1^q C_{AMUj} / n}{Mo_{AMU}}$
Faith	1373	200	0.47	162	98	0.06
Life	406	96	0.13	350	84	0.13
Intellect	204	88	0.07	250	100	0.09
Posterity	823	109	0.28	1841	178	0.71
Property	450	181	0.15	476	186	0.18

Source: Field Study (2019)

It shows that how much a particular dimension is below in the sense of a minimum desired level, and how much it is contributing for keeping units of study for a particular institute deprived in the overall multi-dimensional deprivation index in ratio.

IV. Conclusion

This paper evaluated FGT deficiency measures across dimensions for measuring Islamic human development index through a set of 15 intuitive axiomatic properties. Shortfall headcount index (H) point out the incidence of deficiency in the sense of distance from a desirable level in Maqasid-al-Shariah. The shortfall intensity index (A), in addition to this, exercises about degree of under-privileging of an average deprived unit of analysis (here it is student) in all dimensions. The shortfall headcount adjusted index (M₀) shows the contribution of each dimension in overall IHDI shortfall.

In addition, our proposed cut-off deficiency lines can be used in various contexts. Under such an interpretation, Likert scaling and the corresponding discussion with the first cut-off deficiency line are the raw positions. The second cut-off deficiency line is an improvement over the first, but it will still remain with the 'Mode Average Method' condition. Therefore, here we also suggest that applying the second cut-off produces a censored deprivation matrix. Of course, we are aware that the implementation of censor data with a minimum of three sets of c_i interchanged at different levels, it will give different measurement exercises, but nevertheless, it will improve our understanding.

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