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RESEARCH ARTICLE

ON STANDARDIZATION OF NARAIN *ET AL* METHOD TO COMPUTE COMPOSITE INDEX

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A R T I C L E I N F O

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A B S T R A C T

Prem Narain (1991) developed composite index using Z-Score and device methodology to compute composite index. Narain *et al* (2007) modified the earlier index by weighing the deviations inversely proportional to coefficient of variation and evaluated the disparities in the level of development amongst various districts. In this paper modification is suggested: weights of coefficient of variation is taken and weighing the deviations inversely proportional to weights of coefficient of variation.

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INTRODUCTION

To compute development /distress of blocks, districts need precise method to compute composite index. Narain *et al* in his research developed the algorithm to compute composite index. various authors uses the methodology for measuring development/distress, amongst them are, RC Bharti *et al* (2014) uses the methodology for measuring economic condition of eastern region of India.

Anil Rai *et al* (2008) developed livelihood index for different agro-Climatic Zones of India and study has revealed regional disparity in the development process and has suggested formulating appropriate policies to bridge disparity gap. Ajanta Nath *et al* (2007) studied Inter district disparities in health care service of Assam and throws light on the developmental disparities in health care sector in twenty-three districts of Assam. S.G.

Thote *et al* (2012) study measurement of agricultural growth of Amravati District of Maharashtra state using crop and non-crop indicators and composite index has been constructed. Pajankar *et al* (2010) designed weighted composite index and level of development has been estimated with the help of weighted composite index based on optimum combination of all the developmental indicators.

Narain *et al* (1991) gave a composite index to measure socio economic development for each state. It was based on standerdized variables (Z score). The composite index was calculated as square root of sum of squared deviations from best state for variables considered. Narain *et al* (2007) modified the earlier index by weighing the deviations inversely proportional to coefficient of variation and evaluated the disparities in the level of development amongst various districts.

METHODS OF ANALYSIS

Narain *et al* suggested following methodology to compute composite index [1].

Let [Xij] be data matrix giving the values of the variables of ith state. I=1, 2...n (number of states) and jth indicator, j=1, 2...k (number of indicators).

For combined analysis [Xij] is transformed to [Zij] the matrix of standerdized indicators as follows

$$[Zij] = \frac{Xij - \bar{X}j}{Sj}$$

Where $\bar{X}j$ = mean of the jth indicator
Sj = Standerd deviation of jth indicator.

From [Zij] identify the best value of each indicator. Let it be denoted as Z0j. The best value will be either the maximum value or the minimum value of the indicator depending upon the direction of the impact of indicator on the level of development. For obtaining the pattern of development Ci of ith state, first calculate Pij as follows

$$Pij = (Zij - Z0j)^2$$

Pattern of development is given by

$$Ci = \left[\sum_{j=1}^{n} \frac{Pij}{CVj} \right]^{1/2}$$

(CVj) = coefficient of variation in Xij for jth indicator Here modification is suggested while computing pattern of development, While computing composite index, weights of coefficient of variation is taken and weighing the deviations inversely proportional to weights of coefficient of variation.

$Wj = CVj / \sum_{j=1}^{n} CVj$, j = 1,2 ...n (no of variables)

Table 1 Status and Composite Index of Education

Sr No	States	Male Literacy	Female Literacy	Rural Literacy	Urban Literacy	Composite Index(Di) as per Narain et al method	Composite Index As per Standardized method	Rank as per Narain et al Method	Rank as per Standardized method
1	Assam	71.3	54.6	81	94	0.17	0.15	Excellent	Excellent
2	Bihar	59.7	33.1	47	79	0.71	0.88	Poor	Very Poor
3	Chhattisgarh	77.4	51.9	57	83	0.34	0.62	Very Good	Poor
4	Jharkhand	67.3	38.9	51	84	0.50	0.75	Poor	Poor
5	Odisha	75.3	50.5	61	78	0.40	0.61	Good	Poor
6	Uttar Pradesh	68.8	42.2	56	70	0.63	0.82	Poor	Very Poor
7	West Bengal	77.0	59.6	68	88	0.18	0.35	Excellent	Very Good
	Average	70.97	47.26	60.14	82.29				
	Std Deviation	6.34	9.44	11.40	7.67				
	Correlation with Di	0.77	0.94	0.86	0.86				

Table 2 For the purpose of grading the composite indices has been classified in following five Classes with corresponding Rank.

Sr No	Range of Composite Indices	Rank
1	0.0≤Di<0.2	Excellent
2	0.2≤Di<0.4	Very Good
3	0.4≤Di<0.6	Good
4	0.6≤Di<0.8	Poor
5	0.8≤Di<1.0	Very Poor

$$Ci = \left[\sum_{k=0}^{n} \frac{Pij}{Wj} \right]^{1/2}$$

Composite Index of development is given by

Di = Ci/C Where C = Cbar + 3 SDI

C bar = Mean of Ci

SDI = Standard deviation of Ci

Smaller Value of Di will indicate high level of development and higher value of Di will indicate low level of development Numerical Example. To illustrate the methodology following example is taken from the reference paper, Economic condition of Eastern region of India- An Statistical Evaluation studies the status of education in eastern region of India. (Bharti RC, 2014).

RESULTS AND DISCUSSION

After standardizing the narain *et al* methodology to compute composite index by appropriately weighing coefficient of variation while computing pattern of Development, There is considerable change in ranks of the district and reveal the correct picture of the disparities in the level of development amongst various districts. And the existing composite index of development is replaced with standardized composite index by weighing the deviations inversely proportional to weights of coefficient of variation.

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