Conference

Distribution of Human Capital Between Regions in Indonesia Using the Alternative Human Development Index

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Abstract. Human capital is an important factor in the development and economic growth of a country. This study aimed to (1) adopt a modified model of the Human Development Index (HDI) called the Alternative Human Development Index (AHDI) to measure human capital between regions in Indonesia, and (2) analyze the distribution pattern of human resource inequality between regions in Indonesia using cluster analysis. The results showed that the measurement of human capital with AHDI provided more comprehensive measurement results because it used a more complete dimension of human capital and showed the advantages and disadvantages of human capital between regions in Indonesia. The distribution of human capital inequality in Indonesia based on AHDI, using cluster analysis, showed that regions in Indonesia are divided into areas of high, medium, low and very low AHDI performance. The low and very low clusters are a priority for the government in the development of human capital in Indonesia.

Keywords: human capital, gender empowerment, health index, democracy index, cluster analysis

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1. Introduction

Human capital is a precious asset, in which advancement in various sectors depends on human capital's level of competence and skill. The concept of human capital has long come to researchers' attention regarding the role of human capital as an important factor of a country's welfare improvement (1). The concept of human capital in a limited scope consists of the capabilities, skills and talents built by individual through education, experience and health (2) (3). Inequality between regions is the main problem in Indonesia, covering inequality in development result, existence of natural resources and distribution of human resource (4). Some studies conclude that the existence of human capital available in a region is one of the factors causing inequality between regions (5) (6).

The importance of human capital in economic development level encourages many countries to measure their level of human capital to examine their human capital quality. Human capital measurement is important as a benchmark of success in the improvement of a region's human capital quality. Higher result of human capital measurement shows higher quality of human capital and society's welfare (7). In the last few decades, as the measure of human capital level in a region, human capital measurement result is also deemed to represent development improvement besides using economic growth indicator (8).

The overview of human capital in Indonesia still shows significant inequality in education achievement between regions, as may be viewed from the significant difference in education achievement by quantity and quality of education between regions in Indonesia. Education quantity may be measured using the mean years of schooling (9) and education quality be viewed from students' achieved score at certain age (10) (11) (12). Inequality in education achievement between regions in Indonesia may be observed in (Figure 1).
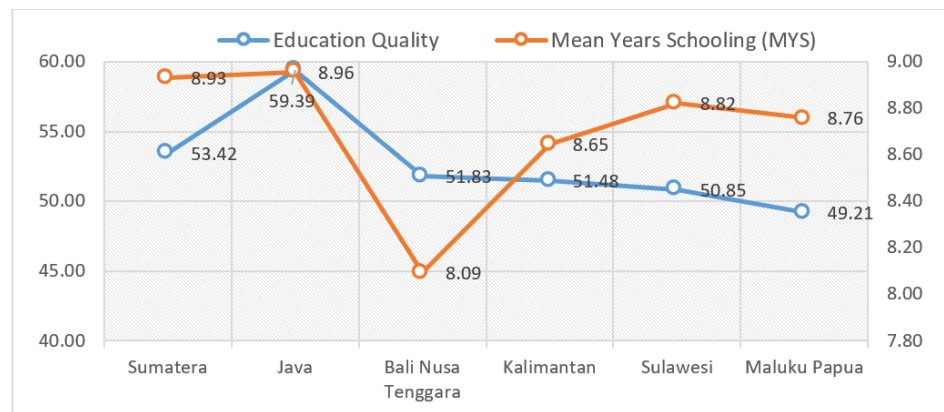
Figure 1: Inequality Education Achievement in Indonesia. (Source: data obtained from the Central Bureau of Statistics and the Ministry of Education, Culture, Research and Technology (2021)).

Figure 1 shows the overview of inequality in education achievement in Indonesia. The highest mean years of schooling (MYS) is still concentrated on Java Island with average MYS achievement of 8.96 years, and the lowest is in Bali and Nusa Tenggara Islands with MYS 8.09 years. From the perspective of education quality in Indonesia, the highest achievement also takes place in Java Island with score 59.39 point and the lowest is in Maluku and Papua Islands of 49.21 point. Java Island remains the center of education achievement in Indonesia, since educational facilities are more complete there than in any other regions.

The study conducted by (13) identifies that the effect of human capital inequality on economic growth depends on regional development level. Countries with low-medium income show that human capital inequality negatively influences economic growth, while countries with high income show that human capital inequality positively influences economic growth. The study conducted by (14) shows that education inequality negatively influences economic growth in Ghana. Meanwhile, another study conducted by Gungor (2010) at regional data level in Turkey concludes that education inequality influences economic growth non-linearly. (15) In provinces with higher education inequality, high human capital inequality positively influences economic growth. Another study shows that an increase in education inequality takes place in the access to higher education in Thailand (16).

Human capital measurement is still limited and has inconsistent result, since the proxy used to measure human capital cannot catch all dimensions or elements of human capital or because of a mistake in the data proxy used. This makes some research findings which use investment proxy on human capital have no rapid influence on economic growth. When human capital is measured accurately and consistently, we may see and understand its influence on economic growth, both by quantity and quality (17). Measuring human capital's contribution to economic growth still causes debate, since human capital conceptually and empirically has many components and dimensions, making it difficult to find the appropriate measure and indicators of human capital (18).

In recent decades HDI is considered the most complex measure of human capital because it uses many dimensions of human capital in its measurement. Several recent studies show criticism of HDI, which is considered not to use several dimensions that can describe human capital. The main criticism of HDI is the claim that it uses relatively few indicators but is able to depict the level of human capital in a country (18 (19) (20) (21). This study tries to modify the measurement of human capital based on HDI, by adding the dimensions of democracy, gender empowerment and health status. The addition of the human capital dimension in the measurement is expected to capture as many human capital phenomena as possible between regions. The dimension of democracy will increase individual opportunities in accessing the sources of development outcomes. The addition of a gender dimension can increase women's opportunities to access education, the economy and improve their quality of life (22). Improved gender empowerment will increase sustainable economic development process. Individual's good health status will increase the time he spends for schooling, while in production process it may increase labor's productivity. Thus, individual's health status is important in effort

to enhance the human capital of a country. UNDP (2001) states that the key capability of human capital is to have long life, healthy life, knowledge to access resources needed in improvement of life standard and able to participate in the community. Region with high human capital tends to have a better health status, while a region with low human capital has low health status (23).

This research contributes to giving alternative measurement of human capital in Indonesia using Alternative Human Development Index (AHDI) with education, health status, descent living standard, life expectancy, economy, democracy and gender empowerment indicators, as a comparison to HDI measurement. Thus, the research objectives are: observing the extent of human capital quality between regions in Indonesia using AHDI; and examining the distribution pattern and condition of human capital inequality between regions in Indonesia.

2. Methods

2.1. Alternative Human Development Index (AHDI)

Since HDI value is an index, each sub-index must be scaled for it to range from 0-1. One of the methods to calculate sub-index is to use value standardization, thus measuring each sub-index may be performed using the formula (24):

$$Standardized\ value = \frac{actual\ value - minimum\ value}{maximum\ value - minimum\ value}$$

The HDI calculation used geometric mean of the 3 indicators used, namely education achievement, longevity and per capita expenditure. Thus, HDI calculation may mathematically be written in the following formula (24):

$$HDI = \sqrt[3]{Health\ sub \times Education\ sub \times Income\ sub}$$

Alternative Human Development Index (AHDI) is a model of human capital development index using the base of HDI measurement. The indicators used were education, health status, decent living standard, longevity and economy. The human capital measurement model using Alternative Human Development Index (AHDI) was calculated using geometric mean. Therefore, human capital measurement model used geometric mean, just like in HDI measurement. Thus, the model may be formulated as follows:

$$AHDI = \sqrt[7]{EI \times HI \times DLSI \times LI \times EcI \times DI \times GEI}$$

Where is: EI= Education Index; HI= Health Index; DLSI= Decent Living Standard Index; LI= Longevity Index; EcI= Economic Index; DI= Democracy Index and GEI= Gender Empowerment Index.

2.2. Cluster Analysis

Cluster analysis is a multivariate analysis technique used to identify and classify an object with similarity to a certain group. Therefore, objects of the same group would have similarity based on the choice criteria applied (25). The first clustering process was to determine how object classification is formed. The purpose of Cluster Analysis is to group objects based on the similarity of characteristics between these objects. The cluster grouping method is divided into 2 ways, namely hierarchical and non-hierarchical methods. Hierarchical clustering is grouping two or more objects that have the closest similarity, and there is a very clear hierarchical level (dendrogram). While non-hierarchical clustering is a grouping by first determining the desired number of clusters (K-means cluster) (25). This was performed by measuring Euclidian distance between objects to determine the similarity of classification between objects. Euclidian distance may be formulated as follows (25):

$$d_{ij} = \sqrt{\sum_{k-1}^{p} (X_{ik} - X_{jk})^2}$$

Where: X_{ik} is the ith object and X_{jk} is the jth object; and p is the number of variables

This study uses K-means clustering, namely by first determining the desired number of clusters. Clustering will show results with phenomena that are in accordance with the theory. Research methods should elaborate on the method utilized in addressing the issues including the method of analysis.

3. Results and Discussion

3.1. Alternative Human Development Index (AHDI)

The AHDI score when compared to HDI has a smaller value but can capture a more comprehensive picture of human capital between regions in Indonesia. The highest AHDI score is in DKI Jakarta, and the lowest is in the province of Papua. This condition shows the same pattern as shown by the HDI score. Comparison of AHDI and HDI values can be seen in the Figure 2.
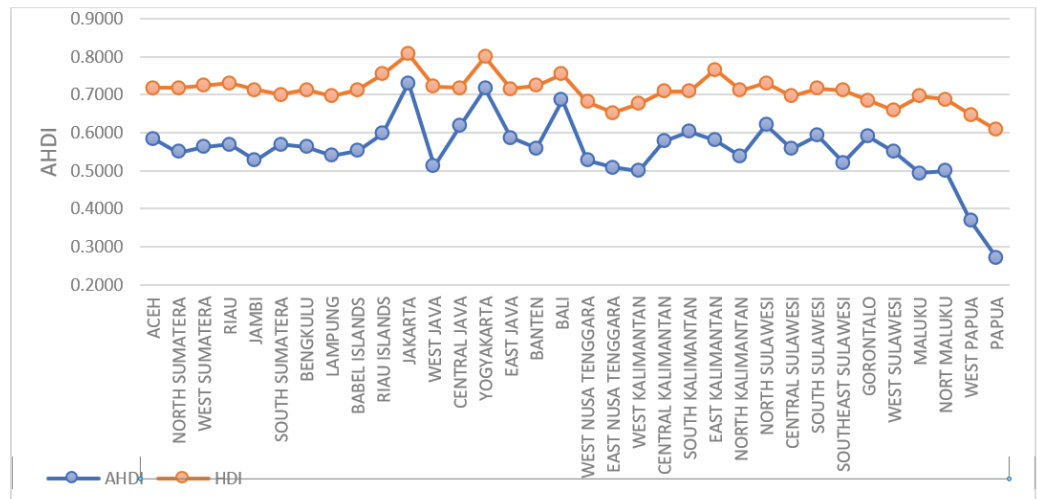
Figure 2: Score AHDI versus HDI Province in Indonesia. (Source: data obtained by the researchers' calculations (2021)).

The results of measurements using the AHDI approach can be seen in the Figure 2 in general, the AHDI score has a lower score than using the HDI approach. The highest AHDI score is in Jakarta and Yogyakarta is in second place. Meanwhile, West Papua and Papua are the two regions with the lowest AHDI scores in Indonesia. The lowest AHDI score is that in Papua of 0.2722, since almost all index values, including in score, are lower than any other regions. The index scores of decent living standard and per capita expenditure in Papua is one among the lowest ones in Indonesia. Papua is a region with the highest declining score, of 0.336 point, showing that the people in Papua still have limited choice and opportunity in accessing education and economic resources in effort to improve people's quality of life.

Papua and West Papua still show to be the two provinces that have the lowest AHDI performance when compared to other regions in Indonesia. This shows that human capital development in the two provinces has not shown optimal results. Quality human capital development policies in the two provinces will be a priority for the government, especially local governments.

Table 1 presents the result of calculation of AHDI values between regions in Indonesia. In general, AHDI score is lower than HDI score. In AHDI calculation, it is known that DKI Jakarta has the highest AHDI score of 0.7302. This is contributed to by education, health status, longevity and per capita expenditure and democracy indexes which are higher than those of any other regions. The highest AHDI component is of democracy index and life expectancy, respectively 0.9263 and 0.8122. Democracy index in Jakarta is the highest among other regions in Indonesia.

TABLE 1: AHDI Scores between Provinces in Indonesia

No	Provinsi	EI	HI	DLSI	LI	EcI	GEI	DI	AHDI
1	Aceh	0.5388	0.6465	0.6933	0.7672	0.3362	0.5579	0.6657	0.5839
2	North Sumatera	0.5527	0.5131	0.7708	0.7531	0.3771	0.6070	0.3926	0.5477
3	West Sumatera	0.6345	0.5870	0.6598	0.7586	0.3879	0.5663	0.4323	0.5620
4	Riau	0.5539	0.5273	0.7155	0.7920	0.4008	0.4790	0.6085	0.5691
5	Jambi	0.5239	0.5316	0.6585	0.7855	0.3749	0.4779	0.4389	0.5273
6	South Sumatera	0.4103	0.5245	0.6696	0.7638	0.3884	0.6828	0.6560	0.5683
7	Bengkulu	0.5279	0.5274	0.5829	0.7571	0.3678	0.5942	0.6568	0.5617
8	Lampung	0.5158	0.5306	0.6540	0.7771	0.3562	0.5075	0.5295	0.5396
9	Bangka Belitung	0.4964	0.5699	0.7148	0.7769	0.4675	0.3470	0.6189	0.5528
10	Riau Island	0.6061	0.6629	0.7846	0.7662	0.5264	0.2937	0.7307	0.5978
11	Jakarta	0.6753	0.7082	0.7678	0.8122	0.6853	0.5849	0.9263	0.7302
12	West Java	0.5656	0.4745	0.6792	0.8131	0.3968	0.3798	0.4160	0.5125
13	Central Java	0.5617	0.6403	0.7733	0.8343	0.3949	0.5639	0.6629	0.6175
14	Yogyakarta	0.7300	0.7056	0.9035	0.8449	0.5236	0.6538	0.7227	0.7169
15	East Java	0.5537	0.4522	0.7818	0.7874	0.4198	0.5725	0.6404	0.5860
16	Banten	0.5836	0.5120	0.7701	0.7668	0.4404	0.4102	0.5326	0.5586
17	Bali	0.5897	0.6773	0.9522	0.7998	0.5139	0.5912	0.7680	0.6853
18	West Nusa Tenggara	0.5234	0.5192	0.7876	0.7120	0.3768	0.3026	0.6516	0.5272
19	East Nusa Tenggara	0.4722	0.4815	0.4100	0.7208	0.2645	0.6988	0.7064	0.5084
20	West Kalimantan	0.4881	0.4709	0.4827	0.7778	0.3148	0.4504	0.6303	0.4991
21	Central Kalimantan	0.5032	0.4705	0.6292	0.7645	0.4001	0.6489	0.7296	0.5781
22	South Kalimantan	0.5299	0.5809	0.7023	0.7460	0.4399	0.5912	0.6816	0.6018
23	East Kalimantan	0.5812	0.6250	0.8349	0.8342	0.4440	0.2986	0.6616	0.5804
24	North Kalimantan	0.5222	0.6743	0.7320	0.8083	0.3261	0.2370	0.7943	0.5365
25	North Sulawesi	0.5355	0.6373	0.7957	0.7935	0.3954	0.6497	0.6387	0.6204
26	Central Sulawesi	0.5181	0.5238	0.6611	0.7420	0.3363	0.5496	0.6855	0.5581
27	South Sulawesi	0.5524	0.5994	0.7902	0.7758	0.3955	0.6699	0.4805	0.5932
28	Southeast Sulawesi	0.5440	0.5090	0.7560	0.7842	0.3297	0.5781	0.3352	0.5215
29	Gorontalo	0.5073	0.6245	0.7829	0.7374	0.3547	0.6292	0.6027	0.5890
30	West Sulawesi	0.4637	0.6477	0.6204	0.6895	0.3218	0.5542	0.6524	0.5486
31	Maluku	0.5315	0.4562	0.4967	0.7049	0.3082	0.6724	0.4033	0.4932
32	Nort Maluku	0.4851	0.5423	0.5130	0.7412	0.2856	0.6343	0.4220	0.4985
33	West Papua	0.4884	0.5685	0.5660	0.7062	0.2784	0.2483	0.1199	0.3683
34	Papua	0.3363	0.5704	0.0326	0.7023	0.2475	0.3271	0.3118	0.2722

Source: data obtained by the researchers' calculations (2021) EI= Education Index; HI= Health Index; DLSI= Decent Living Standard Index; LI= Longevity Index; EcI= Economic Index; GEI= Gender Empowerment Index, DI= Democracy Index
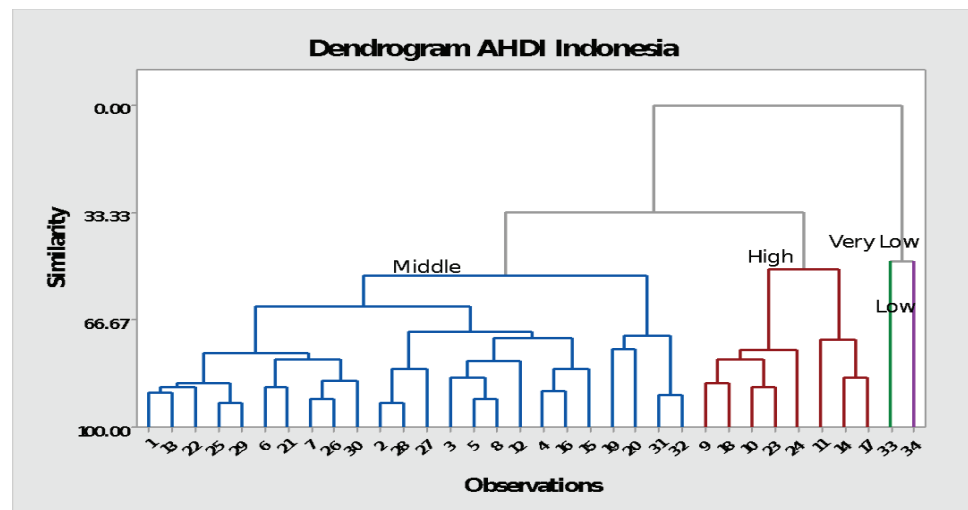
Figure 3: Dendrogram of Alternative Human Development Index (AHDI). (Source: data obtained by the researchers' calculations (2021)).

3.2. Clustering Of Distribution Pattern Of Human Capital In Indonesia Based On AHDI

The pattern of distribution of human capital in Indonesia was analyzed using cluster analysis. Cluster analysis was employed to observe the distribution pattern of human capital between regions in Indonesia, by viewing its variables' characteristic similarity. Based on the cluster analysis with k-means, the distribution of regions in Indonesia based on AHDI measurement results in 4 clusters of area, namely high, medium, low and very low cluster. the results of the clustering are shown in the Figure 3.

The high cluster is a group of provinces that have the highest AHDI performance out of several components that used AHDI. High Cluster has 8 member regions with 50.84 % variable's character similarity of the components that used AHDI. Medium cluster has 24 member regions with 52.90 % variable's character similarity. Low cluster and very low cluster have 1 member region with 48.42 % characteristic similarity.

High cluster is a cluster with high AHDI performance in Indonesia. This cluster has 8 members, namely Bangka Belitung Islands, Riau Islands, Yogyakarta, Bali, East Kalimantan, North Kalimantan, West Nusa Tenggara and DKI Jakarta. This cluster has very high similarity in democracy, descent living standard, health status and longevity indexes. The achieved gender empowerment index is classified into high category compared to the other regions.

Meanwhile, medium cluster is a cluster with medium category of AHDI performance achievement. This cluster generally has characteristic similarity in higher achieved gender empowerment and descent living standard indexes than other regions. Low

Figure 4: Mapping of AHDI between Provinces in Indonesia. (Source: data obtained by the researchers' calculations (2021))

cluster and very low cluster include regions with the lowest AHDI performance, West Papua and Papua. These two regions have almost all of their characteristics with the lowest score among other regions. Meanwhile, from the rating perspective, these two regions show no difference when they are measured using HDI or AHDI. This shows that the human capital achievement in these two regions is still quite low. Thus, they need to be prioritized for human capital development for an improved quality of human capital. The results of AHDI mapping between province in Indonesia can be seen in the Figure 4.

Figure 4 shows the result clustering of AHDI between provinces in Indonesia. Based on the AHDI score, regions in Indonesia are divided into 4 clusters, namely high, medium, low and very low clusters. The results of the calculation of the clustering of human capital conditions between provinces in Indonesia using AHDI, are divided into 4 main clusters that have the same variable characteristics. The results of clustering can be seen in the Table 2.

Table 2 shows changes in the ranking of human capital measurements using AHDI and HDI. That most provinces in Indonesia have their human capital level changed when measured with AHDI. There are 13 regions or 38.24 % having their rate declining while 15 regions or 44.12 % have their human capital rate increasing, and 6 regions or 17.65 % having fixed rate, including Aceh, DKI Jakarta, Yogyakarta, West Kalimantan, West Papua and Papua. The regions with increasing rate have higher descent living standard and gender empowerment values than other regions. This shows that individual's freedom increases people's choice and opportunity to access resources to improve their quality of life.

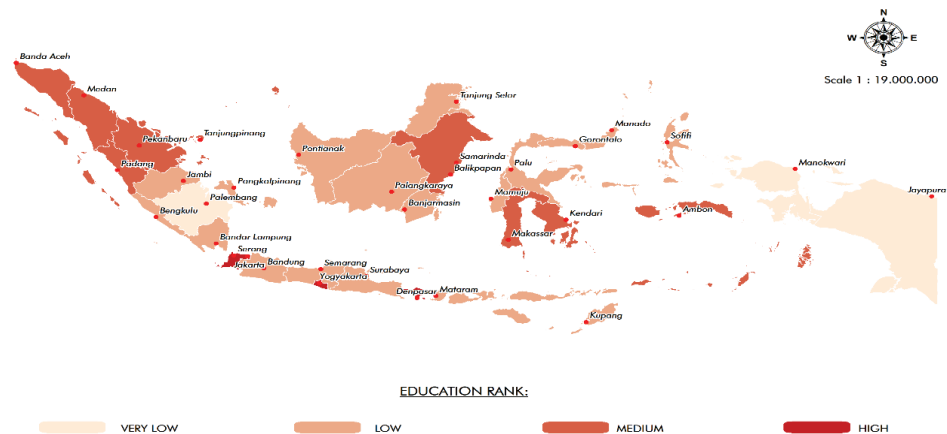TABLE 2: Clustering Between Regions in Indonesia Based on AHDI

No	Province	AHDI	Rank	Rank HDI	Rank HDI	Category
1	Bangka Belitung Islands	0.5528	20	0.7130	16	High
2	Riau Islands	0.5978	7	0.7548	4	High
3	DKI Jakarta	0.7302	1	0.8076	1	High
4	Yogyakarta	0.7169	2	0.7999	2	High
5	Bali	0.6853	3	0.7538	5	High
6	West Nusa Tenggara	0.5272	26	0.6814	29	High
7	East Kalimantan	0.5804	12	0.7661	3	High
8	North Kalimantan	0.5365	24	0.7115	20	High
9	Aceh	0.5839	11	0.7190	11	Medium
10	North Sumatera	0.5477	22	0.7174	12	Medium
11	West Sumatera	0.5620	16	0.7239	9	Medium
12	Riau	0.5691	14	0.7300	6	Medium
13	Jambi	0.5273	25	0.7126	17	Medium
14	South Sumatera	0.5683	15	0.7002	23	Medium
15	Bengkulu	0.5617	17	0.7121	18	Medium
16	Lampung	0.5396	23	0.6957	24	Medium
17	West Java	0.5125	28	0.7203	10	Medium
18	Central java	0.6175	5	0.7173	13	Medium
19	East Java	0.5860	10	0.7150	15	Medium
20	Banten	0.5586	18	0.7244	8	Medium
21	East Nusa Tenggara	0.5084	29	0.6523	32	Medium
22	West Kalimantan	0.4991	30	0.6765	30	Medium
23	Central Kalimantan	0.5781	13	0.7091	21	Medium
24	South Kalimantan	0.6018	6	0.7072	22	Medium
25	North Sulawesi	0.6204	4	0.7299	7	Medium
26	Central Sulawesi	0.5581	19	0.6950	25	Medium
27	South Sulawesi	0.5932	8	0.7166	14	Medium
28	Southeast Sulawesi	0.5215	27	0.7120	19	Medium
29	Gorontalo	0.5890	9	0.6849	28	Medium
30	West Sulawesi	0.5486	21	0.6573	31	Medium
31	Maluku	0.4932	32	0.6945	26	Medium
32	North Maluku	0.4985	31	0.6870	27	Medium
33	West Papua	0.3683	33	0.6470	33	Low
34	Papua	0.2722	34	0.6084	34	Very Low

Source: data obtained by the researchers' calculations (2021)

3.3. Education Index

There is still inequality in education index between regions in Indonesia regarding education achievement. The highest education index score is still concentrated on the High Cluster. In general, the education index value of High Cluster is still higher than

E D U C A T I O N   R A N K   I N D O N E S I A   M A P

Figure 5: Mapping Education Rank between Province in Indonesia. (Source: data obtained by the researchers' calculations (2021)).

that of other regions in Indonesia. The High Cluster includes Bangka Belitung Islands, Riau Islands, DKI Jakarta, Special Region of Yogyakarta, West Nusa Tenggara, East Kalimantan and North Kalimantan, with the mean score of education index is 0.5906. Higher education index scores are dominated by provinces located on the island of Sumatra. The provinces of Yogyakarta and DKI Jakarta are still the provinces with the highest educational attainment in Indonesia. The results of mapping the education index between provinces in Indonesia are shown in the Figure 5.

Figure 5 shows the results of mapping the dimensions of education between provinces in Indonesia. The middle cluster is a cluster that shows a fairly good AHDI performance in several dimensions of AHDI, but also still has a fairly low achievement in other dimensions. While the low and very low clusters both have low AHDI performance achievements on all dimensions, only in the low cluster there are several dimensions that show quite good performance. The education index of high cluster, the highest score is of Special Region of Yogyakarta Province with score of 0.7300, and the lowest is that of Bangka Belitung Islands Province. From the perspective of AHDI value, DKI Jakarta has the highest AHDI value of 0.7302, and North Kalimantan Province has the lowest value of 0.5365.

The medium cluster has the highest number of members of 24 Provinces. Its mean education index is 0.5272, in which the West Sumatera Province has the highest education index value and North Maluku Province has the lowest education index value of 0.4851. The education index of West Papua is one of the lowest ones in Indonesia with a value of 0.4884, which is below the mean education index value of the medium cluster. The education index of the very low cluster is the lowest among
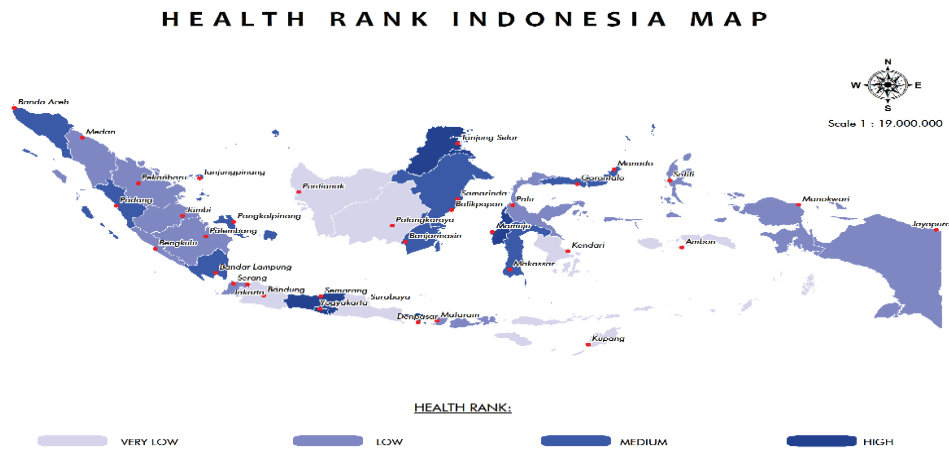
CAPITA RANK INDONESIA MAP

Figure 6: Mapping Economic Rank between Province in Indonesia. (Source: data obtained by the researchers' calculations (2021)).

regions in Indonesia with a value of 0.3363. This may become the government's focus for it to prioritize human capital development in Papua, especially in education both in quantity and quality. Policies that can be carried out by the government in increasing the education index in underdeveloped areas, by increasing public participation in educational attainment, and allocating a special budget for education with a higher portion.

3.4. Economic Index

The AHDI component economic index, shows that the regional classification is divided into 4, namely high, medium, low and very low cluster. The economic index uses an adjusted per capita expenditure indicator. The economic index describes the opportunity for the community to access economic resources. The higher the economic index, the higher the opportunity for the community to access goods or services, so that the welfare of the people in an area increases. Regions belonging to the high cluster have the highest educational attainment index compared to other regions. Meanwhile, regions with the lowest educational attainment index among other regions are included in the lowest cluster group. The results of the mapping of the economic index are shown in the Figure 6.

Figure 6 shows the results of mapping the dimensions of economic between provinces in Indonesia. The province with the highest economic index is DKI Jakarta with a value of 0.6853 and the lowest is North Kalimantan Province with index value of 0.3261. The high cluster has mean economic index of 0.4830, which is the highest

HEALTH RANK INDONESIA MAP

Figure 7: Mapping Health Status Rank between Province in Indonesia. (Source: data obtained by the researchers' calculations (2021)).

among the clusters. The medium cluster has mean economic index value of 0.3662. Banten Province has the highest index value of 0.4404, and North Maluku Province has the lowest value of 0.2856. The low cluster and very low cluster have economic index value respectively of 0.2784 and 0.2475. West Papua and Papua are regions with the lowest economic index value in Indonesia, showing that their people have limited access to goods and services.

Government policies that can be used to reduce inequality in the economic field between regions, among others, are to spread economic growth pole between regions and not only focus on one particular area. Another policy that can be implemented by the government is to build infrastructure in disadvantaged areas, to expand connectivity, facilitate access to goods and people so that economic growth becomes higher and has an impact on increasing people's per capita income.

3.5. Health Index

The overview of health status in Indonesia shows almost evenly distributed condition between regions in Indonesia, as shown with the achieved health status index with slight difference between a region and another. Health level status shows several indicators related to the condition of health facilities in an area. The index's health status dimension consists of the number of health facilities, the number of health workers, infant health, maternal health of productive age, participation in health insurance. Figure 7 shows the society's health status condition between regions in Indonesia.

Figure 7 shows the results of mapping the dimensions of economic between provinces in Indonesia. It is divided into 4 clusters, namely high, medium, low and

very low clusters. The high cluster has mean health index value of 0.6428, which is the highest among the clusters. In this cluster, the highest health index value is that of DKI Jakarta of 0.7082, and the lowest is that of West Nusa Tenggara of 0.5192. DKI Jakarta has the highest health index value in Indonesia since DKI Jakarta boasts the most complete and varied health facilities. This makes is people easily access health facilities. The medium cluster has mean health index of 0.5421. Central Java Province has the highest health index value of 0.6403 and East Java Province has the lowest value of 0.4522. It is a surprising that the lowest health index value is that of East java where health facilities are relatively complete. The low cluster and very low cluster have health index value respectively 0.5685 and 0.5704. These values are higher than that of medium cluster. This means that the regions of the medium cluster have good health status, thus the government need to keep this achievement or improve it to betterment without setting other factors which may influence human capital aside.

Limited access to health is a problem faced by many underdeveloped regions. Policies in the health sector that can be carried out by the government include building adequate and complete health infrastructure, increasing the number of health workers and allocating a larger portion of the health budget. The health status index can reflect the condition of health facilities in an area. Areas that have relatively complete health facilities and good health indicators tend to have high index scores. Meanwhile, a low index score indicates the low quality of health in an area. The level of health status in a region is closely related to the level of quality of human capital and the level of economic productivity.

3.6. Decent Living Standard Index

The decent living standard index shows the basic needs needed by the community to live decently. Consists of community access to clean water, energy, proper housing and access to proper sanitation. The mapping results show that the standard of living index is divided into 4 clusters, namely high, medium, low and very low clusters. The results of decent living standard index mapping are shown in the Figure 8.

Figure 8 shows the results of the inter-provincial standard of living index clustering in Indonesia. The mean decent living standard index of high cluster with AHDI measurement is 0.8097, which is the highest among the clusters. In this high cluster, the highest decent living standard index value is that of Bali Province of 0.9522 and the lowest is that of Bangka Belitung Islands Province of 0.7148. The medium cluster has mean

DECENT LIVE RANK INDONESIA MAP

Figure 8: Decent Living Standard Index between Province in Indonesia. (Source: data obtained by the researchers' calculations (2021))

descent living standard index of 0.6687. The province with the highest descent living standard index is North Sulawesi Province of 0.7597 and the lowest value is that of East Nusa Tenggara Province of 0.400. The low cluster and very low cluster have decent living standard index respectively 0.5660 and 0.0326. The living standard index value of the very low cluster is the lowest in Indonesia. Therefore, the government needs to prioritize its human capital development on the dimensions of decent living standard, such as clean water supply, access to decent occupancy, access to electricity and access to decent and sustainable sanitation.

A decent standard of living will increase people's opportunities to improve their quality of life. Government policies to improve access to living standards can be carried out, among others, by increasing subsidies to the community in accessing energy, providing adequate housing finance, as well as counseling and developing good and sustainable sanitation for developing areas. Society's better living standard will improve the quality of human capital.

3.7. Longevity Index

The mean longevity index value of the high cluster is 0.7943, which is the highest among the clusters. In this cluster, the highest longevity value is that of Special Region of Yogyakarta Province of 0.8449, and the lowest is that of West Nusa Tenggara Province of 0.7120. The medium cluster has mean longevity index value of 0.7639, which is lower than that of high cluster. Central Java has the highest longevity index value in this

LONGEVITY RANK INDONESIA MAP

Figure 9: Longevity Index between Province in Indonesia. (Source: data obtained by the researchers' calculations (2021)).

cluster, and West Sulawesi Province has the lowest value of 0.6895. The results of the longevity index mapping are shown in the Figure 9.

The low cluster and very low cluster have mean longevity index respectively 0.7062 and 0.7023. These index values are not the lowest in Indonesia, thus the longevity of these two clusters may be declared of better achievement than that of the provinces of the medium cluster with the lowest longevity index.

Long life age will increase people's opportunities in accessing the results of economic development. Long life can be increased by improving health status and increasing people's standard of living. People with high health status tend to have a higher life expectancy than people with low health status.

3.8. Gender Empowerment Index

The results of the gender empowerment index mapping consist of 4 clusters namely high, medium, low and very low clusters. Where each cluster has the same characteristics of its constituent indicators. the result of mapping gender empowerment indeks are shown in the Figure 10.

Figure 10 shows the results of mapping the dimensions of the gender empowerment index. This dimension consists of the number of women represented in the legislative, the ratio of women working in the formal sector and the contribution of women's income to family income. The highest gender index value is that of Special Region of Yogyakarta Province of 0.6538 and the lowest is that of North Kalimantan of 0.2370. The medium cluster has gender values respectively 0.5719. This cluster's gender index achievement

GENDER RANK INDONESIA MAP
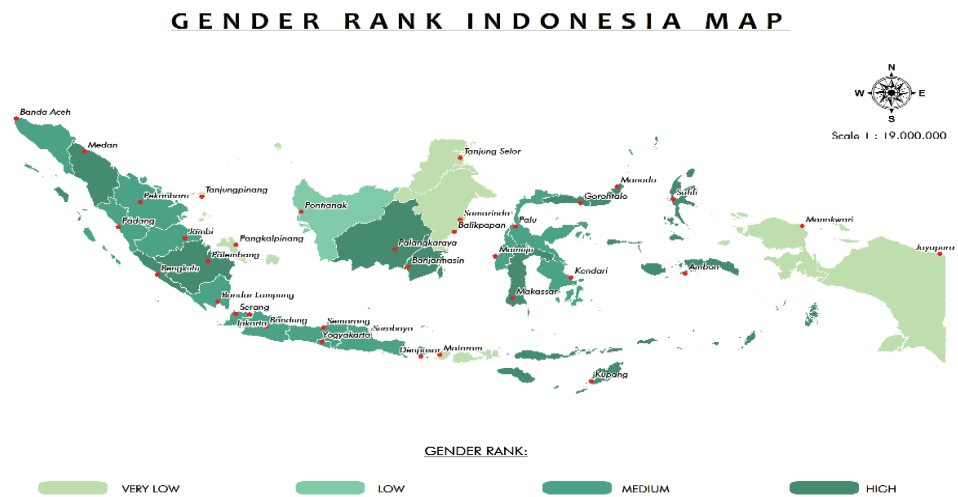
Figure 10: Gender Empowerment Rank between Province in Indonesia. (Source: data obtained by the researchers' calculations (2021)).

is better than that of high cluster. The low cluster has gender index values respectively 0.2483. The gender index in this cluster is the lowest among the clusters. Meanwhile, the very low cluster has gender respectively 0.3271 This achievement is still better than that of low cluster.

Increasing gender empowerment will increase women's opportunities in accessing education, health, economy and other development outcomes. Gender empowerment can be increased by expanding women's access to employment and education. Increased education for women will increase their literacy on the health of themselves and their families so that it will have an impact on improving the quality of human capital. Government policies can be more in favor of women and provide high legal certainty for women. Examples of policies that favor women include policies on the existence of a certain quota for women in the legislature, the elimination of certain stereotypes in the field of work, maternity leave etc.

3.9. Democracy Index

The democracy index in Indonesia shows that areas with low democracy index scores are dominated by provinces located on the island of Sumatra and the islands of Maluku and Papua. Democracy indexes of the high cluster has mean value 0.7343. Meanwhile, the highest democracy index value is that of DKI Jakarta of 0.9263, and the lowest is that of Bangka Belitung Islands of 0.6189.

Figure 11 shows the results of mapping the democracy index between provinces in Indonesia. The mapping results show that the democracy index scores of most provinces

DEMOCRACY RANK INDONESIA MAP

Figure 11: Democracy Rank between Province in Indonesia. (Source: data obtained by the researchers' calculations (2021)).

in Indonesia are included in the middle cluster. The medium cluster has democracy index has mean score 0.5667. East Nusa Tenggara has the highest gender index of 0.6988 and West Kalimantan has the lowest index of 0.4504. Meanwhile, the highest democracy index value is that of Central Kalimantan of 0.7296 and the lowest is that of North Sulawesi of 0.3552. The low cluster has democracy index values respectively 0.1189. Meanwhile, the very low cluster has democracy indexes respectively 0.3118. This achievement is still better than that of Low cluster.

Freedom or democracy is the main basic thing that must be owned by humans in accessing the results of development. Democracy allows people to have equal rights in accessing development outcomes. Policies that can be taken by the government to increase the level of democracy in the community include increasing public participation in the legislative sector, ensuring law enforcement, regulations that protect the interests of the community at large, etc.

4. Conclusion

Alternative Human Development Index (AHDI) is built for HDI to have a better presentation as an approach to measure human capital development. AHDI may depict more complex dimensions of human capital, thus a region's advantages and weaknesses in human capital measurement may be identified. AHDI calculation using modified HDI, by adding dimensions of health status, decent standard of living, gender empowerment and democracy. The addition of the dimensions of human capital is considered to provide a more complex picture of the quality of human capital.

The result of human capital measurement using AHDI shows that in general all regions have lower index value than that with HDI. DKI Jakarta Province is a province with the highest AHDI value than any other regions. Meanwhile, the lowest AHDI index value is that of Papua. Human capital rate measured using AHDI also shifts. However, many regions have their human capital rate increased than that with HDI. There are 38.24 % regions with declining rate and 44.12 % regions with increasing rate. This shows that the performance of measurement with AHDI is better than that with HDI since many regions shows increased rating. However, 17.65 % regions show constant rate, either using HDI or AHDI in human capital measurement. Using AHDI, the advantages and weaknesses of a region in more complex dimensions of human capital may be observed.

The distribution of human capital in Indonesia using cluster analysis results in four cluster areas based on AHDI. The distribution consists of high cluster with 8 member regions with 50.84 % characteristic similarity, medium cluster with 24 member regions with 52.90 % variable's characteristic similarity, and low cluster and very low cluster with 1 member region with 48.42 % characteristic similarity. Provinces that are included in the low and very low groups, become priority areas for human capital development policies so that the level of human capital becomes higher and can contribute more to the process of economic growth.

The index scores for education, economy, health status, decent living standards, long life, gender empowerment and democracy with high scores are still dominated by provinces located in the "Western Indonesia", while the lowest score scores are dominated by regions in the "Eastern Indonesia". This shows that the eastern part of Indonesia still has low human capital development performance achievements, and requires policy priorities in human capital development both in quantity and quality.

The addition of the human capital dimension in the measurement of AHDI can provide a more complex picture of the condition of human capital between regions in Indonesia. This can be used by the government, especially local governments in formulating policies that are more focused and on target in accordance with the problems that each region.

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