Jurnal Informatika Ekonomi Bisnis

http://www.infeb.org

2025 Vol. 7 Iss. 2 Hal: 176-182 e-ISSN: 2714-8491

Interaction Between Dimensions Forming the Human Development Index

Korneles Sangur[1✉], Erly Leiwakabessy[2]

[1,2]Universitas Pattimura

Sangurkorneles9@gmail.com

Abstract

This study covers the three dimensions that make up the HDI to know the mutual influence between the dimensions of decent living standards, health, and education. The research method used is the Panel Vector Auto Regression method. The data used is panel data consisting of 11 districts/cities in Maluku Province during 2010-2022. The decent standard of living dimension and the Health dimension have a two-way effect, the same condition occurs in the Health and Education dimensions. The decent standard of living dimension only has a unidirectional influence on the Education dimension. The results of the Implus Response Function show that all dimensions in the model have a permanent response due to a shock from another dimension. Variance decomposition results show that only the Health dimension has a smaller proportion of series movement due to the shock of the dimension itself compared to the shock of the decent standard of living dimension. The application of this research is to provide a point of view for policymakers, that to improve the welfare of the community as measured by HDI, the policies designed need to stimulate all dimensions of HDI externally and also build harmonization between dimensions so that they influence each other and encourage an increase in HDI internally.

Keywords: Living Standard, Knowledge, Health, HDI, PVAR

1. Introduction

The welfare of the community is a tangible manifestation of the success of the development of every country; this also applies to the Indonesian state, which aspires to become a prosperous country as stated in the 1945 Constitution. To determine the success or failure of a country in carrying out development, various indicators have been developed to measure the level of welfare. A welfare indicator that is currently widely used is the Human Development Index. Previous research has highlighted many macroeconomic problems that impact the development of HDI [1].

The cause of unemployment comes from the low labor supply, which is caused by education and health factors [2]. Shows that unemployment hurts HDI [3]; show that poverty hurts HDI and government spending shows a positive effect on HDI [4]; prove that stable economic growth, price stability, and expansionary fiscal policy have an impact on increasing HDI [5]. There is a strong bidirectional relationship between HDI and economic growth and HDI and democracy.

HDI cannot only be stimulated by external variables such as the previous research above. The components in each dimension of HDI can also affect the HDI itself [6], the analysis results show that all HDI components affect HDI itself. In addition, researchers assume that each dimension of HDI affects HDI itself as a contribution to the influence between one dimension and another. Focuses on the health dimension as the main factor influencing HDI, while knowledge and decent living standards are supporting factors, assuming that health is the basis for a person to carry out activities, especially to live this life [7]. A physically and mentally healthy person will be able to carry out various activities, such as working to earn a living, going to school to seek knowledge, and so on. However, there are many studies that also show that health is not the main factor but the result of the dimensions of decent living standards and knowledge [8]. Proved that education level and health status have a positive relationship of 50.5% [9], the results of his research revealed that individuals with higher levels of education (years of schooling) are likely to have good health status.

While increasing the income of the household head, the chances of household members with poor health status will decrease [10]. Revealed that someone with higher education will be healthier when compared to someone with lower education, with a probability value of 3.07 percent, ceteris paribus. The same study also showed that the higher a person's income, the greater the probability of that person being healthy. Although it does not rule out the dimensions of health and decent living standards, the conclusion of the research conducted by [11] considers that the education dimension is the main dimension of HDI by proving that the education dimension is the driving dimension of HDI.

Concluded that the level of education has a significant influence on individual income, and an increase in the level of education has an impact on increasing income [12]. Proved that the dimension of decent living standards has the largest contribution compared to the other two dimensions of HDI [13]. Designed their

Accepted: 16-04-2025 | Revision: 30-04-2025 | Publication: 14-05-2025 | doi: 10.37034/infeb.v7i2.1124

research using path analysis, which shows the important role of the decent standard of living dimension with the per capita expenditure component as an intermediary variable that connects the knowledge dimension with two components, namely the expectation of years of schooling and average years of schooling and the health dimension with the life expectancy component tested against HDI, this study shows the results that life expectancy, expectation of years of schooling and average years of schooling have a significant influence on HDI through per capita expenditure [14].

Through the above debate, it can be seen that each dimension of HDI has an important role not only as an indicator to explain improvements in the quality of human resources but also shows that there is a relationship and has the potential to have a domino effect (an increase in one component will make other components increase) or a multiplayer effect (an increase in one component will make other components increase more) caused by the reciprocal influence between one component and another component that can affect the increase in HDI itself. This study aims to analyze the interaction between the components that make up HDI in Maluku Province, so it is expected to provide an overview of how policies should be designed to provide the right stimulus to the HDI component site.

2. Research Method

This research is a quantitative research type; the data used based on the time of collection is a panel data type, which consists of cross-section data consisting of 11 districts/cities in Maluku Province and time series data with a period of 13 years from 2010-2022. Based on how to obtain the data used, the data used is secondary data taken using documentation techniques from the website of the Central Bureau of Statistics (BPS) of Maluku Province. The data of this study are three indicators of the Human Development Index, namely Life Expectancy (UHH), Average Years of Schooling (RLS), and Per Capita Expenditure (PP). The data analysis technique uses Panel Vector Auto Regression (PVAR). The stages of PVAR analysis are as follows [15] The data stationarity test will be conducted using the Augmented Dickey-Fuller (ADF) test. Data is said to be stationary if it has a prob value <0.05. Data that are not stationary must be transformed one or more times. If it is stationary at the level, then the analysis can continue using the VAR method.

Determination of the optimum lag is done by comparing the Final Prediction Error Correction (FPE) value, as well as the sum of the smallest Akaike Information Criteria (AIC), Schwarz Information Criteria (SIC), and Hannan-Quin information (HQ). The model is said to be stable if the modulus value is less than 1 and is in the optimal position. Cointegration test using Pedroni Residual Cointegration Test: If the model has cointegration, it will continue with the Panel Vector Error Correction Model (PVECM) analysis. If the model is not cointegrated, the analysis can continue with Panel Vector Auto Regression (PVAR).

PVAR is conducted to describe the relationship between variables in the model. The PVAR results will be compared between the t count and the predetermined t table. This comparison aims to determine the significant influence of the variables in the model. The Granger causality test is conducted to determine whether there is a causal relationship or reciprocal relationship between each variable used. Granger causality is the concept that the past time affects the current time or the future time, provided that the future time cannot affect the past time. The IRF stage describes the duration of the effect of a variable shock on other variables. The duration of this effect is seen until the effect disappears or until it returns to the equilibrium point. The last stage aims to determine how much contribution occurs before and after the shock. This contribution applies to the current period until the future period.

3. Result and Discussion

The first stage is to conduct a stationarity test to determine whether the time series data of each variable in this study have stationary properties or do not contain unit roots. To test stationarity, the Augmented Dickey-Fuller Test is used; the test results are shown in the following Table 1.

Table 1. Augmented Dickey-Fuller Test Results

Variables	Level		1st Difference	
	ADF	Prob.	ADF	Prob.
PP	2.67632	1.0000	53.8340	0.0002
RLS	6.60525	0.9994	47.2092	0.0014
UHH	3.62019	1.0000	52.1148	0.0003

Based on Table 1, the results of the unit root test using Augmented Dickey-Fuller show that the time series data of the Life Expectancy (UHH), Average Years of Schooling (RLS), Expenditure Per Capita (PP) variables that will be used for the next stage is at the first Difference level.

Table 2. Optimal Lag Determination Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	288.5817	NA	4.62e-10	-12.98099	-12.85934	-12.93587
1	325.6992	67.48634	1.29e-10	-14.25906	-13.77246	-14.07860
2	338.5881	21.67667	1.09e-10	-14.43582	-13.58428	-14.12003
3	399.5029	94.14115	1.04e-11	-16.79559	-15.57909*	-16.34445
4	415.0993	21.97670	7.98e-12	-17.09542	-15.51398	-16.50895
5	428.8176	17.45960*	6.77e-12*	-17.30989*	-15.36350	-16.58807*
6	436.1002	8.275793	7.90e-12	-17.23183	-14.92049	-16.37467
7	441.6911	5.590845	1.03e-11	-17.07687	-14.40058	-16.08437
8	450.2365	7.380108	1.24e-11	-17.05620	-14.01497	-15.92837

Based on Table 2, the optimal lag results are at lag 5, as indicated by the LR, FPE, AIC, and HQ criteria. The current situation shows. This condition indicates that there will be an optimal exchange between one variable and another variable in the model in the fifth period of time [15]. VAR stability needs to be tested because if the VAR stability estimation results are unstable, the analysis of the Impulse Response Function (IRF) and Variance Decomposition (VD) will be unstable. The results of the model stability test are shown in the following Table 3.

Table 3. Model Stability Test Results

Root	Modulus
0.051201 - 0.580859i	0.583112
0.051201 + 0.580859i	0.583112
-0.437489	0.437489
0.291365	0.291365
0.133292 - 0.241478i	0.275823
0.133292 + 0.241478i	0.275823

Based on Table 3, the Root of Characteristic Polynomial test results show the modulus value < 1, so it is concluded that the VAR estimation is stable for IRF and VD analysis. The cointegration test is conducted to determine whether there is a long-term influence between the variables in the model. The cointegration test used is the Pedroni Residual Cointegration Test; if the Pedroni test probability threshold> 0.05, then there will be integration between variables and further analysis using the Panel Vector Error Correction Model (PVECM), but if the Pedroni test probability < 0.05, then the analysis will continue with Panel Vector Auto Regression (PVAR) [15].

VAR estimation is very sensitive to the lag length used. Testing the optimal lag length is very useful for eliminating autocorrelation problems in the VAR system used as a VAR stability analysis. Determination of the number of lags (order) to be used in the VAR model can be determined based on the Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan Quinnon (HQ) criteria [16], the optimum lag test results are shown in the following Table 4.

Table 4. Data Cointegration Test Results

Test Statistic	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-0.495559	0.6899	-1.773654	0.9619
Panel rho-Statistic	1.210677	0.8870	1.091910	0.8626
PP-Statistic Panel	-2.988064	0.0014	-3.796219	0.0001
Panel ADF-Statistic	-8.456727	0.0000	-7.079657	0.0000
Group rho-Statistic	2.631656	0.9958		
Group PP-Statistic	-3.881190	0.0001		
Group ADF-Statistic	-8.984596	0.0000		

Based on Table 4, the cointegration test results show that the Panel v-statistic, panel rho-statistic and group rho-statistic have a probability value > 0.05; it can be concluded that the analysis to be used is the PVAR method. The results of PVAR estimation make it possible to see how one variable affects another. This correction can be done by comparing the absolute zero value of the t-statistic and the critical rule of thumb. If the absolute number of t-statistics is higher than the critical rule of thumb number of 1.98, then the result is significant and vice versa [15]. The PVAR estimation results are shown in the following Table 5.

Table 5. PVAR Estimation Results

	D(LN_PP)	D(RLS)	D(UHH)
D(LN_PP(-1))	-0.377250	0.030573	0.198685
	(0.10701)	(0.13177)	(0.36845)
	[-3.52527]	[0.23202]	[0.53925]
D(LN_PP(-2))	-0.194190	0.049529	-0.796241
	(0.11295)	(0.13908)	(0.38888)
	[-1.71930]	[0.35612]	[-2.04754]
D(LN_PP(-3))	-0.371551	0.017630	-3.122407
	(0.11029)	(0.13580)	(0.37972)
	[-3.36894]	[0.12982]	[-8.22297]
D(LN_PP(-4))	0.102976	-0.140427	2.556713
	(0.13505)	(0.16630)	(0.46499)
	[0.76248]	[-0.84441]	[5.49841]
D(LN_PP(-5))	0.492428	0.030286	-0.140131
	(0.16178)	(0.19921)	(0.55702)
	[3.04377]	[0.15203]	[-0.25157]
D(RLS(-1))	0.026884	0.126000	0.407123
	(0.09295)	(0.11446)	(0.32003)
	[0.28923]	[1.10085]	[1.27215]
D(RLS(-2))	-0.153426	0.004717	-0.130977
	(0.08141)	(0.10025)	(0.28030)
	[-1.88454]	[0.04706]	[-0.46727]
D(RLS(-3))	-0.090028	0.063794	-0.284135
	(0.07606)	(0.09366)	(0.26188)
	[-1.18361]	[0.68112]	[-1.08498]
D(RLS(-4))	0.092152	0.149532	0.373503
	(0.07258)	(0.08938)	(0.24990)
	[1.26963]	[1.67308]	[1.49463]
D(RLS(-5))	0.054133	0.126056	0.069757
	(0.07470)	(0.09198)	(0.25719)
	[0.72469]	[1.37044]	[0.27123]
D(UHH(-1))	0.024606	0.039964	0.175937
	(0.01792)	(0.02206)	(0.06169)
	[1.37318]	[1.81124]	[2.85179]
D(UHH(-2))	-0.014047	-0.009933	0.159836
	(0.01765)	(0.02174)	(0.06077)
	[-0.79577]	[-0.45700]	[2.63002]
D(UHH(-3))	0.024315	0.009907	0.191085
	(0.01604)	(0.01975)	(0.05522)
	[1.51614]	[0.50167]	[3.46071]
D(UHH(-4))	0.068159	0.054373	0.282238
	(0.01513)	(0.01863)	(0.05210)
	[4.50388]	[2.91782]	[5.41684]
D(UHH(-5))	-0.071754	-0.059630	0.233891
	(0.01514)	(0.01864)	(0.05212)
	[-4.73974]	[-3.19877]	[4.48733]
C	0.019045	0.001861	-0.012556
	(0.00853)	(0.01050)	(0.02937)
	[2.23265]	[0.17717]	[-0.42752]

Based on Table 5, the PVAR estimation results show that the relationship between the Per capita Expenditure (PP) variable and Average Years of Schooling (RLS) has no significant positive or negative relationship in Lag 1, Lag 2, Lag 3, Lag 4, and Lag 5. While the relationship between the Per capita Expenditure variable (PP) and Life Expectancy (UHH) has a significant relationship positively in Lag 4 and negative in Lag 5, significance is indicated by the absolute value of the t-statistic smaller than the critical value of the rule of thumb of 1.98.

Based on Table 5, the PVAR estimation results show that the relationship between the Average Years of Schooling (RLS) variable and Per Capita Expenditure (PP) has no significant positive or negative relationship in Lag 1, Lag 2, Lag 3, Lag 4, and Lag 5. The relationship between the Average Years of Schooling (RLS) variable and Life Expectancy (UHH) is significant between positive in lag four and negative in Lag 5. Significance is indicated by the absolute value of the t-statistic smaller than the rule of thumb critical value of 1.98.

Based on Table 5, the PVAR estimation results show that the relationship between the variable Life Expectancy (UHH) and Per Capita Expenditure (PP) has a significant relationship in Lag 2, Lag 3 and negative in Lag 4. The relationship between the variable Life Expectancy (UHH) and Average Years of Schooling (RLS) has no significant relationship positively or negatively in Lag 1, Lag 2, Lag 3, Lag 4, and Lag 5. Significance is indicated by the absolute value of the t-statistic smaller than the rule of thumb critical value of 1.98.

The causality test is conducted to determine whether an endogenous variable can be treated as an exogenous variable. Granger's Causality is used to test the existence of a causal relationship between two variables. Granger's assessment of data quality uses a significance level of around 0.05. If the probability value > 0.05, then there is no relationship between variables, and vice versa. The results of the Granger causality test are shown in the following Table 6.

Table 6. Granger Causality Test Results

No.	Null Hypothesis:	Obs	F-Statistic	Prob.
1.	UHH does not Granger Cause LN_PP	88	4.38323	0.0015
	LN_PP does not Granger Cause UHH		5.04778	0.0005
2.	LN_RLS does not Granger Cause LN_PP	88	0.60634	0.6952
	LN_PP does not Granger Cause LN_RLS		2.29393	0.0535
3.	LN_RLS does not Granger Cause UHH	88	3.18740	0.0114
	UHH does not Granger Cause LN_RLS		5.55401	0.0002

Based on Table 6, the results of the Granger causality test show that there is no reciprocal relationship between the variables of Average Years of Schooling (RLS) and Expenditure per capita (PP), but there is a unidirectional relationship between the variables of Expenditure per capita (PP) and Average Years of Schooling (RLS). While the variables of Life Expectancy (UHH) and Per Capita Expenditure (PP) have a reciprocal relationship, the same also applies to the relationship between Life Expectancy (UHH) and Average Years of Schooling (RLS).

IRF analysis is a method used to determine an endogenous variable's response to a particular variable's shock. IRF is also used to see shocks from one other variable and how long the effect occurs [16]. The results of the impulse response function can be seen in the following Figure 1.

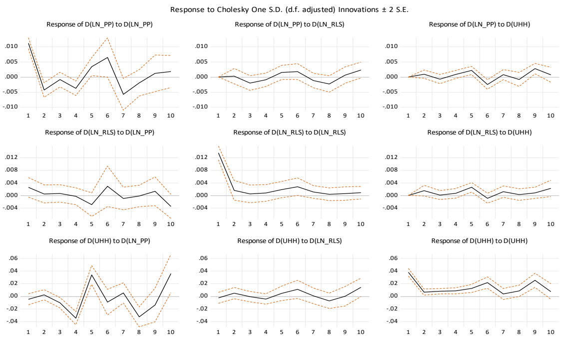

Figure 1. Nine Curves

Based on Figure 1 of the nine curves, there are five curves that show the response of each variable in the model due to shocks originating from the variable itself or shocks from other variables in the model that have a permanent effect, indicated by the movement of the curve which is quite volatile from the beginning of the period to the end of the period or does not return to the previous equilibrium. The only curve that does not have a permanent influence is the response of the Average Years of Schooling (RLS) variable due to a shock from the variable itself; in the short term, the shock gives a large response, but in the long term the response begins to disappear and returns to the initial equilibrium.

Variance decomposition decomposes the variation of one endogenous variable into the component variables of another endogenous variable shock in the VAR system. This variance decomposition explains the proportion of movement of a series due to the shock of the variable itself compared to the shock of other variables [16]. The results of variance decomposition can be seen in the following Table 7, 8 and 9.

Table 7. Variance Decomposition Results of Per Capita Expenditure Variables

Variance Decomposition of D(LN_PP):				
Period	S.E.	D(LN_PP)	D(LN_RLS)	D(UHH)
1	0.011195	100.0000	0.000000	0.000000
2	0.012021	99.32317	0.065345	0.611485
3	0.012232	96.37980	2.716158	0.904039
4	0.012843	95.75481	2.957482	1.287707
5	0.013557	92.31716	3.928513	3.754332
6	0.015324	90.03386	4.474316	5.491819
7	0.016407	90.56744	4.394443	5.038114
8	0.016694	88.77742	6.137058	5.085527
9	0.016985	86.29870	6.073884	7.627420
10	0.017254	84.74036	7.689920	7.569725

Based on Table 7, it can be seen that over the next ten years, it is estimated that the variable that will have the largest contribution to the Per Capita Expenditure (PP) variable is the Per Capita Expenditure (PP) variable itself, the next contribution in a row to the smallest is the Average Years of Schooling (RLS) and Life Expectancy (UHH) variable.

Table 8. Hasil Variace Decomposition Variabel Rata-Rata Lama Sekolah

Variance Decomposition of D(LN_RLS):				
Period	S.E.	D(LN_PP)	D(LN_RLS)	D(UHH)
1	0.013785	3.473842	96.52616	0.000000
2	0.013971	3.501704	95.30413	1.194168
3	0.013995	3.699390	95.10436	1.196247
4	0.014037	3.714227	94.86056	1.425214
5	0.014692	7.337739	88.21330	4.448965
6	0.015262	10.45651	85.08374	4.459756
7	0.015380	10.68978	84.31117	4.999050
8	0.015388	10.69148	84.28189	5.026626
9	0.015480	11.30670	83.43502	5.258281
10	0.016049	15.21536	77.92009	6.864551

Table 8 shows that the variable Average Years of Schooling (RLS) in the next 10 years is estimated to have the largest contribution is the variable Average Years of Schooling (RLS) itself, the next contribution in a row to the smallest is the variable Life Expectancy (UHH) and Expenditure Per Capita (PP).

Table 9. Variance Decomposition Results of Life Expectancy Variables

Variance Decomposition of D(UHH):				
Period	S.E.	D(LN_PP)	D(LN_RLS)	D(UHH)
1	0.038543	1.399911	0.358882	98.24121
2	0.039534	1.720309	2.010234	96.26946
3	0.041626	7.551014	1.829224	90.61976
4	0.054946	43.81208	1.637578	54.55034
5	0.065975	56.89874	1.666059	41.43520
6	0.070938	50.86829	3.873837	45.25787
7	0.071252	51.01109	3.850607	45.13831
8	0.079095	58.24498	3.927225	37.82780
9	0.084195	54.04884	3.466210	42.48495
10	0.093027	59.34149	5.203993	35.45451

Table 9 shows that the variable of Life Expectancy (UHH) in the next 10 years is estimated to have the largest contribution is the variable of Per Capita Expenditure (PP), the next contribution in a row to the smallest is the variable of Life Expectancy (UHH) and Average Years of Schooling (RLS). These results indicate that the UHH variable is endogenous because the contribution of the PP variable is more significant to the UHH variable; the increase in expenditure per capita in each district/city in Maluku Province over five years contributes to the public health dimension. Interaction between Standard of Living and Health Dimension. An increase in the per capita expenditure indicates the community's ability to fulfill a decent standard of living, such as food that has the nutritional value needed by the body, good quality clothing, living in a livable house, and access to higher health facilities. Changes in the factors of a decent standard of living, such as food, clothing, shelter, and health, lead to improvements in the health dimension itself.

The same condition applies to vice versa; an increase in life expectancy indicates that the community has a long life, which can be identified as having a higher health dimension. A good level of public health will provide good physical ability and endurance in completing work and being able to obtain a higher income.

This reciprocal influence provides a permanent change response; people whose per capita expenditure is higher will tend to increase the standard of living for themselves and their families, including increasing the level of health continuously; on the other hand, a long life expectancy means that the community continues to improve the level of health so that at an unproductive age, the person does not become a burden for the younger generation to look after and care for them in old age and even still contribute to the family economy even though it is not as good as in their productive age.

Previous research that also shows similar results to this study was conducted [17], proving that the results of per capita expenditure affect the morbidity rate. Life expectancy has a positive and significant effect on GRDP per capita [18]. Interaction between the Living Standard Dimension and Knowledge Dimension. Changes in the decent standard of living dimension due to changes in the per capita expenditure component indicate that higher community capabilities encourage demand for higher levels of education, increasing the knowledge dimension.

The above conditions do not apply otherwise; changes in the knowledge dimension due to changes in the average years of schooling component can indeed identify an increase in the soft skills of the workforce, but it is not necessarily able to increase the per capita expenditure component, this can occur because many other factors influence such as the availability of jobs, sources of funding to open new jobs, besides that the high level of education sacrifices much time (opportunity cost) to find a job so that it does not guarantee the work experience required by a job that considers a lot of work experience.

Previous research conducted by [19] proved that the high level of education has a significant effect on the high growth of GDP per capita in South Sumatra Province. Also showed different results from this study where the average length of schooling had a positive and significant effect on GDP per capita in Indonesia [18]. The difference between the two previous studies with this research lies in the observation area, Indonesia has a wider coverage with many regions that have a high level of employment opportunities and good access to capital, thus contributing to the high contribution of GDP and affecting national GDP per capita. The same thing also happened in the observation area of South Sumatra Province. Showed that unemployment that occurred in the province in 2019 and 2020 was dominated by high school and university education levels [20].

Interaction between the Health Dimension and the Education Dimension. An increase in life expectancy as a component of health indicates a change in the level of public health. A physically and mentally healthy society will have the ability and endurance to continue learning to a higher level of education, thereby increasing the knowledge dimension.

This condition applies vice versa; the more components of the average length of schooling encourage a higher level of knowledge dimension, indicating a change in the mindset of the community that is improving. A good mindset makes people aware of the importance of a healthier life. Without good health, people will be hampered in daily activities, including increasing their knowledge. Previous research that also shows similar results to this study was conducted by [21], proving that higher education contributes to a decrease in maternal mortality.Proves that health positively and significantly affects dropout decisions because good/lousy health can impact children's school activities.

4. Conclusion

This study shows that there is a two-way effect between the dimensions of decent living standards and the Health dimension, and between the Health dimension and the knowledge dimension, as well as a unidirectional effect between the dimensions of decent living standards and the knowledge dimension. The application of this research is to provide a point of view for policymakers, that to improve the welfare of the community as measured by the HDI, the policies designed need to stimulate all dimensions of the HDI externally and also build harmonization between dimensions so that they influence each other and encourage an increase in HDI internally. Practically, this research shows that there is a problem that results in the statistical loss of influence between the knowledge dimension and the decent standard of living dimension. The implication of this research is that the government needs to pay attention to education management in Maluku Province, not only related to the number of people with a high formal education level but also the quality of each graduate so that they can be absorbed into employment. Collaboration between the world of education and employment must continue to be intensified by the government to ensure that high levels of education also have the required work experience, and must also provide access to capital that can support creative ideas to increase new jobs. The limitation of this study is that only one component is used from the knowledge dimension, namely the average years of schooling, further research can also test the reciprocal effect with the expected years of schooling component that has not been used in this model.

References

[1] Alviani, L. O., Kurniati, E., & Badruzzaman, F. H. (2021). Penggunaan Regresi Data Panel pada Analisis Indeks Pembangunan Manusia. *Jurnal Riset Matematika, 1(2), 99–108*. DOI: https://doi.org/10.29313/jrm.v1i2.373 .

[2] Amru, D. S., & Sihaloho, E. D. (2020). Pengaruh Pengeluaran Per Kapita dan Belanja Kesehatan terhadap Angka Kesakitan di Kabupaten/Kota Se-Pulau Jawa. *Jurnal Ilmiah Bisnis dan Ekonomi Asia, 14(1), 14–25.* DOI: https://doi.org/10.32812/jibeka.v14i1.135 .

[3] Andini, T. D., & Aan Julia. (2022). Pengaruh Tingkat Pendidikan, Jumlah Bidan, dan Tingkat Pendapatan terhadap Angka Kematian Ibu di 9 Provinsi Indonesia Tahun 2010-2020. Bandung Conference Series: *Economics Studies, 2(2)*. DOI: https://doi.org/10.29313/bcses.v2i2.3599 .

[4] Arofah, I., & Rohimah, S. (2019). The Human Development Index (HDI) is a measure of the condition of human resources in a country . Human Development Index has three elements , namely health , education achieved , and standard of living or often called the economy . The purpose of this. *Jurnal Saintika UNPAM, 2(1), 76–87*. DOI: https://doi.org/10.32493/jsmu.v2i1.2920 .

[5] Widyastuti, A., & Nugraha, J. (2021). Pengaruh Investasi, Tenaga Kerja, dan Produksi Perikanan Terhadap Pertumbuhan Ekonomi Pulau Jawa. Independent: *Journal of Economics, 1(1), 222–239*. DOI: https://doi.org/10.26740/independent.v1n1.p222-239 .

[6] Corneles, S. M., & Losu, F. N. (2015). Hubungan Tingkat Pendidikan Dengan Pengetahuan Ibu Hamil Tentang Kehamilan Risiko Tinggi. *Jurnal Ilmiah Bidan, 3(2), 51–55*. DOI: https://doi.org/10.47718/jib.v3i2.331 .

[7] Hanifah, N., & Rachmawati, R. (2023). Analisis Faktor Konfirmasi Indeks Pembangunan Manusia Indonesia Tahun 2019-2020 Confirmatory Factor Analysis of Indonesian Human Development Index 2019-2020. *Jurnal Samudra Ekonomi Dan Bisnis, 14(225), 304–317*. DOI: https://doi.org/10.33059/jseb.v14i2.7137 .

[8] Hasibuan, S. L., Rujiman, R., & Sukardi, S. (2020). Analisis Determinan Indeks Pembangunan Manusia (IPM) di Indonesia. *Jurnal Penelitian Pendidikan Sosial Humaniora, 5(2), 139–141*. DOI: https://doi.org/10.32696/jp2sh.v5i2.470 .

[9] Herdiansyah, D., & Kurniati, P. S. (2020). Pembangunan Sektor Pendidikan Sebagai Penunjang Indeks Pembangunan Manusia di Kota Bandung. *Jurnal Agregasi : Aksi Reformasi Government dalam Demokrasi, 8(1), 43–50.* DOI: https://doi.org/10.34010/agregasi.v8i1.2765 .

[10] Murendo, C., Chirongwe, G., & Sisito, G. (2022). Food Expenditure Shares and Income Elasticities In Zimbabwe: Accounting for Gender and Poverty Differences. *Cogent Economics and Finance, 10(1).* DOI: https://doi.org/10.1080/23322039.2022.2101241 .

[11] Kusuma Nigrum, D. A. (2023). Pengaruh Tingkat Pendidikan dan Belanja Bidang Kesehatan terhadap Pertumbuhan PDRB Perkapita di Provinsi Sumatera Selatan. *Jurnal Informatika Ekonomi Bisnis, 5, 698–706.* DOI: https://doi.org/10.37034/infeb.v5i3.625 .

[12] Leiwakabessy, E., & Amaluddin, A. (2020). a Modified Human Development Index, Democracy and Economic Growth in Indonesia. *Humanities & Social Sciences Reviews, 8(2), 732–743*. DOI: https://doi.org/10.18510/hssr.2020.8282 .

[13] Nurlina, N., Ridha, A., & Asnidar, A. (2023). Analisis Determinan Indeks Pembangunan Manusia di Indonesia Tahun 1990-2021. *Jurnal Samudra Ekonomi dan Bisnis, 14(2), 239–250*. DOI: https://doi.org/10.33059/jseb.v14i2.7287 .

[14] Pririzki, S. J., Sulitiana, I., & Adriyansyah, A. (2023). Analisis Kausalitas Antara Pendidikan, Kemiskinan, dan PDRB Menggunakan Panel Vector Autoregression. Euler : *Jurnal Ilmiah Matematika, Sains dan Teknologi, 11(1), 98–110*. DOI: https://doi.org/10.34312/euler.v11i1.19504 .

[15] Rahmawati, P. (2020). Pengaruh Program Bos terhadap Keputusan Anak Putus Sekolah. Efficient: *Indonesian Journal of Development Economics, 3(1), 680–697.* DOI: https://doi.org/10.15294/efficient.v3i1.35970 .

[16] Rakasiwi, L. S., & Kautsar, A. (2021). Pengaruh Faktor Demografi dan Sosial Ekonomi terhadap Status Kesehatan Individu di Indonesia. *Kajian Ekonomi dan Keuangan, 5(2), 146–157*. DOI: https://doi.org/10.31685/kek.v5i2.1008 .

[17] Ramly, F., & Ramly, A. (2022). Analisis Profil Pengangguran Di Provinsi Maluku. *Jurnal Cita Ekonomika, 16(1), 50–59*. DOI: https://doi.org/10.51125/citaekonomika.v16i1.5324 .

[18] Jin, G., Deng, X., Dong, Y., & Wu, F. (2020). China's

multidimensional poverty measurement and its spatio-temporal interaction characteristics in the perspective of development geography. *Dili Xuebao/Acta Geographica Sinica, 75(8), 1633–1646.* DOI: https://doi.org/10.11821/dlxb202008006 .

[19] Setiawan, A. W., & Ariani, M. . N. (2021). Jurnal Indonesia Sosial Sains. *Jurnal Indonesia Sosial Sains, 2(3), 494.* DOI: https://doi.org/10.59141/jiss.v3i01.505 .

[20] Sitorus, Y. F., Muchtar, M., & Sihombing, P. R. (2024). Pengaruh Tingkat Pendidikan Dan Tingkat Kesehatan Terhadap PDRB Per Kapita Di Indonesia. *Journal of Law, Administration, and Social Science, 4(1), 110–121*. DOI: https://doi.org/10.54957/jolas.v4i1.692 .

[21] Zhang, Y., Mao, J., & Wang, S. (2018). Experimental Study On The Learning Effect of Yoga Based On Motion Sensor. *Basic & Clinical Pharmacology & Toxicology, 124 CC-, 83–84.*