

Human Capital Role in the Development of Food Security in Malaysia

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Abstract : This study examines the direction of the relationship between human capital and agriculture where education and health are indicators of human capital development in this study. For indicators of agricultural development, we focus on agriculture performance and employment in agriculture. This study uses vector analysis to see the direction of the relationship between education investment, health investment, employment in agriculture and agriculture performance. The data used is secondary data with an annual period from 2000 to 2019. We found that investments in education, agriculture performance, and employment in agriculture in Malaysia enter a period of maturity where there is a decline after experiencing continuous increases. This shows the existence of innovation and encouragement of educational investment to reverse the direction of agriculture performance to increase. Health investment continues to increase as the image of Malaysia with high health standards.

Keywords: Human Capital, Agriculture, Employment in Agriculture, Vector Analysis

JEL Classification : C01,E24,J24,J43

1 INTRODUCTION

Malaysia's per capita income is growing rapidly, allowing consumers to spend more on food (Mamun et al,2021). From an agricultural point of view, or tropical climate and fertility only Malaysia have the potential to produce various agricultural commodities. To keep its agribusiness alive, Malaysia must outperform its main competitor, Malaysia. Malaysia faces competition for expertise from Malaysia in agriculture (Widarni & Drean,2021).

The Malaysian government offers free education at primary and secondary levels. Primary and secondary education is regulated by the Ministry of Education, while higher education is under the supervision of the Ministry of Higher Education. Almost all Malaysian students wear school uniforms which are standardized across the country (Ahmad & Ghapar,2019). The main subjects in Malaysian public schools are Malay followed by English and Mathematics. The number of weekly lessons in this subject is reduced in the second stage of secondary education, where it is expanded to other subjects such as science, life skills or local studies. The main purpose of Life Skills is to teach students the skills of trading, entrepreneurship, and engineering. Chinese and Tamil schools have almost the same curriculum. The only difference is that Chinese or Tamil are the main subjects followed by Malay and Mathematics. English is not taught until the second stage of primary education.

Malaysia has earned a reputation as a health tourism destination as one of the best and cheapest in the world. Although foreigners cannot access the public health system, low prices and broad insurance offers mean that paying for medical care is not a barrier. Health care costs are so low that they can be self-paid for many standard procedures (Praveena et al,2021).

The high standard of health in Malaysia has a positive impact on Malaysians to stay healthy and productive. This strongly supports the development of agriculture in Malaysia. This study examines the direction of the relationship between human capital and agriculture where education and health are indicators of human capital development in this study. For indicators of agricultural development, we focus on agriculture performance and employment in agriculture.

2 LITERATURE REVIEW

Health is a state of complete physical, mental and social well-being. In recent years, this definition has been complemented by the ability to lead a productive social and economic life, as well as a spiritual dimension. Health is a very broad issue. Physical health is the proper functioning of the body, its systems, and organs. Physical health also speaks of a balance between anabolic and catabolic processes. An organism is considered physically healthy when

pathological processes (diseases) do not occur in it, and its components function properly (Widarni & Bawono,2020).

The world is moving forward and it is very difficult to keep up. A hasty and common lifestyle can have a detrimental effect on health. This lifestyle is associated with stress, decreased sleep quality, decreased physical activity, poorer diet, and can lead to disease. Many of them, like cardiovascular disease, are asymptomatic at first. This disease can not only reduce daily activities but even temporarily paralyze humans from work life and complicate the personal life of sufferers of the disease. It is often difficult to think of a potential illness while feeling well, but illness is a part of human life and prevention is better than cure, and if treated at an early stage, without complications (Widarni & Mora,2021 ; Mora & Afriani,2021). The systematic examination is one of the elements of periodic verification of your health condition. You should not wait until unwanted symptoms appear or your health deteriorates rapidly, but detect abnormalities at an early stage optimally. To carry out health checks and other health services, investment in the health sector is required.

Managers usually recognize the importance of a good work-life balance. Unfortunately, the work style and subsequent challenges keep health care and routine preventive check-ups not always at the highest level. Therefore, rationally introduced physical activity along with a balanced diet and stress relief will contribute to the improvement of our psychophysical state. When it comes to financing health care, the concepts of expenses and/or costs are often used. This also applies to the public health sector, where, for example, an analysis of expenditures for activities in the field of health promotion and disease prevention is carried out or the costs of implementing these activities. Meanwhile, recent scientific reports and recommendations from international expert groups emphasize the need to treat funds allocated to public health activities in terms of investments, not costs (Pruckner et al,2021).

Health is one of the key factors in sustainable development. Healthier people not only work more efficiently but are also better able to relate and cooperate with one another. All of these contribute to economic progress and sustainable development. Investing in health has many benefits: economic, social, and environmental. The high-cost effectiveness of various forms of health promotion and disease prevention, not only by lowering future health care costs but also by increasing productivity and reducing costs in other sectors, such as social care. High-cost effectiveness of interventions that address specific behavioral risk factors, including smoking, alcohol consumption, physical activity, and unhealthy nutrition, as well as certain environmental and mental health risk factors. This is especially true for interventions involving fiscal policy, regulation, and better access to health information. Health investment is very important in productivity, including the productivity of workers working in the agricultural sector. Health is a very important factor to keep everyone working well and productively. In schools, many teachers and teachers pass on to children and youth values that are not included in the core curriculum: cooperation, respect, courage, responsibility, empathy, and many others. They are supported by social organizations. Thanks to curricula and educational materials, teachers carry out more than basic projects (Motegi et al,2020).

The lack of qualified employees is an obstacle to the development of the company. The period of study in high school, and even at the elementary level, is a great opportunity to acquire skills that are useful in a professional career. Entrepreneurs should also take advantage of this moment. The company's involvement in the educational process can make it difficult to adjust the competence of graduates to the needs of the labor market. The return on investment in youth education is potentially unlimited, and the risk of such an investment is low, comparable to that of government bonds. The opportunity for a better future for your child is to send him to school (Afriani,2021). Parents often don't realize how much money they are spending on their children. Sending a child to study again costs tens of thousands of zlotys. According to experts, this money should not be treated as an expense, but as an investment. Besides the cost of daily living and health care, education is the most expensive cost of raising a child. However, these costs will be paid back when the child's abilities improve in many ways, depending on the interests and education of the child. Learning outcomes in the form of knowledge, knowledge, and experience are human capital owned by children and cannot be separated from educational activities in schools.

Agriculture is a branch of the national economy that aims to obtain plant and animal products by cultivating soil and breeding animals. In a broader sense, agriculture also includes horticulture, forestry, and fisheries. Agricultural productivity depends on soil fertility, which affects the degree and type of land use. The natural fertility of the soil depends on the climate and water conditions and the type of soil. Proper soil processing enables efficient long-term

agricultural production. Agricultural land predominates in areas where the soil is best. Areas with unfavorable soil conditions should be used as land for anthropogenic infrastructure. Agriculture, one of the oldest and basic sectors of the economy, the main purpose of which is to provide food for the people for direct consumption or after processing in the food industry, as well as the production of industrial raw materials to satisfy people other (non-food) human needs (Wang et al,2020).

Agriculture, taking advantage of the productivity of living nature, depends on its laws; However, while as a result of centuries of experience and scientific advances, humans can significantly affect the living nature by increasing its productivity, its effect on inanimate natural factors such as temperature, rainfall, the wind is negligible; Therefore, agricultural production is more dependent on the forces of nature than any other branch of the economy. The concept of agriculture has a wide range of scope; in a narrower sense, it includes crop production from field crops and plantations, from horticulture, horticulture and livestock production from animal husbandry, beekeeping and freshwater fisheries; in a broader sense, agriculture also includes the processing (home, rural) of plant and animal products and the activities of agricultural service units (companies and service companies); there is also the complex concept of food economy (agribusiness), which is equated with agriculture in a broad sense, which also includes industries that produce the means of production for agriculture (eg tractors, machinery, agricultural implements, fertilizers, chemical crop protection products. Agricultural use is a set of disciplines that continuously developing) agricultural sciences; these are: soil science and agricultural chemistry, animal husbandry and breeding, veterinary medicine, melioration, agricultural machinery, rural construction, economics and organization of agricultural enterprises, agricultural economics, agrarian policy, rural sociology, etc. The basis of agricultural science is not only natural sciences, such as chemistry and biochemistry, zoology and botany, physiology and genetics, geology and physics, and technological achievements but also social sciences, such as economics and enterprise organization, economics, economic policy, sociology (Drean & Bawono,2021).

3 RESEARCH OBJECTIVE AND METHODOLOGY

This study uses vector analysis to see the direction of the relationship between education investment, health investment, employment in agriculture and agriculture performance. The data used is secondary data with an annual period from 2000 to 2019.

4 RESULTS AND DISCUSSION

The table below presents a summary of descriptive statistics of several variables used in this study during the period 2000 to 2019.

Table 1. Descriptive statistics of agricultural performance in USD value in January 2021, education (investment in education in USD value in January 2021), and employment in agriculture (total working population).

	AGRICULTURE_PERFORMANCE	EDUCATION	EMPLOYMENT_IN_AGRICULTURE	HEALTH
Mean	2.07E+10	1.20E+10	1.65E+06	7.89E+09
Median	2.40E+10	1.24E+10	1.63E+06	7.55E+09
Maximum	3.41E+10	1.80E+10	1.82E+06	1.39E+10
Minimum	7.43E+09	5.60E+09	1.48E+06	2.37E+09
Std. Dev.	8.67E+09	4.33E+09	1.05E+05	4.04E+09

Based on Table 1 above, it appears that from the period 2000 to 2019, the average agricultural performance in Malaysia is very high at around 20.07 billion USD which can be seen from the mean value in Table 1. with a high level of volatility at 8.67 billion USD. With an average number of workers 1.65 million people with an average educational investment value of 12 billion USD, and Health investment 7.89 billion USD. To see a more detailed and careful relationship of influence, vector analysis is carried out, namely Vector Autoregressive. Before estimating using Vector Autoregressive, there are several conditions that must be met from several observed variables, namely Stationarity Test, and Optimum Lag Test.

Cointegration test to see if there is a long-term relationship between variables and a causality test to see a reciprocal relationship between variables. Estimation using the VAR model requires all variables to be stationary at the level, if the variable is not stationary at the level, the estimation is carried out using the VECM model on the condition that all variables formed are cointegrated with each other where the results are shown in Table 2 below:

Table 2. stationarity test

Method			Statistic	Prob.**
ADF - Fisher Chi-square			7.09E+01	0.00E+00
ADF - Choi Z-stat			-7.18E+00	0.00E+00
Series	Prob.	Lag	Max Lag	Obs
D(AGRICULTURE_PERFORMANCE,2)	0.00E+00	1.00E+00	3.00E+00	1.60E+01
D(EDUCATION,2)	0.00E+00	0.00E+00	3.00E+00	1.70E+01
D(EMPLOYMENT_IN_AGRICULTURE,2)	1.70E-03	1.00E+00	3.00E+00	1.60E+01

From the results of stationarity testing with Augmented Dickey-Fuller, it can be seen that at the 2nd level the difference is stationary and vector estimation uses Vector Autoregressive. It can be seen that the probability is less than 0.05 in each tested variable. After doing the stationarity test, a cointegration test was conducted to see the long-term integration between variables. If there is cointegration between variables, the estimation is made using the Panel Vector Error Correction Model (VECM) method, but if there is no cointegration, the estimation is made using the Vector Autoregressive method. Cointegration test results are shown in Table 3.

Table 3. Cointegration test results

Hypothesized		Trace	5.00E-02	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	8.55E-01	4.63E+01	4.79E+01	6.96E-02
At most 1	3.24E-01	1.16E+01	2.98E+01	9.46E-01
At most 2	2.13E-01	4.52E+00	1.55E+01	8.58E-01

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

From the cointegration result, the critical value is higher than the Trace Statistics value and the Max-Eigen Statistics value which shows that there is no cointegration relationship in the variable equation so that the next method that can be used to determine the long-term and short-term relationship is the Vector Autoregressive method.

Optimum lag test is used to determine the time period of the influence of a variable on other variables which will give optimal results. This is because changes in the movement of a variable are not directly responded to by changes in other variables, but there is still a certain grace period. Therefore it is important to know the lag length. The optimum lag test can be seen in Table 4.

Table 4. Optimum lag test

Lag	LogL	LR	FPE	AIC	SC	HQ	
0.00E+00	-1.47E+03	NA	2.45E+66	1.64E+02	164.4149	164.2444	
1.00E+00	-1.41E+03	86.87414*	1.93e+64*	159.3122*	160.3015*	159.4486*	
2.00E+00	-1.40E+03		1.30E+01	3.76E+64	1.60E+02	161.4287	159.8935

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

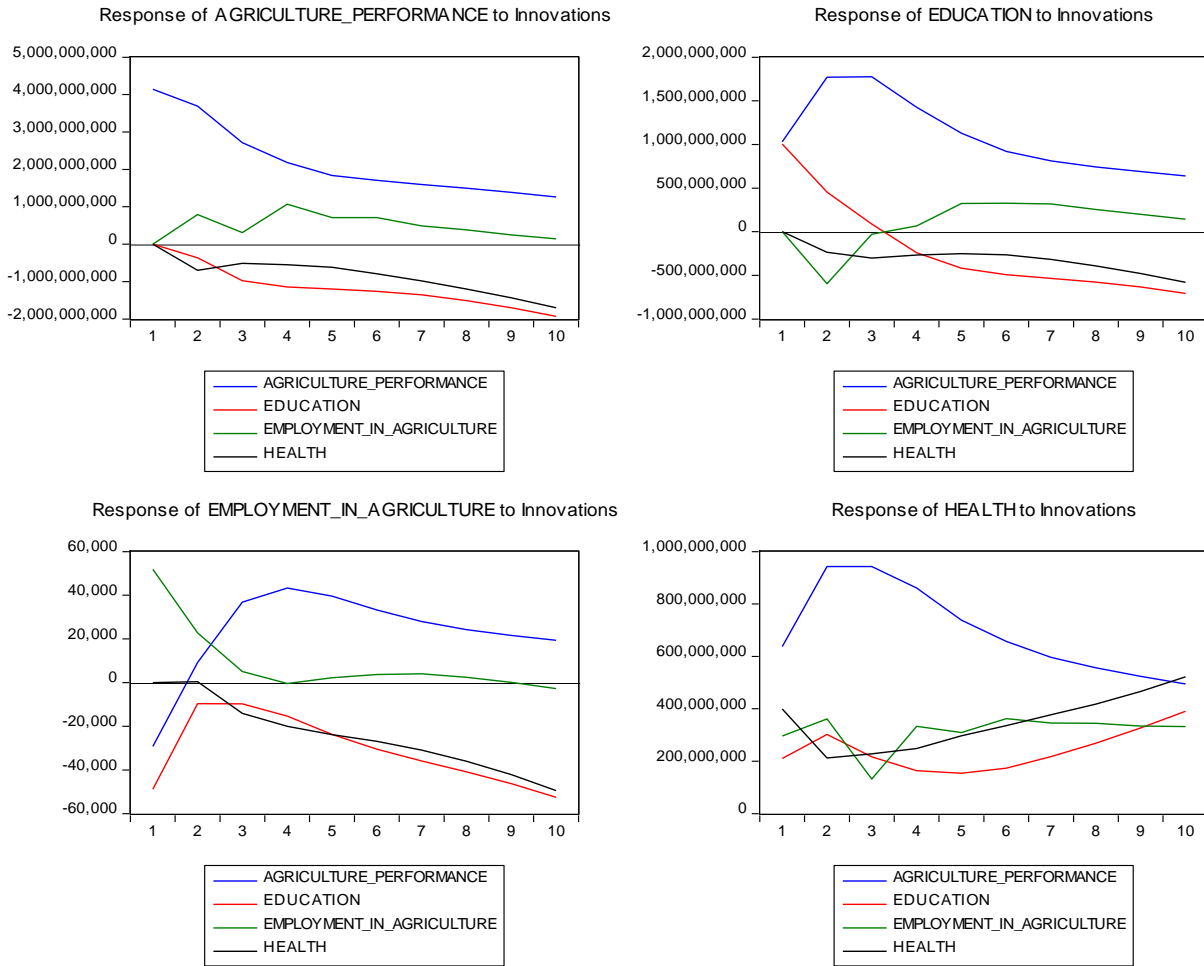
From the results of the Optimum lag test, it can be seen that the optimum lag is found in lag 1. The results of the Vector Autoregressive are shown in Table 5.

Table 5. The results of the Vector Error Correction Model estimation

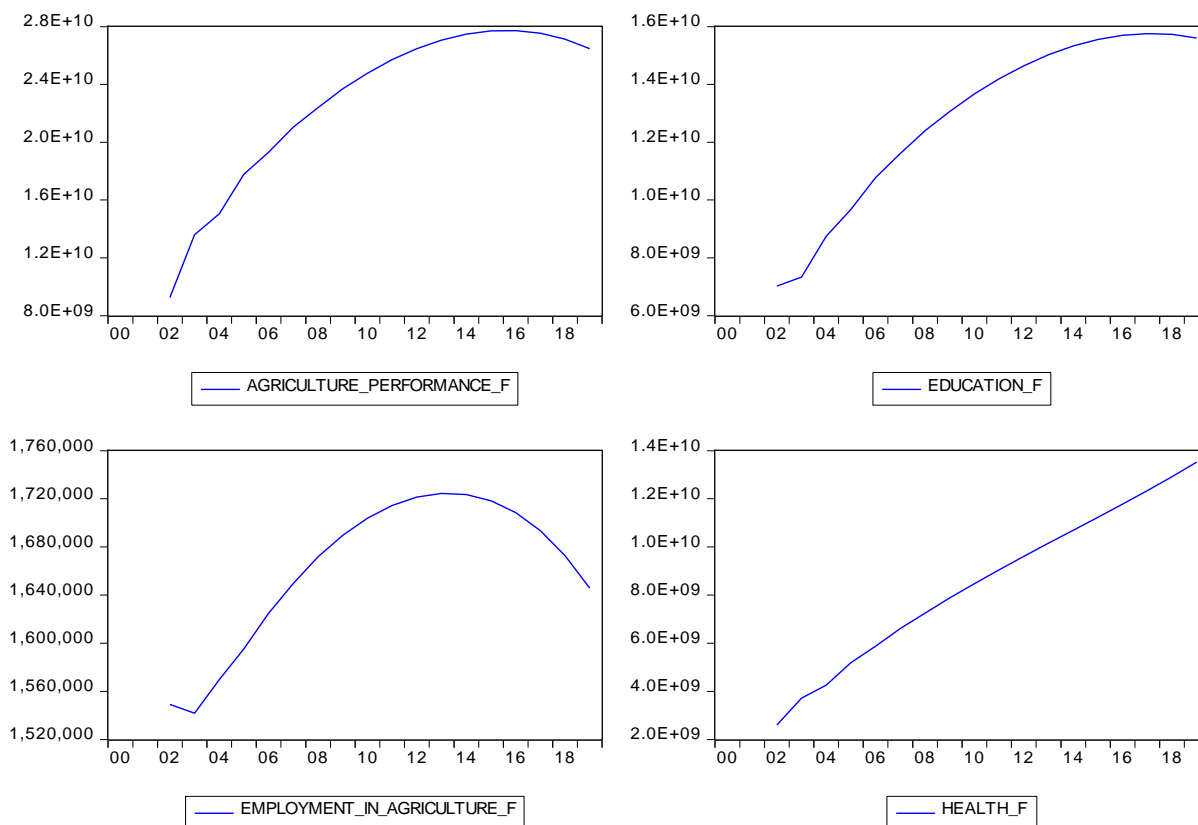
	AGRICULTURE_PERFORMANC E	EDUCATIO N	EMPLOYMENT_IN_AGRICULTUR E	HEALTH
AGRICULTURE_PERFORMANCE(-1)	1.03E+00*	4.15E-01	2.32E-06*	7.87E-02*
	-4.75E-01	-1.65E-01	-8.80E-06	-9.56E-02
	[2.17450]	[2.51968]	[0.26294]	[0.82308]
AGRICULTURE_PERFORMANCE(-2)	-5.37E-01*	2.60E-02*	5.24E-06*	-1.71E-01*
	-6.80E-01	-2.36E-01	-1.30E-05	-1.37E-01
	[-0.79026]	[0.11029]	[0.41525]	[-1.24800]
EDUCATION(-1)	1.23E+00	1.82E-01*	1.13E-05*	3.81E-01*
	-1.60E+00	-5.55E-01	-3.00E-05	-3.22E-01
	[0.76886]	[0.32772]	[0.37906]	[1.18263]
EDUCATION(-2)	-1.17E+00	1.99E-01	2.08E-06	-3.52E-01
	-1.20E+00	-4.18E-01	-2.20E-05	-2.43E-01
	[-0.97013]	[0.47618]	[0.09285]	[-1.44921]
EMPLOYMENT_IN_AGRICULTURE(-1)	2.53E+04	-8.11E+03	4.34E-01*	3.94E+03
	-2.55E+04	-8.86E+03	-4.74E-01	-5.14E+03
	[0.99132]	[-0.91550]	[0.91648]	[0.76668]
EMPLOYMENT_IN_AGRICULTURE(-2)	-6.90E+03	5.77E+02	1.39E-01*	-3.42E+03
	-1.45E+04	-5.05E+03	-2.70E-01	-2.93E+03
	[-0.47510]	[0.11434]	[0.51693]	[-1.16657]
HEALTH(-1)	-1.75E+00	-5.89E-01*	1.01E-06*	5.32E-01*
	-2.27E+00	-7.88E-01	-4.20E-05	-4.57E-01
	[-0.76937]	[-0.74781]	[0.02404]	[1.16402]
HEALTH(-2)	2.15E+00	4.00E-01*	-2.57E-05*	6.46E-01*
	-2.45E+00	-8.52E-01	-4.60E-05	-4.94E-01
	[0.87612]	[0.46965]	[-0.56348]	[1.30629]
C	-2.22E+10	1.29E+10	5.70E+05	-1.08E+06
	-4.30E+10	-1.50E+10	-7.99E+05	-8.70E+09
	[-0.51634]	[0.86195]	[0.71334]	[-0.00012]
R-squared	8.53E-01	9.34E-01	6.89E-01	9.74E-01
Adj. R-squared	7.23E-01	8.76E-01	4.12E-01	9.51E-01
Sum sq. resids	1.55E+20	1.86E+19	5.33E+10	6.28E+18
S.E. equation	4.15E+09	1.44E+09	7.70E+04	8.35E+08
F-statistic	6.53E+00	1.60E+01	2.49E+00	4.25E+01
Log likelihood	-4.18E+02	-3.99E+02	-2.22E+02	-3.89E+02
Akaike AIC	4.74E+01	4.53E+01	2.56E+01	4.42E+01
Schwarz SC	4.79E+01	4.58E+01	2.61E+01	4.47E+01
Mean dependent	2.22E+10	1.26E+10	1.65E+06	8.50E+09
S.D. dependent	7.87E+09	4.09E+09	1.00E+05	3.78E+09

Based on the results of the estimated output, it can be indicated the direction of the relationship, and the significance of each variable and each period. Negatively related variables are marked (-). Significant relationships are marked with a sign (*). The value of the coefficient of determination (Adj. R-Square) shows the degree of truth of the estimate of 0.988. This means 99% accuracy of the calculation rate of the vector error correction model. Impulse Response Function (IRF) describes the response of an endogenous variable to shock that occurs in other variables in a dynamic VAR system. IRF can be used to see the effect of fluctuations or shocks from one variable on the value of another variable either now or in the future. The results of the Impulse Response Function (IRF) of the Infrastructure variable against other variables are shown by the following Impulse Response graph:

Response to CholeskyOne S.D. (d.f. adjusted) Innovations



Based on the response and impulse graphs, it can be seen that each variable responds to each other since the first time period with a lag of 1. This shows that in Malaysia the three variables influence each other. To see the direction of influence can be seen in the following forecasting chart:



Based on the forecasting graph, it can be seen that the growth of agriculture performance is in line with or in line with education and health investment in Malaysia. This indicates that Malaysia has succeeded in successfully investing in education an health to improve agricultural performance. Both investments in education, agriculture performance, and employment in agriculture enter a period of maturity where there is a decline after experiencing continuous increases. This shows the existence of innovation and encouragement of educational investment to reverse the direction of agriculture performance to increase. Health investment continues to increase as the image of Malaysia with high health standards.

5 CONCLUSION

Malaysia has succeeded in successfully investing in education and health to improve agricultural performance. Investments in education, agriculture performance, and employment in agriculture enter a period of maturity where there is a decline after experiencing continuous increases. This shows the existence of innovation and encouragement of educational investment to reverse the direction of agriculture performance to increase. Health investment continues to increase as the image of Malaysia with high health standards.

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