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# Does quality-adjusted human capital matter for economic growth of Malaysia: Time series analysis

**Amelia Putri**[1]✉
**Emily Bellamy**[2]

*Westcliff University, Irvine, USA.*
*Email: aputri@westcliff.edu*

*(✉ Corresponding Author)*

## Abstract

Human capital plays a crucial role in driving productivity development and enhancing the standard of living. Human capital refers to the collective knowledge and skills possessed by individuals, which significantly contribute to enhancing productivity and are closely linked to economic growth and development. The significance of human capital in driving innovation and productivity in the case of Malaysia cannot be overlooked. The primary objective of this study is to conduct an empirical analysis of the impact of human capital on the economic growth (EG) of Malaysia over the period from 1990 to 2022. This study utilized quality-adjusted human capital to accurately reflect the underlying significance of human capital. Hence, this study contributes to the existing body of literature by using quality-adjusted human capital in the case of Malaysia. To check the cointegration among variables, this study uses the Fisher Type Bayer-Hanck cointegration test and Johansen cointegration techniques. Using the ARDL approach, we find a positive impact of human capital on economic growth. This implies that labor with developed human capital is more productive and hence contributes more to economic growth. To optimize the positive impact of human capital on economic growth in Malaysia, it is imperative to establish a comprehensive array of policy recommendations that encompass both the quantity and quality of human capital development.

**Keywords:** Economic growth, Quality-adjusted human capital, Time series data.

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## Contents

**Contribution of this paper to the literature**
This study examines the impact of human capital on economic growth in the case of Malaysia over the period of 1990 to 2022. This study utilized quality-adjusted human capital (number of publications, number of patents, and labor force) to accurately reflect the underlying significance of human capital in Malaysia.

## 1. Introduction

It is widely acknowledged that human capital plays a crucial role in driving productivity development and enhancing the standard of living. Human capital refers to the collective knowledge and skills possessed by individuals, which significantly contribute to enhancing productivity and are closely linked to economic growth and development. Prior research has extensively debated the impact of human capital on economic growth. Human capital is generally recognized as the catalyst for innovation and productivity in economies. Enhancing productivity can be achieved by employing novel technologies, which, in turn, foster economic efficiency. In their respective works, Romer (1986) and Lucas Jr (1988) examined the concept of human capital as a significant driver of both increasing returns and dispersion in growth rates among nations. The primary school enrollment ratio is commonly employed in academic literature as a significant indicator of human capital. According to Barro (1991) research, there exists a significant correlation between the primary school enrollment ratio and economic growth. The allocation of resources toward the development of human capital has been widely recognized as a significant driver of economic growth and productivity in industrialized nations. One of the primary factors contributing to the low per capita GDP in developing nations is the limited allocation of resources toward human capital development.

The contemporary growth models of economic growth prioritize the concept that investments in human capital play a significant role in fostering economic growth. According to these perspectives, the development of persistent growth is attributed to the actions of individuals within the economy. The potential exists for human capital to exert an additional influence on the attraction of other factors, such as physical investment, thereby making a quantifiable contribution to the increase in per capita income. The significance of allocating sufficient attention to human capital is underscored by the recent endeavor to efficiently accumulate physical capital in economically disadvantaged regions. This phenomenon can be attributed to the recognition that the effective allocation of physical resources is contingent upon the presence of human resources. If there is a lack of adequate investment in human capital, the ability to effectively employ additional physical capital is limited. The optimal use of physical capital necessitates the presence of individuals possessing technical, professional, and administrative knowledge. Lucas Jr (1988) posits that the inadequate provision of physical capital to impoverished nations can be attributed to their relatively limited availability of complementary intellectual capital. Hence, it is generally inferred that human capital facilitates the adoption of advanced technology from foreign countries (Alderman, Behrman, Ross, & Sabot, 1996; Anand & Sen, 2000; Appleton & Teal, 1998; Balach & Law, 2015; Gyimah-Brempong & Wilson, 2004). Furthermore, it is worth noting that human capital plays a significant role in explaining the disparities observed in the production and growth rates of pertinent input indicators. The subject of examining the correlation between human capital and economic growth is a topic of considerable debate. Moreover, the enhancement of human capital fosters entrepreneurial pursuits and nurtures a societal environment that places importance on innovation and the propensity to undertake risks, both of which are crucial for the advancement of economies that exhibit both dynamism and resilience. Furthermore, human capital contributes to the advancement of social capital and the formation of unified societies by promoting equitable opportunities and enabling individuals to actively participate in economic activities. According to Solow (1957), technological innovation was seen as a significant driver of productivity growth. Mankiw, Romer, and Weil (1992) subsequently incorporated human capital into the growth model, recognizing its significant impact on productivity and output growth. Easterly and Levine (2003) and Wang, Li, and Fang (2018) incorporated additional variables into the growth models. These theories regarded technological innovation as a crucial determinant of countries' growth rates. In addition, investments in human capital play a significant role in mitigating poverty, fostering social cohesion, and enhancing living standards. This is achieved by equipping individuals with the necessary skills and knowledge to actively participate in the economy and society. Consequently, understanding the influence of human capital on economic growth is not only a theoretical pursuit but a crucial requirement for policymakers and stakeholders striving to establish a trajectory toward sustainable development in Malaysia.

The significance of human capital in driving innovation and productivity in the case of Malaysia cannot be overstated, given the country's rapid industrialization and technological advancements, both of which are crucial for achieving sustainable economic prosperity. In recent years, Malaysia has performed remarkably in enhancing its human capital. The country focuses on prioritizing the enhancement of its human resource capabilities to be competitive with industrialized nations in the context of increasing global technology advancements. However, the country is facing several issues related to human capital, which need to be solved for the country's future productivity. Hence, it is important to explore the impact of human capital on the economic growth of Malaysia. To sustain its competitiveness in the global market, Malaysia focuses on possessing a workforce that is both highly skilled and adaptable. The country is keen to develop knowledge-intensive industries.

This study examines the impact of human capital on economic growth in Malaysia from 1990 to 2022. The present study undertakes an empirical analysis to assess the influence of human capital on Malaysia's economic growth. It utilizes quality-adjusted human capital to accurately reflect the underlying significance of human capital in the country. Quality-adjusted human capital considers the number of publications, patents, and the labor force.

The rest of the study is organized as follows: Section 2 presents the literature review. Section 3 presents the data, model, and econometric methods. Section 4 presents the results and discussions. The final section provides concluding remarks and policy implications.

## 2. Literature Review

After the introduction of new growth theories, the issue of human capital and economic growth has become a topic of great interest among researchers and academia. Lucas Jr (1988); Romer (1986); Romer (1990); Romer (1994) and Barro (1991) considered human capital an important factor contributing to economic growth. The model

proposed by Lucas Jr (1988) incorporates the concept of human capital, specifically schooling, and elucidates the impact of individuals' time allocation to various activities on their future productivity and degree of human capital. The study conducted by Barro (1991) employed school enrollment rates as a surrogate measure for human capital and examined the relationship between human capital and economic growth. Following the footsteps of Lucas Jr (1988); Romer (1990) and Barro (1991), there has been a significant amount of research conducted on the human capital-led growth nexus (Aghion, Howitt, & Murtin, 2010; Alderman et al., 1996; Anand & Sen, 2000; Appleton & Teal, 1998; Baldacci, Clements, Gupta, & Cui, 2008; Bokhari, 2017; Farooq, Arshi, Sattar, & Khalil, 2020). The Keynesian model, which stated that there are two components of production—labor and capital—was the foundation upon which the Solow model of economic growth was constructed. When it came to human capital formation, however, the model did not take any considerations into account. After some time had passed, researchers began incorporating human capital into the production function, which they referred to as the human capital-augmented production flow. Productivity can be significantly increased by investing in human capital, which can be accomplished through educational advancement. Nevertheless, the extent of the effect that education has on growth varies between leading countries and those that are lagging behind. Barro (1991) contends that there is a high correlation between growth performance and human capital, which is assessed by educational attainment while also taking into account life expectancy. Inferring similar findings, Behrman, Ross, and Sabot (2008) conclude that life expectancy and educational attainment are significant for economic development. They also argue that these factors matter. Additionally, Pelinescu (2015) expanded his research by contrasting the effects of human capital and physical capital on the success of an organization. When compared to the growth effect of physical capital, the author contends that the scale of the effect that human capital has on growth is far greater. The authors López-Bazo and Motellón (2012) contend that there is a significant correlation between human capital and the earnings of workers. When compared to regions with low educational attainment, the authors discovered that regions with high educational attainment have higher pay for workers. This is in contrast to regions with low educational attainment.

A lack of studies has been conducted to examine the impact of human capital on economic growth in the case of Malaysia (Akinwale, 2020a, 2020b, 2022; Alshuaibi, 2017; Baldacci et al., 2008; Hanushek, 2013; Khodabakhshi, 2011; Maitra, 2018; Mathur, 1999; Mihut & Plesoianu, 2014; Pelinescu, 2015; Rastogi, 2002; Sapkota, 2014; Sehrawat & Giri, 2017; Sharpe, 2001; Shuaibu & Oladayo, 2016; Siddiqui & Rehman, 2016; Wigley & Akkoyunlu-Wigley, 2006). The findings of these studies indicate that human capital, which may be enhanced through educational progress, exerts a substantial impact on productivity growth. However, a notable constraint of these studies pertains to the use of weak proxies as indicators of human capital. Furthermore, while these studies examine the correlation between human capital and economic growth, their focus mostly lies on the rise of the financial industry. Additional studies have been conducted. Akinwale (2022) employed the Autoregressive Distributed Lag (ARDL) approach to ascertain the significant impact of research and development, along with technological innovation, on the economic growth of Malaysia. According to Alshuaibi (2017), Malaysia demonstrates a strong inclination towards enhancing innovation, particularly within the information technology industry, as part of the government's efforts to diversify its economy in alignment with Vision 2030. This can impact the economic progress of the nation. Lin (2004) categorized higher education in Taiwan into four distinct domains to examine its influence on three specific sectors of the economy from 1965 to 2000. The higher education system was divided into distinct domains, namely education, social sciences, and humanities, and it was seen as a significant contributor to the overall productivity of society. The study eliminated participants who had degrees from foreign nations. In relation to the level of output in Taiwan throughout the examined time frame, the results suggest that three out of the four fields exhibit a significant and favorable impact. Based on the research findings, it can be observed that a rise in higher education is associated with a corresponding gain in real production. The various forms of higher education had diverse impacts on the tangible outcomes in the specific field under investigation. The humanities failed to satisfy the demands of the labor force, while the natural sciences emerged as the primary drivers of economic growth. According to the findings of Akinwale (2020b), a triangular relationship exists between growth, research and development, and innovation. The authors emphasize the importance of promoting both public and private support for research and development, as well as innovative endeavors. The primary objective of this effort is to enhance the level of innovation, thereby ensuring the nation's continued prominence as a participant in a comprehensive knowledge-based economy. Gyimah-Brempong and Wilson (2004) conducted a study utilizing panel data to examine the correlation between health and the per capita population growth rate in countries belonging to the Organization for Economic Co-operation and Development (OECD) and sub-Saharan Africa. An extended iteration of the Solow growth model was employed during the inquiry. The empirical data indicate a statistically significant and positive correlation between the growth rate of per capita income and human capital. The effects exhibited a quadratic nature.

To summarize, human capital is a significant factor that influences the rate of economic growth in both leading and lagging countries. In previous research, the effect of human capital (represented by education level and health status) on economic growth was investigated independently. Previous studies employed different proxies to quantify human capital, such as school enrollment rates, dropout rates, and literacy rates. Nevertheless, these proxies fail to represent the true picture of a country's human capital because they attach similar weights irrespective of quality differences. Since quality is more essential than quantity, this study utilized quality-adjusted human capital to accurately reflect the underlying significance of human capital in Malaysia. The quality-adjusted human capital takes into account the number of publications, number of patents, and labor force. Previous studies in the case of Malaysia have not considered quality while measuring human capital. Hence, this study makes a substantial contribution to the existing body of literature by utilizing quality-adjusted human capital.

## 3. Methodology

### 3.1. Model, Data and Analytical Techniques

To examine the impact of human capital on economic growth in the presence of control variables (investment and trade openness), the empirical model is provided as:

$$Y_t = \beta_o + \beta_1 HC_t + \beta_2 INV_t + \beta_3 TO_t + \eta_t \quad (1)$$

Where Y represents the real GDP growth rate, HC refers to human capital, INV represents investment (as a percentage of gross domestic product (GDP)), and TO represents trade openness (the sum of exports and imports as a percentage of GDP). $\eta_t$ represents the white noise error term, and the subscript t indicates the period.

This study uses a quality-adjusted human capital variable to measure human capital. Following Ali, Cantner, and Roy (2016), the quality-adjusted human capital (QAHC) variable can be measured by the following equation:

$$QAHC = HC * (Publications/L + Patents/L) \quad (2)$$

Where L represents the labor force. The time span of the study ranges from 1990 to 2022. The data for all variables are obtained from World Bank (2022).

The significance of human capital in influencing output is well acknowledged. Countries are able to create products effectively as a result of the growth in human capital development. Human capital facilitates the adoption of advanced technology from foreign countries. Furthermore, it is worth noting that human capital plays a significant role in explaining the disparities observed in the production and growth rates of pertinent input indicators. The relationship between human capital and economic growth is expected to be positive. The real sector of the economy experiences significant benefits as a result of the rise in investment. Hence, it is anticipated that investment will have a positive impact on economic growth. This study incorporates trade openness as a control variable in growth regression, building upon the research conducted by Romer (1994); Sala-i-Martin (1996) and Dollar and Kraay (2002). It is anticipated that an augmentation in the level of openness will result in an improvement in production. Based on the observed correlation between the coefficient of γ and HC, it may be inferred that there exists a simultaneous relationship between HC and output growth. Therefore, OLS will yield incongruous outcomes.

### 3.2. Analytical Techniques

One of the most captivating subjects of discourse among econometricians pertains to the implementation of error correction mechanisms (ECM) and cointegration methodologies. The application of these methodologies as empirical instruments has gained considerable prominence in recent times. An issue that arises, nonetheless, is the applicability of these methodologies to stationary data. The utilization of ECM is recommended due to its versatility and applicability to both stationary and non-stationary data. Conversely, Durr (1992) argues that ECM is unsuitable for the analysis of stationary data under consideration. Durr (1993) pertains to the data that were modeled using the ECM, which are unequivocally cointegrated. Regarding the acceptability of stationary data in error correction models, a contentious debate has persisted since 1993 without resolution. Researchers have gained a more comprehensive understanding of the ways in which theory is linked to time series during the development process as a result of these contentious debates. The evaluation of immediate and enduring consequences is facilitated by error correction models, which not only provide a reliable modeling technique but also enable estimation.

#### 3.2.1. Unit Root Test

Applying OLS regression on time series data without ensuring stationarity would result in false regression, meaning that the estimates would be unreliable. To address this issue, the data is rendered stationary by the process of taking differences. To assess the unit root properties of each series, the current study used Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests to examine the order of integration of variables. When conducting these tests, varying lag orders are employed, which are determined based on the AIC and SBC criteria. This study also uses the nonparametric (Phillips, 1988) unit root test, which controls for serial correlation while testing for a unit root.

#### 3.2.2. Fisher Type Bayer-Hanck (2013) Cointegration Test

We use the Fisher-type Bayer and Hanck (2013) cointegration test to explore the long-run relationship among the variables of model 1. The Bayer and Hanck (B-Y) cointegration method is a unified strategy that integrates multiple independent cointegration tests. The analysis provides an opportunity to incorporate factors that have been significantly underrepresented in the equation. The Fisher formula by Bayer and Hanck (2013) is employed in the test to combine the probability values derived from various cointegration approaches.

#### 3.2.3. ARDL Econometric Approach

There are various reasons why the ARDL technique is considered robust and efficient in comparison to other econometric approaches such as Ordinary Least Squares (OLS) and Fully Modified Least Squares (FMOLS). Nevertheless, the primary justification for employing ARDL over alternative methodologies is that it facilitates the effective handling of structural breaks. Moreover, ARDL operates effectively in contexts of heterogeneity. It is advantageous for securing optimal outcomes in the presence of endogeneity. The utilization of the ARDL instrumental variable technique involves the incorporation of the lagged dependent variable in Equation 2, as it is acknowledged that the OLS method tends to overestimate the coefficient of the stringent lagged dependent variable. Therefore, this study used the ARDL technique to examine the impact of human capital, investment, and trade openness on economic growth in the case of Malaysia. The ARDL approach consists of estimating the following equation.

$$\Delta(Y)it = \alpha + \sum_{j=1}^{n} \beta j\Delta(Y)t - j + \sum_{j=1}^{n} \gamma j\Delta(HC)t - j + \sum_{j=1}^{n} \delta j\Delta(INV)t - j + \sum_{j=1}^{n} \psi j\Delta(TO)t - j + \lambda 1(Y)t - 1 + \lambda 2(HC)t - 1 + \lambda 3(INV)t - 1 + \lambda 4(TO)t - 1 + \eta t \quad (3)$$

Where ηt captures the error correction in the model. In this study, the analyses are based on Equation 3, which captures the long-run features, but the study also estimates the dynamic model of Equation 4, which reflects only a short-term perspective and disturbance.

## 4. Results and Discussion

Within the context of Malaysia, this study investigates the relationship between human capital, investment, and trade openness in relation to economic growth. With the intention of serving this objective, this study provides an estimation of the model, in which human capital, investment, and trade openness are considered explanatory

variables, and economic growth is regarded as the dependent variable. This research employs the ARDL econometric technique to estimate the model. Additionally, this study utilizes the Johansen (JJ) Cointegration technique to determine whether the variables are cointegrated with one another. However, before proceeding with the estimation of the model, it is essential to ensure that the data series possesses stationarity features. This research uses the ADF and Phillips-Perron (PP) unit root tests to accomplish this goal.

Table 1 presents the correlation matrix of variables. The real GDP growth rate (Y) is highly correlated with all other variables. However, the degree of association between independent variables is very low. Given that the real GDP growth rate (Y) is the dependent variable in the correlation matrix, it follows that the model will always explain at least one of these variables. As a result, the correlation between Y and the explanatory factors is stronger (greater than 0.5), which indicates that the explanatory variables are connected with economic performance. When it comes to the variables that explain the phenomenon, there is no correlation coefficient that is notably high among the variables that explain the phenomenon.

**Table 1.** Correlation matrix.

| Variables | Y | QAHC | INV | TO |
|---|---|---|---|---|
| Y | 1 | --- | --- | --- |
| QAHC | 0.73 | 1 | --- | --- |
| INV | 0.81 | 0.14 | 1 | |
| TO | 0.78 | 0.16 | 0.29 | 1 |

The results of the ADF unit root test are presented in Table 2. The results indicate that the variables Y, HC, INV, and TO are non-stationary at the level and stationary at the first difference. Hence, all variables are first-difference stationary.

**Table 2.** Unit root test.

| Variable | I (0) | I (1) |
|---|---|---|
| Y | -0.782 | -3.241** |
| QAHC | -1.651 | -4.671*** |
| INV | -2.092 | -3.002* |
| TO | -1.624 | -4.178*** |

**Note:** *, ** and *** represent significant at 10%, 5%, and 1% respectively.

We use the Fisher Type Bayer-Hanck cointegration test to explore the long-run relationship among variables Y with HC, INV, and TO. The results of the Fisher Type Bayer-Hanck test are presented in Table 3. The results show that all variables in Model 1 are cointegrated. Therefore, it is inferred that economic growth is cointegrated with human capital, investment, and trade openness.

**Table 3.** Fisher-type Bayer-Hanck cointegration test.

| Variables | EG | JJ | Ba | Bo |
|---|---|---|---|---|
| Test statistics | -13.2712 | 98.5203 | 28.7204 | 81.6192 |
| P-value(s) | 0. 0000 | 0.0000 | 0.0000 | 0.0000 |
| EG-J | 61.0983** | | | |
| EG-J-Ba-Bo | 98.7146** | | | |

**Note:** ** represents significant at 5% level.

The findings of the ARDL approach are presented in Table 4. The results suggest that human capital, investment, and trade openness are positively related to the real GDP growth rate. The symbol ECM (-1) represents the speed of adjustment, indicating that the government's policy should be fully implemented within a period of more than one year, with a rapid pace of adjustment towards equilibrium.

The coefficient of QAHC is both positive and statistically significant, indicating a positive impact of QAHC on economic growth. In other words, an increase in QAHC leads to a corresponding increase in growth. The significant and positive coefficient of QAHC implies that labor with developed human capital is more productive and hence contributes more to economic growth. The results are consistent with the findings of Alderman et al. (1996); Gyimah-Brempong and Wilson (2004); Balach and Law (2015) and Sehrawat and Giri (2017). Human capital refers to the collective knowledge and skills possessed by individuals, which significantly contribute to enhancing productivity and are closely linked to economic growth and development. The enhancement of productivity is significantly influenced by the development of human capital through educational advancement. The allocation of resources toward the development of human capital has been widely recognized as a significant driver of economic growth and productivity in industrialized nations. One of the primary factors contributing to the high per capita GDP in Malaysia is the efficient allocation of resources toward human capital development. Human capital facilitates the adoption of advanced technology from foreign countries. Furthermore, it is worth noting that human capital plays a significant role in explaining the disparities observed in the production and growth rates of pertinent input indicators. Both human capital and trade openness have been found to have a positive impact on economic growth in Malaysia. The rise of knowledge-based economies is facilitated by human capital, which in turn contributes to economic growth. According to Romer (1990), the enhancement of qualities, abilities, and skills contributes to the economic growth of a nation, hence benefiting the economy. The relationship between human capital and output growth is mediated by the processes of input accumulation and technological advancement. The phenomenon of growing returns to scale is influenced by the rate of human capital growth, as human capital introduces externalities into the production process. Additionally, a clear relationship exists between investment (INV) and economic growth. The coefficient of INV is positive and statistically significant, indicating a positive impact of INV on economic growth. An increase in INV leads to a corresponding increase in growth. This is due to the fact that investment contributes positively to economic growth.

**Table 4.** ARDL results.

| Variables | Coefficients |
|---|---|
| Constant | 1.084*** [0.007] |
| QAHC | 0.197*** [0.006] |
| INV | 0.019** [0.028] |
| TO | 0.098*** [0.003] |
| EC (-1) | -0.652** [0.018] |

**Note:** Values in the [ ] are the p-values. ** and *** represents significant at 5% and 1% respectively.

## 5. Conclusion

Malaysia has demonstrated significant advancements in enhancing its human capital in recent years. To remain competitive with industrialized nations in the context of increasing global technology advancements, the country is prioritizing the enhancement of its human resources capabilities. Malaysia, as a nation abundant in resources, encounters a multitude of issues pertaining to its human capital, the enhancement of which is anticipated to exert a significant impact on the country's future productivity. Previous scholarly research has conducted individual investigations on the impact of human capital, specifically education level and health status, on economic growth. Furthermore, a significant amount of research is conducted to specifically investigate the impact of human capital on economic growth. To the best of our current understanding, this study represents the inaugural empirical investigation of the influence of human capital on economic growth. Furthermore, no research has been conducted to investigate this matter in the context of Malaysia. This study employed quality-adjusted human capital as a means to accurately measure the true value of human capital, as it is argued that quality has greater significance than quantity. In addition, this research employs quality-adjusted human capital as a means to measure human capital in Malaysia. Prior to this endeavor, there has been a lack of research conducted on the utilization of quality-adjusted human capital as a measure to capture human capital. Therefore, this research makes a substantial contribution to the existing body of literature by examining the impact of quality-adjusted human capital on the economic growth of Malaysia. The real growth rate in GDP is employed as a measure of economic growth. In addition, investment and trade openness are used as control variables. The study holds significance due to the pressing need for government policies aimed at enhancing the standard of living for the general population and effectively increasing productivity through the implementation of the development of human capital. This study utilizes a time series methodology to conduct a model analysis, wherein many tests are employed to assess the statistical significance of both the data and the model. The Unit Root test is utilized to assess the stationarity and stability of the data by applying it to each variable in the model. The empirical findings derived from the ARDL technique indicate a positive relationship between economic growth and various factors, namely human capital, investment, and trade openness.

To optimize the positive impact of human capital on economic growth in Malaysia, it is imperative to establish a comprehensive array of policy recommendations that encompass both the quantity and quality of human capital development. The allocation of resources towards education at all levels is of utmost importance. These investments should encompass not only the augmentation of enrollment rates but also the enhancement of educational quality, ensuring that students obtain the requisite information and skills necessary for the modern market. Moreover, it is crucial to enhance vocational training and opportunities for lifelong learning to guarantee a continuous improvement of skills and flexibility in the labor force. Furthermore, policy should strive to attract and retain skilled individuals by providing avenues for professional growth and entrepreneurial pursuits, alongside delivering competitive remuneration in the market and fostering a conducive business climate.

This study is limited to exploring the role of quality-adjusted human capital on the economic growth of Malaysia. In the future, studies may be carried out to explore the role of quality-adjusted human capital on economic growth in a panel data framework.

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