

## Investigating the role of governmental scholarships, technical training and R&D in the provision of better-quality education in Asia

Noorhapizah, Universitas Lambung Mangkurat, Jl. H. Hasan Basry, Banjarmasin, South Kalimantan 70123, Indonesia. E-mail: [noorhapizah@ulm.ac.id](mailto:noorhapizah@ulm.ac.id)

Amhar, Universitas Muhammadiyah Sumatera Utara, Jl. Kapten Muchtar Basri No.3, Medan, Sumatera Utara 20238, Indonesia. E-mail: [amhar@umsu.ac.id](mailto:amhar@umsu.ac.id)

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### Abstract

It is believed that the significance of various factors like the availability of training in technical terms, research and development expenditure, and government scholarships play a major role in increasing the quality of education. This study has been carried out in order to analyze the detailed impact of various variables on the quality of education in the region of Asia. For this purpose, data was collected over the last 26 years from various Asian economies while considering different databases and sources as well. After collecting the data, unit root test was used in order to analyze the cointegration. Furthermore, ARDL test was also applied in order to investigate the short run and long run relationship between the study variables. The findings of the study reveals the fact that there is a positive impact of selected explanatory variables on the quality of education in Asian economy. Furthermore, the authors conclude that various policy makers, and decision makers can use the present study in both theoretical and practical perspectives as well. However, various limitations are also associated with the present study.

Keywords: Asia ; government scholarship; quality of education research and development.

## 1. Introduction

It is believed that the quality of education receives much attention from the various policy makers in the region of Asia. Various economies in this continent are striving to improve education for a better and sustainable growth in their economies (Odalén, Brommesson, Erlingsson, Schaffer & Fogelgren, 2019). Furthermore, the development of the education sector is mainly observed in the East Asian economies while little attention is paid to it within the South Asian countries. In order to increase the potential outcomes from the key human resource through quality education, significant attention is still needed (Abadia Alvarado & De la Rica, 2020; Bibi, 2020; Abdi Zarrin et al., 2020; Abulela & Davenport, 2020; Ahmed et al., 2020; Adewumi, 2020; Antoni et al., 2020). Various studies specifically in the region of Asia were centred on the title ‘quality of education,’ which captures the impact of various variables (Zhang, Wang, Min, Chen, & Huang, 2016; Baharuddin & Dalle, 2019). Moreover, some other studies in other regions have also focused on the title ‘quality of education’ (Ghislandi & Raffaghelli, 2015; Zhang et al., 2016; Dlouhá & Burandt, 2015; Hopkins, 2015; Baharuddin et al., 2018; Dalle et al., 2017). However, while focusing on the quality of education, there is a significant need regarding the development of infrastructure along with the increase in investment on the human capital for sustainable development (Pelinescu, 2015; Tyndorf Jr & Glass, 2017; Dinda, 2016). To set the path towards sustainable development and prosperity, it is a pre-requisite for future researchers to consider studying ‘quality education’ in other countries as well ( Kruss, McGrath, Petersen, & Gastrow, 2015; Atalay, 2015; Elliott, Rhoades, Jackson, & Mandernach, 2015). Figure 1 below provides the trends regarding the international student enrolment in the Chinese region which indicates a good growth over the years from 2009 to 2018.

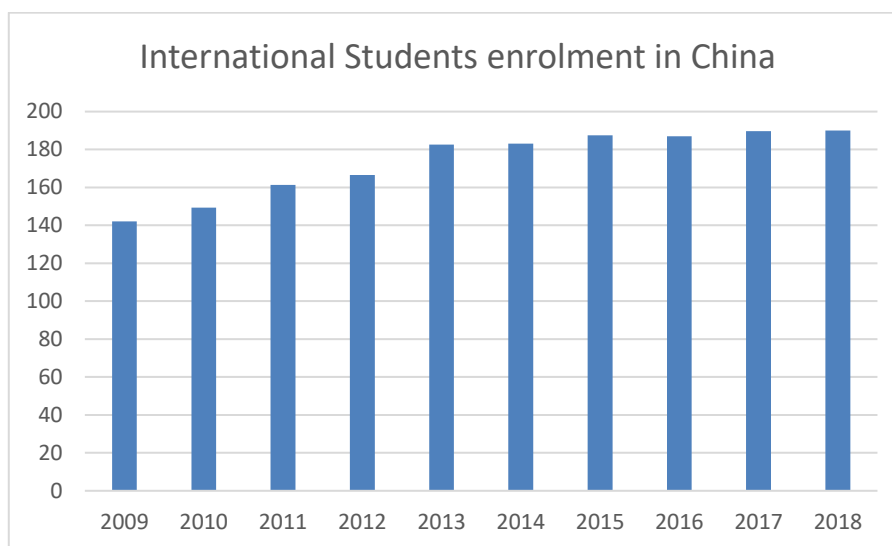


Figure 1. International Students over the Year Enrolment in China

### 1.1 Quality of Education

The title ‘quality of education,’ covers various dimensions. However, the most significant dimensions include learned faculty members, student learning and performance and quality of infrastructure. Almost a decade ago, educational quality was measured through total enrolment in different educational institutions. However, with the passage of time, there is a growing significance of human capital role towards sustainable development which is not possible without quality education. Furthermore, nourishing of the society has shifted towards the enrolment of quality learning in education as expressed by the research findings of Masino & Niño-Zarazúa (2016).

In addition, some other researchers have also provided their views about the quality of education. For example, Masino & Niño-Zarazúa (2016) have identified the three drivers which can affect the quality of education. These are supply side policy intervention, policies to provide incentives to teachers, students and households, and finally the diffusion of knowledge and decentralization along with the participation of the community members. Additionally, authors like Ali, Zhou, Hussain, Nair, and Ragavan (2016) also believed that good educational quality can lead to higher level of satisfaction from the students and could increase their loyalty to their institution as well. Furthermore, the level of student satisfaction through learning are the key components, which can reflect the quality of education as well. This study reviewed the literature while considering the stated explanatory variables in order to examine the trend in quality education.

### *1.2 Government Scholarship and Quality Education*

Akareem and Hossain (2016) have stated that the status of scholarship affects the students' perception of the educational quality. Their study scope only covers the data from five different universities which were working in the region of Bangladesh. The findings of their study reveal that there is a positive linkage between the quality of education and scholarship through different sources. Meanwhile, those students who are listed on scholarship tend to show higher level of educational quality comparatively to those who do not hold scholarships. In their study, Qayyum, Zipf, Gungor, and Dillon (2019) have identified the association between the quality of education and scholarship dynamics. Howard (2018) conducted a survey in order to analyse the educational program. It is observed that positive relationship exists between the financial aid and student attention towards learning and quality of education. Furthermore, previous literature has examined the fact that there is a significant need for the administration of community college about the effective role of financial aid and scholarships on the educational programs. Therefore, this study has also developed the following hypothesis in order to test the association between the scholarship and quality of education as well.

H1: Quality of education is significantly and positively linked with the government scholarship.

### *1.3 Quality of Education and Research and Development*

From previous literature, it is observed that with the help of innovation and increasing level of research and development, significant growth has been observed in the quality of education in different economies (Hasanov & Akbulaev, 2020; Sadowska & Wójcik-Jurkiewicz, 2020). Various institutes around the globe have reasonably increased their research capabilities through research and development efforts. Pandya (2016) on the other side has mentioned in his study that there is a non-present quality of research and development in the region of India. Meanwhile, there are traces of higher education in Indian history, but at the same time, there is a lack of research as well. Moreover, various researchers have proposed that teaching schools can deliver good standards of education through training and skills development of their staff (Walker, 2017; Harangus, Horváth & Szentes, 2020). As per the research findings of Arimoto (2016), it is believed that Japanese academics have their greater level of researchers comparatively to the teachers and they opted for full-fledged model of research orientation in their academics which is entirely opposite to USA where both academics and research orientation model exists. The next hypothesis is therefore:

H2: Research and development has a significant and positive impact on the quality of education in selected economies.

### *1.4 Quality of Education and Technical training*

A common notion is that technical training of the faculty members and teachers can play a critical role towards the quality of education (Alkan, 2020; Sedofia, & Kumassah, 2020). For this reason, the fundamental provision of knowledge and information is to help both students and teachers (Maigari & Arafat, 2019; Ozcan, 2019). Various NGOs and governmental organizations are involved in providing reasonable training facilities to different teachers and educational staff. For this reason, the significance of well-trained staff in the field of teaching cannot be ignored. Earlier studies through theoretical and empirical contribution have stated that quality of teaching at different educational institutions can be improved through training and technical assistance to the most valuable asset of the organization; human (Condon, Iverson, Manduca, Rutz, & Willett, 2016; Chalmers & Gardiner, 2015). Researchers like Boudersa (2016) have proposed that in the economy of Algeria, teachers are the most responsible persons because they diffuse knowledge to students through quality education. He further indicated that students may suffer due to poor technical knowledge from their teachers. Meanwhile, training plays an important role in academic institutes along with some e-learning applications which can significantly increase the level of satisfaction of the students as well (Supriyatno, Susilawati & Ahdi, 2020). Violante and Vezzetti (2015) have stated that e-learning models can improve the student satisfaction. They have conducted a survey through 3D medical device and concluded that students are most satisfied with e-learning compared to other models. Based on the above discussion, the following hypothesis has been developed and tested under present study.

H3: significant and positive impact of technical training on quality of education exists.

### *1.5 Objective of the study*

This study is focused on the impact of various indicators like technical training, research and development, and government scholarship on the quality of education in the region of South Asia. It is assumed that among other variables, government scholarships reasonably facilitate the equitable access of higher education for different individuals in any economy (Cosentino, Fortson, Liuzzi, Harris, & Blair, 2019; Altounjy et al., 2020; Dlalisa & Govender, 2020; Antoni et al., 2020; Berejena et al., 2020; Auriacombe & Sithomola, 2020; Basheka & Auriacombe, 2020). Additionally, the role of government scholarships and related programs in the low-income economies cannot be neglected, as it provides some significant level of opportunities for those students who cannot afford high tuition. Furthermore, the lack of training in terms of technical context specifically in the Asian institutes have affected the title of quality of education. Various universities and colleges are inclined towards the technical training of students as well as various faculty members, in order to improve the quality and understanding of education. Additionally, research and development also helps the teachers to improve their knowledge and also helps them to be innovative in providing quality education and creative learning methods in any country (Serdyukov, 2017; Brichieri-colombi, 2020; Grajetzki, 2020; Chan & Huang, 2020; Carolina-paludo et al., 2020; Codina et al., 2020).

Comparatively, in other OCED economies, the issue of quality of education in Asia is relatively stagnant. This is due to the fact that government is currently focusing on other sectors due to various reasons like low budget. This would justify the argument that quality of education is not only a hot issue in the Asian economies but also among other nations as well. Various researchers believe that this issue should be addressed on serious grounds as it has some disastrous impact on the learning of students. Although a range of studies have been conducted to address the issue of quality of education, there is a big gap in the Asian economies in this regard. More specifically, variables like government scholarship, technical training, and research and development to check the trends in quality of education are not widely observed in the Asian countries (Yildiz, Cengel & Alkan, 2020). Besides, no study has employed the regression model while examining the relationship between stated variables of the current study. For this

reason, this study has provided a good novelty in the recent literature and has considered the following objectives

- I. To determine the impact and role of scholarship from the government in the educational quality in Asian economies.
- II. To investigate the effect of key amount of technical training on the quality of education in the Asia.
- III. To analyse the effect of research and development on educational quality in Asia.

It is believed that quality education and relevant studies have their positive impression towards the policy implications in different economies (Dinda, 2016; Pelinescu, 2015; TyndorfJr & Glass, 2017). This is due to the fact that such studies enable the policy makers to consider the significance of quality of education during the time of policy formulation for the entire education sector. Moreover, earlier studies in the field of quality education provide a good level of theoretical education along with some practical frameworks as well. This study has also contributed in a similar way. Overall, this paper is organized into different sections where related to literature, the study methods being adopted, the results and discussion, while the last section covers the conclusion based on the recommendations and policy implication based on the study findings.

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## 2. Methodology

Under the present section, research methods have been discussed regarding the data collection and model specification. Details are provided below:

### 2.1 Data

In order to examine the study variables, data was collected for the three independent and one dependent variable of the study. The three dependent variables under the present study are known as government scholarships, amount spent on technical training, and finally the level of research and development being used in different educational institutions. Furthermore, the key dependent variable is known as quality of education. This study has considered two major control variables which are population growth and literacy rate. The data for the study variables was collected during 1990 to 2016 which indicates a total time duration of 26 years. This data set has specified the application of ARDL model for the time series analysis and overall data is collected for the 10 economies which includes, India, Pakistan, Iran, Japan, China, Jordan, Nepal, Lebanon, and Bangladesh as well.

### 2.2 Model Specification

In order to examine the relationship between the study variables, the title of population growth and literacy rate are observed as key control variables. In order to measure the research and development, technical training and amount of money spent, these variables are observed as key measurement for the education sector. Additionally, government scholarship is also observed through amount of money being spent by the government on this factor. Literacy rate is observed through percentage of children who are enrolled above the secondary level, where the level of population growth is measured through differences in the population, year to year. In addition, authors like Terziev and Can (2017) reflect the fact that population reasonably impacts the educational quality as well. Whereas, Kapur and Perry (2015), concluded that government facilities in any economy may facilitate and intervene in the educational field through government funds. Through their research contribution, Noaman, Ragab, Madbouly, Khedra, and Fayoumi (2017) have specified that technical and innovative advancement in the educational institutes

play a big role in the quality of education. A similar concept is shared by Gil-Flores, Rodríguez-Santero, and Torres-Gordillo, (2017) who have focused on the classroom environment and quality of teaching as well. Based on the above discussion, the following regression model is developed and empirically tested.

$$QE_t = \beta_0 + \beta_1 GS_t + \beta_2 TT_t + \beta_3 RD_t + \beta_4 PG_t + \beta_5 LR_t + \epsilon_t \quad (1)$$

Where  $QE_t$  indicates the dependent variable as observed through educational quality. This variable is measured through passing ratio in both secondary and higher examinations. In addition,  $GS_t$  shows the money being spent for the scholarship,  $TT_t$  represents the amount of expenditure in terms of dollars for the technical training, while  $RD_t$  reflects the amount spent by the government on level of research and development in the country. Finally,  $PG_t$  is the population growth rate as measured through year-to-year change in percentage.  $LR_t$  is the literacy rate or the percentage of population with a certain level of education. Finally,  $\epsilon_t$  is the error term.

Furthermore, all the study variables are transformed into natural log in order to address the issue of heteroscedasticity. For this equation 2 can be presented as follows:

$$\ln QE_t = \beta_0 + \beta_1 \ln GS_t + \beta_2 \ln TT_t + \beta_3 \ln RD_t + \beta_4 \ln PG_t + \beta_5 \ln LR_t + \epsilon_t \quad (2)$$

Where in the above equation 2,  $\beta_0$  reflects the constant term and  $\beta_i$  which have further range from 1 to 5 values for the long run elasticity with respect to various explanatory and control variables of the study.

### 2.3 Estimation Methodology

#### 2.3.1 Unit root test

For analysing the stationary data, unit root test is applied in order to determine the appropriate and designated model of the study. For this purpose, the present study has used LLC unit root test which specifies the stationarity of the data as suggested by Bornhorst & Baum, (2006).

#### 2.3.2 Bound test of co-integration:

In order to use the panel ARDL model, Pesaran, Shin, and Smith (2001) have proposed the model which investigates the presence of cointegration. Meanwhile, the bound test specifies a flexible test comparatively to other tests. To examine the long run relationship between the variables, Wald test or F-test is used through the following equation 3 below:

$$\Delta \ln QE_t = \beta_0 + \sum_{i=0}^p \beta_i \ln QE_{t-i} + \sum_{k=0}^k \beta_k \ln GS_{t-k} + \sum_{l=0}^l \beta_l \ln TT_{t-l} + \sum_{m=0}^m \beta_m \ln RD_{t-m} + \sum_{n=0}^n \beta_n \ln PG_{t-n} + \sum_{o=0}^o \beta_o \ln LR_{t-o} + \pi_{QE} \ln QE_{t-1} + \pi_{GS} \ln GS_{t-1} + \pi_{TT} \ln TT_{t-1} + \pi_{RD} \ln RD_{t-1} + \pi_{PG} \ln PG_{t-1} + \pi_{LR} \ln LR_{t-1} + v_t \quad (3)$$

Where the value of  $v_t$  indicates the error terms and  $\Delta$  means the short run. However, if the value of F-tests is higher than the upper bounds, then the researchers will reject the null hypotheses. This would justify the argument that there is a long run relationship between the study variables. After analysing the cointegration between the study variables, equation 4 and 5 helps to examine both long run and short run relationship between the study variables.

$$\ln QE_t = \alpha_1 + \sum_{i=1}^p \varphi 1_i \ln QE_{t-i} + \sum_{k=1}^q \omega 1_k \ln GS_{t-k} + \sum_{l=1}^r \vartheta 1_l \ln TT_{t-l} + \sum_{m=1}^s \phi 1_m \ln RD_{t-m} + \sum_{n=1}^u \delta 1_n \ln PG_{t-n} + \sum_{o=1}^v \delta 1_o \ln LR_{t-o} + \mu_t \quad (4)$$

$$\ln \Delta QE_t = \gamma_0 + \sum_{i=1}^p \gamma 1_i \Delta \ln QE_{t-i} + \sum_{k=1}^q \gamma 1_k \Delta \ln GS_{t-k} + \sum_{l=1}^r \gamma 1_l \Delta \ln TT_{t-l} + \sum_{m=1}^s \gamma 1_m \Delta \ln RD_{t-s} + \sum_{n=1}^u \gamma 1_n \Delta \ln PG_{t-n} + \sum_{o=1}^v \gamma 1_o \Delta \ln LR_{t-o} + \psi ECT_{t-1} + \mu_t \quad (5)$$

where  $ECT_{t-1}$  is error correction term.

### 3. Results and Analysis

As discussion, it is stated that the present study has utilized the LLC unit root test in order to examine the integration, in order to make sure that all the study variables are stationary where the results are presented under Table 1 of the study. For this purpose, values at level and at first difference are given and discussed as well. For this reason, the significance of unit root test cannot be ignored. The study findings have confirmed the fact that only the coefficient of technical training at level is not significant while all other variables have their significant coefficients both at level and first difference as well.

Table 1. LLC unit root

Constructs	LLC Test	
	Level	1 <sup>st</sup> diff.
Government scholarship	-1.212*	-11.217***
Technical training	-0.318	-10.041***
Research and development	-3.632*	-14.482***
Population growth	-3.852*	-16.847***
Literacy rate	-1.634*	-9.624***
Quality of education	-3.824*	-13.352***

Table 2. Cointegration Test

O.P.L. values at length (A.I.C)	(2,0,0,0,0)		
F-test score	29.3852***		
C.V in terms of percentage	1%	5%	10%
L.B.C.V. score	3.45	2.43	1.89
U.B.C.V. score	4.87	4.01	3.62

In this table, \*represents the significance level at 10%. The optimal lag is selected using the A.I.C test result.

The optimal lag length was selected for the AIC criteria which specifies the second row of Table 2. Meanwhile, F-test computed for ARDL shows the evidence for the existence of cointegration between the study variables. Additionally, the bound critical values also ensure the presence of cointegration.

Table 3. Panel ARDL

Run Long Results	B	t-value	Summary & Diagnostic Test	
QE	1.842***	-	R <sup>2</sup>	0.721***
QE (-1)	0.238	-	Adj. R <sup>2</sup>	0.693***
QE (-2)	1.264***	-	D.W.	1.95
GS	0.259	4.263**	X <sup>2</sup> SC	4.375 (0.356)
TT	0.274	3.455**	X <sup>2</sup> W	1.495 (0.659)



RD	0.243	5.409**	X <sup>2</sup> AR	2.593 (0.089)
PG	0.290	4.306**		
LR	0.022	1.398**		
C	2.487	9.388***		
Short Run Results	B	t-value	Summary & Diagnostic Test	
GS	0.387	3.496**	R <sup>2</sup>	0.704***
TT	0.295	3.394**	Adj. R <sup>2</sup>	0.674***
RD	0.322	4.397**	X <sup>2</sup> SC	2.295 (0.298)
PG	0.287	2.958**	X <sup>2</sup> W	4.984 (0.852)
LR	0.209	3.474**	X <sup>2</sup> AR	3.472 (0.066)

In addition, Table 3 indicates the results for the coefficient of both short run and long run as well. Meanwhile, the quality of education is observed as main dependent variable. Meanwhile, the value of long run elasticity for the government scholarship on the quality of education is significantly positive. This would justify the argument that one unit increase in the value of government scholarship leads to increase in the value of 0.259 percent in quality of education while keeping other variables as constant.

#### 4. Discussions

This study explores the role of selected explanatory variables on the quality of education in the various economies. For this purpose, data was collected from different sources for all the study variables. It is believed that government scholarship, technical training, and other indicators have their key contribution towards the quality of education. To address this study objective, various hypotheses were examined. The first study hypothesis was to examine the relationship between government scholarship and quality of education in the selected economies. The findings of the study show that first hypothesis has been accepted which indicates that government scholarship is positively impacting on the quality of education. This result is consistent with the past studies as conducted by (Akareem & Hossain, 2016).

Meanwhile, the second hypothesis of the study is to explore the association between educational quality and technical training. The results of the study show that there is a positive and significant impact of technical training on the quality of education. Moreover, this result is also consistent with the earlier studies as presented by (Foroudi, Jin, Gupta, Melewar, & Foroudi, 2016; Kelkay, Sahile, Mola & Yeshiwass, 2020).

Additionally, the third study hypothesis was to explore the relationship between the research and development expenditure and quality of education. The findings show that this hypothesis is also accepted due to significant and positive relationship between the study variables as findings are consistent with the outcomes as presented by ( Park, Lee, Jin, Shen, & Kim, 2015). Finally, the results for the control variables like population growth and literacy rate have also shown a positive impact over the main dependent variable of the study.

#### 5. Conclusions

It is observed that education is playing its vital role for the development of any economy. In the present study, three explanatory variables like technical training, government scholarship, and research and development are observed in order to analyse the trends in quality of education over the last 26 years for the selected economies. The findings through unit root test, cointegration test, and ARDL model have provided some good outcomes. The results are provided through variable tables and figures. As per the study findings there is a positive and significant impact of government scholarship, technical training, and



research and development on the quality of education. For this reason, current study has provided various theoretical, practical, and empirical implications along with some limitations as well.

### 5.1 Implications

The current study has provided various implications which are theoretical and empirical in nature. The theoretical implication of present study is to help various policy makers who are directly or indirectly analysing the role of government scholarship, technical training and research and development for the higher quality of education specifically in the region of Asia. In addition, this study has provided its theoretical implication while contributing to existing body of literature. This would indicate that through its contribution present study will cover the major gap in terms of exploring the relationship between the government scholarship, technical training, and research and development parameters.

### 5.2 Limitations and Future research recommendations

Although the present study has provided some good managerial implications, however, various limitations are also associated to it. The first limitation under the present study is that sample size is considered only from the 10 economies while no other economies are under consideration either from developed or developing economies. This has provided a significant limitation which can be observed in the upcoming studies. Secondly, this study has considered only three explanatory variables which are government scholarships, technical training, research and development. The third limitation of the current study is observed in a sense that it has limited implication which is observed in the Asian economies as well. Future studies are highly suggested to focus on the above limitations in order to provide more generalization of the findings with better implication as well.

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