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Human capital impact on China-ASEAN cross-border trade

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ABSTRACT

With the implementation of the Belt and Road Initiative and RCEP, the economic and trade cooperation between China and ASEAN is deepening, and the position of China and ASEAN countries in their cross-border trade is becoming increasingly important. In international trade and its division of labour, the impact of a country's human capital on its trade development is crucial. This article uses panel data between China and ASEAN from 2000 to 2021 and uses a fixed effects gravity model to analyse the impact of human capital factors on China-ASEAN cross-border trade. The results show that human development index has a significant negative effect on ASEAN imports from China, but significant promoting effect on ASEAN exports to China. The tertiary level enrolment has an insignificant negative effect on ASEAN imports from China, and an insignificant promoting effect on ASEAN exports to China. Policy recommendations were proposed based on the results.

1.0 INTRODUCTION

China and ASEAN signed the "China ASEAN Comprehensive Economic Cooperation Framework Agreement" in 2002 and completed the construction of the China ASEAN Free Trade Area in 2010, creating a stable political and economic environment for the development of bilateral trade between China and ASEAN. Since 2009, China has been ASEAN's largest trading partner for 14 consecutive years. At the same time, since 2020, ASEAN has become China's largest trading partner for three consecutive years, surpassing the European Union and the United States. In the past decade, the trade volume between China and ASEAN has increased from $443.6 billion in 2013 to $975.3 billion in 2022, with an average annual growth rate of 9.1% (Association of Southeast Asian Nations, 2023).

The Regional Comprehensive Economic Partnership Agreement (RCEP) came into effect on January 1, 2022, injecting new impetus into economic and trade cooperation between China and ASEAN.

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According to the National Bureau of Statistics of China (2023) statistic, in the first half of 2023, the proportion of imports and exports from ASEAN to China's total imports and exports to other RCEP members increased to 50.5%. Under the RCEP framework, the level of trade facilitation has been improved, the integration of industrial and supply chains has accelerated, and the confidence of China ASEAN enterprises in conducting cross-border cooperation has been continuously enhanced.

Most ASEAN countries are close neighbours of China by the sea, and both sides have obvious complementary advantages. China has maintained its position as the largest trading partner of ASEAN for 14 consecutive years, and ASEAN has also surpassed the European Union and the United States as China's largest trading partner for 3 consecutive years. The trade between China and ASEAN countries has shown rapid growth. In 2000, ASEAN accounted for only 8.33%, 6.96%, and 9.85% of China's total trade, exports, and imports respectively. The performance of the above indicators in 2021 increased to 14.52%, 14.37%, and 14.7% respectively. Figure 1 shows the development process of China ASEAN in import and export trade over the past 22 years.

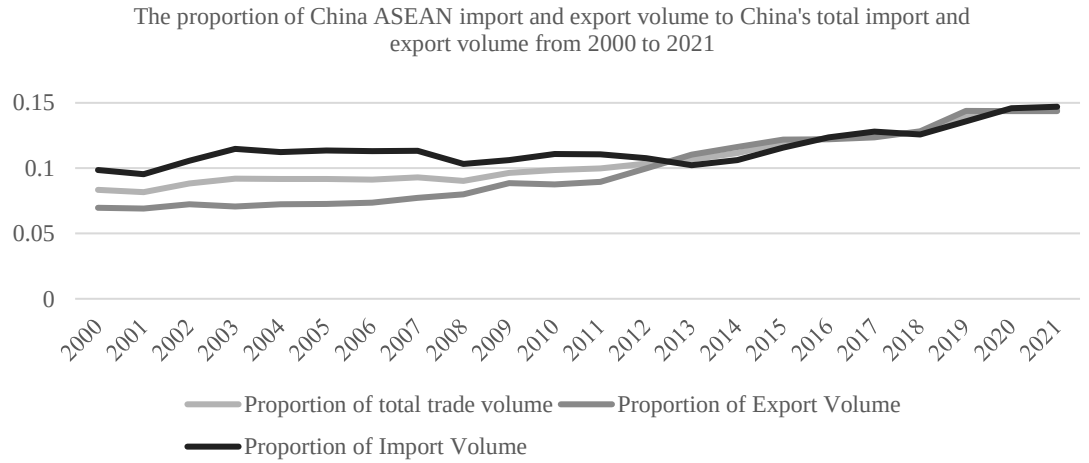

Fig. 1. The proportion of China ASEAN import and export volume to China's total import and export volume from 2000 to 2021.
Source: National Bureau of Statistics of China (2023)

The import and export trade between China and the 10 ASEAN countries shows significant country differences. In 2021, Vietnam's total trade in goods with China reached $230.2 billion, accounting for 26.2% of the total trade between China and ASEAN, ranking first. Next are Malaysia, Thailand, Indonesia, Singapore, and the Philippines. While the total trade in goods between Myanmar, Cambodia, Laos, and Brunei and China accounts for less than 5% of the 10 ASEAN countries.

In cross-border trade business, various processes such as product research and development, marketing, logistics, and customer service are largely influenced by human capital. Enterprises with higher levels of human capital can better participate in cross-border trade activities. As they continue to participate in cross-border commerce, investment, and economic collaboration, it becomes clear that the role of human capital, generally defined as the workforce's knowledge, skills, and experiences, is critical to the relationship's long-term success (Zhao et al., 2017). In the study of the relationship between human capital and international trade, some studies have presented a positive correlation between human capital and trade (Hwang and Lee, 2021), while others have not found a correlation (Pata & Caglar, 2021) and some have

even identified a negative correlation (Ali et al., 2022). These inconsistencies in research results indicate that further research is needed to fully understand the role of human capital in cross-border trade.

The bilateral trade cooperation between China and ASEAN countries is becoming increasingly important. With the signing and implementation of RCEP, cross-border trade cooperation between China and ASEAN countries is facing new challenges and opportunities. At present, China and ASEAN countries still participate in international trade mainly in primary technology products. The human capital of a country plays a certain role in its economic development and participation in international division of Labour (Sima et al., 2020).

Although China and ASEAN nations' educational attainments have been rising in recent years, there are still significant labour skill shortages and uncoordinated labour markets. The educational quality of the 10 ASEAN countries shows individual heterogeneity and uneven development. The Human Capital Index released by the World Economic Forum points out that the overall ranking of the ASEAN region is lower than the world average, with countries such as Myanmar, Cambodia, and Laos ranking last globally in the human capital index (World Economic Forum, 2020). Although ASEAN has made significant progress in economic growth and international integration, the prominent issues related to human capital development hinder the maximum realization of cross-border trade potential in the region. As the Sustainable Development Goals (SDGs) prioritize the education progress while developing the economy (Friedman et al., 2020), is it crucial to investigate the effects of human capital on cross-border trade between China and ASEAN nations.

The remaining sections of this study are structured as follows. First, in section 2, several related literatures that discuss the cross-border trade and human capital. Next, the methods used in estimating and analyse the effect of human capital factors on China-ASEAN countries highlighted in Section 3. Then, the conclusions estimated, and suggestions will be discussed in Section 4.

2.0 LITERATURE REVIEW

Many scholars have conducted research on cross-border trade between China and ASEAN, but most have focused on macroeconomic factors and trade facilitation, with little involvement in the impact of human capital on trades.

2.1 Cross-border trade between China and ASEAN countries

Cross-border trade refers to the transaction of goods and services between two or more countries, which is an important driving force for the economic development of countries in the international trading system. The article is based on the narrow concept of cross-border trade in goods.

Several scholars have conducted research on economic and trade cooperation between China and ASEAN, mostly focusing on relevant policy agreements and influencing factors between China and ASEAN. Zhai (2023) believes that the establishment of the China ASEAN Free Trade Area has a positive impact on bilateral trade among members. Meanwhile, Quan Yi et al. (2014) proposed to promote the construction and upgrading of the China ASEAN Free Trade Area by improving the trade facilitation and two-way investment level of countries along the "the Belt and Road". Moreover, Nguyen et al., (2016) study also indicates trade facilitation needs and priorities that vary between ASEAN members.

With the continuous promotion of CAFTA, the reduction of trade barriers between China and ASEAN and the simplification of customs clearance procedures have led to more literature focusing on the impact of trade facilitation on bilateral trade. For instance, He Min et al. (2015) used gravity and marginal effects models to explore the impact of infrastructure connectivity on cross-border trade between China and ASEAN. Meanwhile, Foo (2020) used as a gravity model to empirically study the smooth trade between

China and ASEAN. The results showed that economic development, population size, preferential trade policies, and coastal characteristics of countries are factors that promote the smooth trade between the two sides. From the previous study, transportation distance found to be a core variable that hinders trade circulation, and the appreciation of the RMB also restricts the development of bilateral trade to a certain extent. Qiao (2023) adopted the China-ASEAN trade volume as the research object, establishes the trade facilitation evaluation index system and showed the level of trade facilitation has an important impact on the bilateral trade between China and ASEAN. Petri and Plummer (2020) explored the potential trade creation and transfer effects of RCEP on ASEAN countries and evaluated the gains or losses of trade using a general equilibrium model.

2.2 Definition of human capital

Human capital, also known as "intangible capital", is the capital reflected in workers, such as their knowledge and skills, cultural and technological level, and health status. The core of human capital is to improve the quality of the population, and education is the most important means to improve human capital. Through education, the quality of labour, the work ability and technical level of workers can be improved, thereby improving labour productivity (Buzavaite & Korsakiene, 2019).

Numerous scholars' empirical and empirical studies have shown that human capital is an important factor affecting international economic growth differences, and the stock differences of human capital determine the wealth differences between countries. Lin et al. (2021) believed that human capital always has a significant positive impact on total output.

From the perspective of endogenous growth theory, on the one hand, human capital, as a factor of production, directly participates in social division of labour, and its own knowledge spillover and factor complementarity can improve labour productivity and affect economic growth (Romer, 1986). This theory consistent with Fleisher and Zhao (2010), which stated that human capital, including education, positively influences output and productivity growth across provinces. This study finds both direct and indirect effects of human capital on TFP growth. The direct effect is attributed to domestic innovation activities, while the indirect effect is a spillover effect of human capital on TFP growth. On the other hand, human capital indirectly affects economic growth through its participation in research and development, technological innovation, and social division of labour (Nelson & Phelps, 1966). Zhang et al. (2023) found in their research high-quality human capital is essential to support an innovation-driven economy in China.

According to the theory of heterogeneous trade among enterprises, the productivity of different enterprises exhibits differentiation. Melitz (2003) pointed out that trade shocks will reconfigure market share among export enterprises, thereby affecting their demand for skilled workers. Generally, export enterprises hire more skilled workers than non-export enterprises, thereby increasing the demand for skilled human capital. In addition, due to the need to expand production scale, export enterprises are more likely to enhance their technological level to gain strong international competitiveness; On the contrary, non-export enterprises experience technological regression due to reduced production.

However, research on the impact of human capital on bilateral trade between China and ASEAN is still insufficient. This article will explore the current situation of human capital in ASEAN countries and its impact on bilateral trade between China and ASEAN, based on the level of higher education and the Human Development Index.

3.0 THEORETICAL BACKGROUND AND MODEL CONSTRUCTION

This article is based on the trade gravity model and uses trade data between China and ASEAN from 2000 to 2021. Through empirical analysis methods, it studies the impact of human capital in ASEAN countries on bilateral trade between China and ASEAN.

The gravity model originated from Newton's "universal gravitation" law in physics. Tinbergen's early gravity model mainly included two types of explanatory variables, one being variables that measure market size, such as GDP, per capita GDP, population size (Gross & Friedmann, 1964). The second is to measure variables of geographical location, such as the distance between capitals and whether the country borders. The early expansion of the gravity model of trade was mainly reflected in studying the impact of regional economic cooperation on bilateral trade flows and predicting trade potential. The extended gravity model adds explanatory variables to measure other factors, such as adding exchange rates and tariff levels to examine the impact of domestic conditions in various countries on bilateral trade. The basic equation is as follows:

$$T_{ij} = a * \frac{g_i g_j}{D_{ij}} \quad (1)$$

In the equation, T_{ij} represents annual bilateral trade volume between country i and j, a represents a constant term, g_i is the GDP of country i, g_j is the GDP of country j, and D_{ij} indicates the geographical distance of the capitals between country i and country j.

For the convenience of calculation, when applying a gravity model, the variables in the above formula are usually logarithmically processed to obtain a linear estimation equation, and regression estimation is performed on this basis.

$$LnT_{ij}=\beta_0 + \beta_1 Ln(g_i g_j) + \beta_2 LnD_{ij}+\mu_{ij} \quad (2)$$

β_0 is a constant term, β_1 and β_2 represents the elastic coefficients of $g_i g_j$ and D_{ij} respectively, with μ_{ij} as the error term.

The gravity model has proven its stability and explanatory power for trade flows in widespread applications. In addition, researchers have enriched and expanded the trade gravity model by adding other relevant variables to the model, enhancing its practicality and explanatory power for dependent variables. Based on the research of domestic and foreign scholars, this study takes the exports and imports of China and ASEAN countries as dependent variables, selects tle and hdi, proxies for human capital, as core explanatory variables, and selects per capita GDP, population, tariffs, and trade distance as control variables to establish a new gravity model. Model 1 and Model 2 are designated as:

Model 1:

$$import(i,j)_{it} = \beta_0 + \beta_1 hdi_{it} + \beta_2 tle_{it} + \beta_3 gdp_{it} + \beta_4 pop_{it} + \beta_5 taf_{it} + \beta_6 dis_{it} + \varepsilon_{im,it} \quad (3)$$

Model 2:

$$export(i,j)_{it} = \beta_0 + \beta_1 hdi_{it} + \beta_2 tle_{it} + \beta_3 gdp_{it} + \beta_4 pop_{it} + \beta_5 taf_{it} + \beta_6 dis_{it} + \varepsilon_{ex,it} \quad (4)$$

$import(i,j)_{it}$ represents the volume of goods trade that ASEAN nation i import from China in the year of t, and $export(i,j)_{it}$ represents the volume of goods trade that ASEAN country i export to China in the year of t. hdi_{it}indicates the human development of country i, tle_{it} indicates the tertiary level enrollment of country i, gdp_{it} indicates the GDP per capita of country i, pop_{it} represents the population size of country i, the tariff level is represented by taf_{it}, trade distance between China Beijing and each ASEAN country's capital is represented by dis_{it}, while the $\varepsilon_{im,it}$ and $\varepsilon_{ex,it}$ indicate the white noise or errors.

Table 1. Description of Variables

Variables	Description	Expected results	Source
import	Annual volume of cross-border trade goods that ASEAN nation i import from China	/	National Bureau of Statistics of China (2023）
export	Annual volume of cross-border trade goods that ASEAN country i export to China	/	National Bureau of Statistics of China (2023)
hdi	Human development index, multiply hdi of each ASEAN countries by hdi of China in that year	+/-	UNDP (2023)
tle	Tertiary level enrolment, percentage of gross	+/-	The World Bank (2023)
gdp	Per capita GDP	+	The World Bank (2023)
pop	The population statistics of ASEAN countries	+/-	The World Bank (2023)
taf	The tariff level between China and ASEAN countries	-	The World Bank (2023)
dis	A proxy for transport cost, multiply the distance between the two capitals by the Brent crude oil price of that year	-	CEPII,Energy Information Administration

All the selected variables in this study were processed by stata, and the panel data ranged from 2000 to 2021. Table 1 shown the data sources, descriptions and expected results. Figures 2 have shown the annual total trade value between ASEAN countries and China, it presented a pleasant increasing in the past years. Among ASEAN countries, Vietnam, Malaysia, and Thailand are the top three ranked trade partners with China, while Brunei, Lao's and Cambodia are the three smallest trading partners.

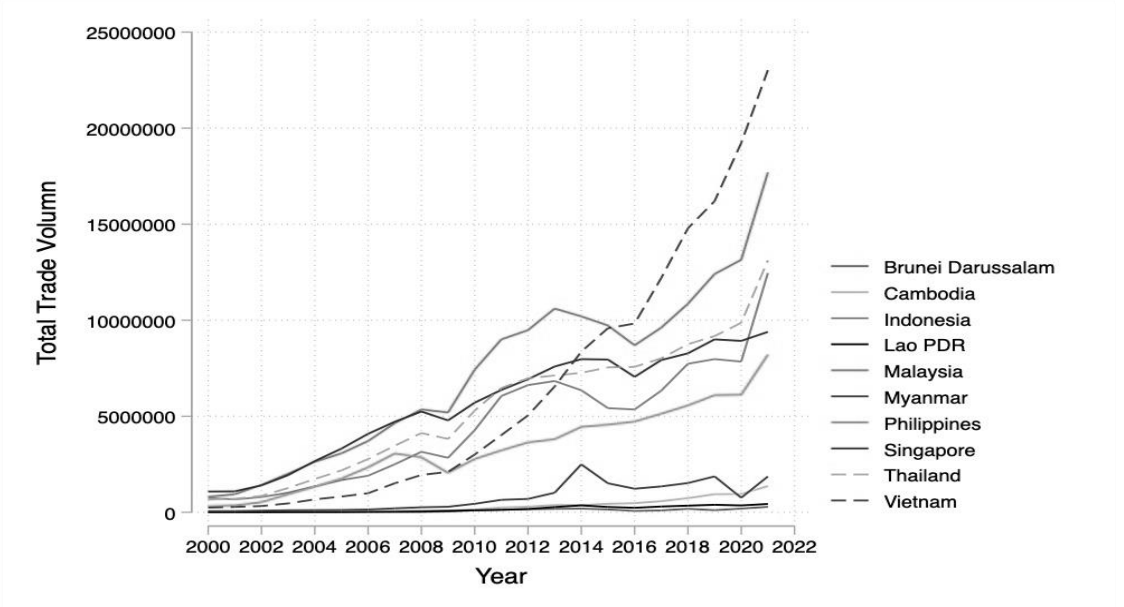

Fig. 2. Annual Total Trade Volume of Each Ten ASEAN Countries with China during 2009-2021 (US $ 10 thousand)
Source: National Bureau of Statistics of China (2023)

Figure 3 presented the import and export structure between ASEAN countries and China in 2021. Vietnam, Thailand, Singapore, Philippines, Myanmar, and Cambodia are China's trade deficit countries, while the rest ASEAN countries are the trade surplus countries of China.

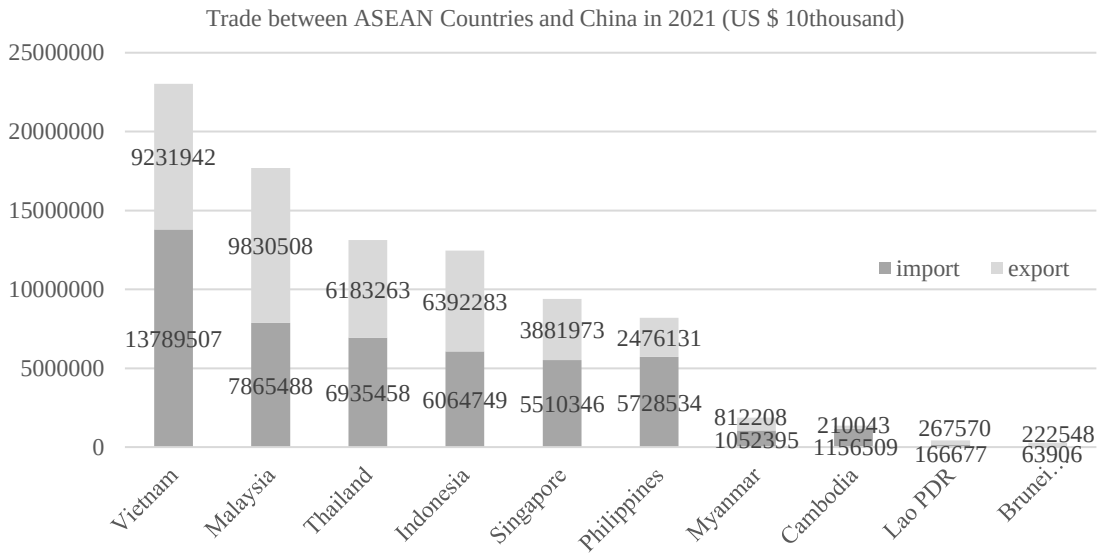

Fig. 3. Trade Volume between ASEAN Countries and China in 2021 (US $ 10thousand)
Source: National Bureau of Statistics of China (2023)

3.1 Econometric approach

To estimate the impact of human capital on bilateral trade between China and ASEAN countries, this study uses the panel data from 2000 to 2021. This study first conducted inter group heteroscedasticity test, inter group autocorrelation test, and inter group contemporaneous correlation test on panel data. Due to the presence of heteroscedasticity and autocorrelation in the data, this article uses the fixed effects of Driscoll Kraay estimator for regression to overcome cross-sectional and temporal correlations and improve the robustness of the results (Yassin et al., 2021).

3.2 Estimation results

Before estimating the model, to reduce the impact of heteroscedasticity, and for the convenience of calculation, logarithmic processing of absolute variables imports, export, gdp, pop, taf and dis in variables. Table 2 shows the description of variables, averages are quantified as lnimport(8.552), lnexport(8.182), hdi(0.683), tle(0.300), lngdp (8.082), lnpop (5.421), lntaf (2.998) and lndis (2.998).

Table 2. Descriptive Statistics of Variables

Variable	Mean	Std.dev.	Min	Max
lnimport	8.552	2.038	2.566	11.83
lnexport	8.182	2.378	1.859	11.50
hdi	0.683	0.129	0.41	0.943
tle	0.300	0.209	0.024	0.952
lngdp	8.082	1.525	4.879	11.26
lnpop	5.421	1.795	1.206	7.915
lntaf	1.346	1.327	-3.219	2.845
lndis	2.998	0.527	1.739	4.064

Firstly, conduct the panel unit root test on the Panel data using IPS stability test. Learn from Table 3 that all data reject the original hypothesis at second-order difference, which indicates that there is no Root of unity problem, and the panel data sequence is stable.

Table 3. Results of Unit Root Test

	IPS Test		
	Level	1st difference	2nd difference
lnimport	0.0728	-6.9964***	-8.5042***
lnexport	-1.4969*	-5.9381***	-7.9481***
hdi	12.8856	0.5594	-4.8190***
tle	1.7359	-5.7809***	-8.6757***
lngdp	3.4350	-6.2487***	-8.4330***
lnpop	5.3771	0.6493	-4.7076***
lntaf	-3.6738***	-7.7462***	-9.2698***
lndis	-0.7394	-6.4962***	-7.3160***

Source: Computed by author. (*) significant at the 10% level, (**) significant at the 5% level, and (***) significant at the 1% level.

The diagnostic test is employed to investigate the issue of serial correlation and the presence of heteroscedasticity, as shown in Table 4. The model in this paper has concerns with inter group synchrony, as seen in Table 4; the Breusch Pagan LM test was then applied to find cross-sectional dependencies in the data. The findings demonstrate that when evaluating China and ASEAN panel data, the error structure is anticipated to be heteroscedasticity, autocorrelation, and synchronicity due to a likely connection across groups (Hoechle, 2007).

Table 4. Diagnostic Tests

Model	1	2
Wooldridge test	0.708	42.135***
Modified Wald	760.11***	369.98***

Source: Computed by author. (*) significant at the 10% level, (**) significant at the 5% level, and (***) significant at the 1% level.

Table 5. Cross-Sectional Dependence Tests

		Breusch-Pagan LM test	Pesaran's test	Frees test
Mode1 1	FE	164.339***	1.623	1.246
	RE	222.341***	9.535***	1.898
Model 2	FE	152.962***	0.718	1.267
	RE	153.936***	0.493	1.290

Source: Computed by author. FE and RE present fixed and random effect estimations respectively.
(*) significant at the 10% level, (**) significant at the 5% level, and (***) significant at the 1% level.

Using B-P test to determine whether a mixed POLS or a variable coefficient model, seen from the result of chibar2(01) = 593.03, Prob > chibar2 = 0.0000, it's better to use a variable coefficient model. Then use Hausman test to determine whether a fixed effect model or random effect model, results show this study is applicable to fixed effects models. To produce a convincing result, the standard error estimation in models 1 and 2 utilizing the Driscoll Kraay estimator is resistant to common types of cross-sectional and time dependency (Hoechle, 2007). For the convenience of comparison, Table 6 and Table 7 show the regression results of Model 1 and Model 2 respectively.

This article presents the mixed POLS effect model, fixed effect model, random effect model and fixed effect model with Driscoll Kraay estimator in Table 6 to allow the comparison of estimate findings. The regression results in Table 6 show significant negative correlations between variables hdi and lnimport. The results under Driscoll Kraay FE model are in line with fixed effect model, which present that ASENA countries with 1 per cent higher Human Development Index will cause 8.643 per cent decreasing on its export to China. A country with a higher Human Development Index, indicating the country with better educated and skilled Labour, which is more likely to develop its technology and generate high-value goods

and services. This increased productivity and capacity for innovation may result in a reduction in dependency on imports in specific areas or industries.

Table 6. Measurement Results of Extended Gravity Model 1

	POLS	FE	RE	FE Drisc/Kraay
hdi	-2.806	-8.643***	-1.636	-8.643***
	(2.588)	(2.132)	(2.046)	(1.840)
tle	2.605***	-0.502	2.226***	-0.502
	(0.554)	(0.692)	(0.629)	(0.774)
lngdp	0.840***	0.665***	1.128***	0.665***
	(0.254)	(0.129)	(0.166)	(0.136)
lnpop	1.016***	-0.555	1.313***	-0.555
	(0.0606)	(0.892)	(0.0754)	(1.128)
lntaf	-0.0766	-0.191***	-0.300***	-0.191***
	(0.0660)	(0.046)	(0.0549)	(0.050)
lndis	0.478***	3.994***	0.445***	4.483
	(0.148)	(0.528)	(0.0878)	(2.982)
_cons	-3.943***	1.125	-8.161***	0
	(0.660)	(4.366)	(0.717)	(0)
Hausman	chi2(6) = 91.31, Prob > chi2 = 0.0000			
R-sq	0.854	0.9402		
F	214.5	83.98		

Source: Computed by author. FE and RE present fixed and random effect estimations respectively.
(*) significant at the 10% level, (**) significant at the 5% level, and (***) significant at the 1% level.

Table 7. Measurement Results of Extended Gravity Model 2

	POLS	FE	RE	FE Drisc/Kraay
hdi	-0.0722	13.12*	2.856	13.12*
	(2.541)	(3.497)	(2.520)	(4.973)
tle	0.381	1.487	-1.570**	1.487
	(0.544)	(1.135)	(0.799)	(1.190)
lngdp	1.416***	1.757***	1.612***	1.757***
	(0.249)	(0.212)	(0.199)	(0.177)
lnpop	1.302***	5.094***	1.534***	5.094***
	(0.0595)	(1.463)	(0.124)	(1.229)
lntaf	-0.0328	-0.403***	-0.246***	-0.403***
	(0.0648)	(0.075)	(0.0655)	(0.110)
lndis	-0.187	-2.773***	-0.156	-17.76***
	(0.146)	(0.866)	(0.103)	(3.342)
_cons	-9.783***	-34.468***	-13.84***	0
	(0.648)	(7.161)	(0.978)	(0)
Hausman	chi2(6) = 16.41, Prob > chi2 = 0.0117			
R-sq	0.899	0.8566		
F	317.6	27.74		

Source: Computed by author. FE and RE present fixed and random effect estimations respectively. (*) significant at the 10% level, (**) significant at the 5% level, and (***) significant at the 1% level.

The regression results of variable tertiary level enrolment present significant positive correlation with lnimport under POLS but show insignificant negative correlation with lnimport under fixed effect model

and Driscoll Kraay FE model. According to the results of fixed effect model, a country with a higher tertiary level enrolment in ASEAN countries, presents the high education of human capital in the country, similar with the variable of human development index, the increased productivity will reduce ASEAN countries' imports from China.

Meanwhile, as shown in table 7, the regression results show insignificant negative correlation between hdi and lnexport under POLS, but present significant positive correlations at the 10% level between hdi and lnexport under fixed effect model. The results under Driscoll Kraay FE model are in line with fixed effect model, which demonstrate that ASENA countries with 1 per cent higher Human Development Index will cause 13.12 per cent increasing on its export to China. A country with a higher Human Development Index has a higher knowledge and skilled Labours, which is conducive to improving the country's productivity and producing more goods, thereby promoting exports.

At the same time, the regression results display insignificant positive correlations between variables tle and lnexport. Similarly with the variable of Human Development Index, ASEAN countries with higher tertiary level enrolment, means there are more skilled Labours and the ability to produce more products, the increased productivity will probably increase its export to China.

In analysing the control variables, firstly, ASEAN partner countries' GDP, per capita, shows a positive and statistically significant impact on both imports and exports with China. Higher per capita GDP in both ASEAN and China increases their consumption capacity and demand for bilateral trade. This symbiotic economic relationship underscores the mutually advantageous aspects of trade between these regions. Secondly, with the increase in China's population, a larger Labour force is available to produce a greater quantity of goods, ultimately promoting exports to ASEAN countries. Thirdly, the tariff exhibits a significant negative impact on imports and exports between ASEAN countries and China. Tariffs are significant trade barriers between nations, significantly raising the price of commodities while indirectly lowering the comparative advantages of imports and exports, ultimately resulting to reduced trade flow.

Conversely, the distance variable presents a significant negative impact on ASEAN countries' exports to China, consistent with expectations. The greater the trade distance, the higher the corresponding transportation costs, posing a hindrance to the escalation of trade volumes. However, this variable presents a positive but statistically insignificant impact on ASEAN countries' imports from China.

4.0 CONCLUSION AND RECOMMENDATION

This study extends the literature on the influence of human capital variables on cross-border commerce between China and the ASEAN countries. The research findings indicate a significant negative correlation, at the 1% level, between HDI and lnimport in ASEAN countries. A higher human development index reflects a high quality of human capital, denoting a well-educated and skilled Labour force, thereby enhancing a country's productivity, and reducing its reliance on foreign goods and imports. Conversely, there is a significant positive correlation, at the 10% level, between HDI and lnexport in ASEAN countries. This suggests that a higher human development index in ASEAN countries boosts their productivity and facilitates increased exports to China. Meanwhile, results from a fixed-effect model using the Driscoll Kraay estimator indicate that TLS exhibits a negative correlation with lnimport and a positive correlation with lnexport, but these correlations are statistically insignificant. Meanwhile, the number of students enrolled in tertiary education in ASEAN nations serves as an indicator of the nation's human capital quality, much like the HDI. These factors collectively influence import and export patterns between ASEAN nations and China.

This study offers the following policy implications based on our findings. First, by boosting education and skill development, China and ASEAN nations may remodel their commercial relationship into one that is more balanced and mutually beneficial. This strategy addresses trade imbalances by providing

individuals and businesses with the tools and knowledge they need to efficiently negotiate international trade and compete on a level playing field. Secondly, encourage businesses to diversify their export and import portfolios by exploring new product categories and markets. Government incentives, such as tax benefits or grants for diversification efforts, can be implemented to support this strategy. Thirdly, promote value chain integration across borders. Encourage businesses in ASEAN countries to become part of the supply chain of Chinese companies and vice versa. This integration can lead to more balanced trade and enhanced competitiveness.

In addition, the scope of this study is limited to China and ASEAN countries, and the selected influencing factors are limited. The universality of the impact of human capital on imports and exports still needs to be verified, which will be further explored in future research.

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7.0 CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

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