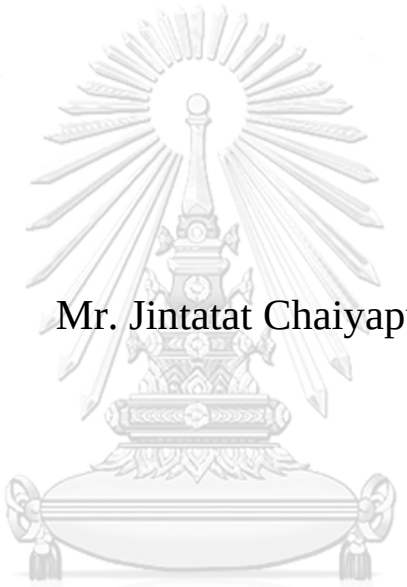
Global Talent Competitiveness Index: The Implication of 6 GTCI pillars on Singapore, Malaysia, and Thailand's Real GDP per capita to Promote Talent Development

Mr. Jintatat Chaiyapuck



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ดัชนีชี้วัดศักยภาพการแข่งขันด้านทรัพยากรมนุษย์โลก: ผลกระทบของ 6 ดัชนีชี้วัดศักยภาพการแข่งขันด้านทรัพยากรมนุษย์โลกระหว่างประเทศสิงคโปร์ ประเทศมาเลเซีย และประเทศไทย กับผลิตภัณฑ์มวลรวมในประเทศต่อหัวเพื่อพัฒนาความสามารถของทรัพยากรมนุษย์

นายจินตทัศน์ ไชยพรรค

สารนิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาศิลปศาสตรมหาบัณฑิต
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Independent Study Title	Global Talent Competitiveness Index: The Implication of 6 GTCI pillars on Singapore, Malaysia, and Thailand's Real GDP per capita to Promote Talent Development
By	Mr. Jintatat Chaiyapuck
Field of Study	Population Policy and Human Development
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Accepted by the COLLEGE OF POPULATION STUDIES, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master of Arts

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จินตทัศน์ ไชยพรรค : ดัชนีชี้วัดศักยภาพการแข่งขันด้านทรัพยากรมนุษย์โลก: ผลกระทบของ 6 ดัชนีชี้วัดศักยภาพการแข่งขันด้านทรัพยากรมนุษย์โลกระหว่างประเทศสิงคโปร์ ประเทศมาเลเซีย และประเทศไทย กับผลิตภัณฑ์มวลรวมในประเทศต่อหัวเพื่อพัฒนาความสามารถของทรัพยากรมนุษย์. (Global Talent Competitiveness Index: The Implication of 6 GTCI pillars on Singapore, Malaysia, and Thailand's Real GDP per capita to Promote Talent Development) อ.ที่ปรึกษาหลัก : ดร.ชฎาธาร โอษธีศ

การศึกษาครั้งนี้มีวัตถุประสงค์ เพื่อศึกษาผลกระทบของการเปลี่ยนแปลงของ 6 ดัชนีชี้วัดศักยภาพการแข่งขันด้านทรัพยากรมนุษย์โลก ที่ส่งผลต่อผลิตภัณฑ์มวลรวมในประเทศต่อหัว เพื่อแสดงให้เห็นถึงความสัมพันธ์ของ 6 ดัชนีชี้วัดศักยภาพการแข่งขันด้านทรัพยากรมนุษย์โลก โดยศึกษาเปรียบเทียบระหว่างประเทศสิงคโปร์ ประเทศมาเลเซีย และประเทศไทย เพื่อศึกษาและทำความเข้าใจถึงความสำคัญ และผลกระทบของการแข่งขันด้านทรัพยากรมนุษย์ต่อการพัฒนาระบบเศรษฐกิจที่ให้ความสำคัญต่อการสร้างนวัตกรรม

กรอบแนวคิดของการศึกษาในครั้งนี้ ผู้วิจัยเลือกใช้ 6 ดัชนีชี้วัดศักยภาพการแข่งขันด้านทรัพยากรมนุษย์โลก ประกอบด้วย 1) ปัจจัยส่งเสริมภายในประเทศที่เกี่ยวข้องกับบริบทแวดล้อมทางกฎหมาย ด้านการตลาด ด้านธุรกิจและแรงงาน (Enable) 2) การดึงดูดแรงงาน (Attract) 3) การพัฒนาแรงงานในมิติของการศึกษา การเรียนรู้ตลอดชีวิต และการเข้าถึงโอกาสในการประสบความสำเร็จ (Grow) 4) การรักษาฐานแรงงานในมิติของการดำเนินชีวิตและความยั่งยืน (Retain) ในโมเดลปัจจัยนำเข้า และ อีก 2 ตัวแปรในโมเดลผลลัพธ์ ได้แก่ 5) ทักษะสายเทคนิค (Vocational and Technical Skills) และ 6) ความรู้ความสามารถระดับสูงของแรงงาน (Global Knowledge Skills)

การศึกษาครั้งนี้เป็นการศึกษาเปรียบเทียบผลการเก็บข้อมูลที่ได้จากสำรวจดัชนีชี้วัดศักยภาพการแข่งขันด้านทรัพยากรมนุษย์โลก โดยใช้การวิเคราะห์ทางสถิติ ผ่านวิธีการถดถอยพหุคูณ (Multiple Regression Analysis) ของประเทศสิงคโปร์ ประเทศมาเลเซีย และประเทศไทย โดยใช้ข้อมูลระหว่างปี พ.ศ. 2556 - พ.ศ. 2564 รวมทั้งสิ้น 8 ปี

ผลของการศึกษาครั้งนี้ แสดงให้เห็นว่า ดัชนีชี้วัดศักยภาพการแข่งขันด้านทรัพยากรมนุษย์โลกในหัวข้อที่ 3) การพัฒนาแรงงานในมิติของการศึกษา (Grow) มีความสัมพันธ์ทางลบ และ หัวข้อที่ 5) ทักษะสายเทคนิค (Vocational and Technical Skills) มีความสัมพันธ์ทางบวกและ มีผลกระทบกับผลิตภัณฑ์มวลรวมในประเทศต่อหัวของประเทศไทย สำหรับประเทศสิงคโปร์ ผลการศึกษาได้แสดงให้เห็นว่า ดัชนีชี้วัดศักยภาพการแข่งขันด้านทรัพยากรมนุษย์โลกในหัวข้อที่ 5) ทักษะสายเทคนิค (Vocational and Technical Skills) และหัวข้อที่ 6) ความรู้ความสามารถระดับสูงของแรงงาน (Global Knowledge Skills) มีความสัมพันธ์ทางบวก และมีนัยสำคัญทางสถิติกับผลิตภัณฑ์มวลรวมในประเทศต่อหัวของประเทศสิงคโปร์

จากการศึกษาครั้งนี้ แสดงให้เห็นว่าประเทศไทยควรให้ความสำคัญกับ การพัฒนาแรงงานในมิติของการศึกษา

สาขาวิชา นโยบายประชากรกับการพัฒนามนุษย์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2564 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

6484001051 : MAJOR POPULATION POLICY AND HUMAN DEVELOPMENT
KEYWORD: Global Talent Competitiveness Index, Real GDP per capita, Talent Development, Singapore, Malaysia, Thailand

Jintatat Chaiyapuck : Global Talent Competitiveness Index: The Implication of 6 GTCI pillars on Singapore, Malaysia, and Thailand's Real GDP per capita to Promote Talent Development. Advisor: Dr. Chadatan Osatis, Ph.D.

This study aims to examine the implications of the Global Talent Competitiveness Index (GTCI) against real GDP per capita. Specifically, the study aims to show the relationship between 6 GTCI variables between Singapore, Malaysia, and Thailand and explore the significance and the implications of the GTCI index in the innovation-driven economies.

The conceptual framework can be elaborated through 6 GTCI indices. The first four indices in the input model are: (1) enabling and impeding talent attraction and institutional development; (2) attracting talents; (3) growing talent through formal education, lifelong learning, and access to growth opportunities; and (4) retaining talents through the support of sustainability and lifestyle in the input model. On the other hand, the two variables in the output model are: (5) vocational and technical skills and (6) global knowledge skills.

This is a time-series data, and the data sets were collected from the Global Talent Competitiveness Index with a focus on Singapore, Malaysia, and Thailand from 2013 to 2021, accounting for the total of an 8-year period.

The study found that the GTCI indices of the input model; (3) grow was statistically significant and had a negative correlation; and (5) vocational and technical skills were statistically significant and positively correlated with Thailand's real GDP per capita. On the other hand, the vocational and technical skills, and global knowledge skills were the variables in the GTCI output model that were statistically significant and had a positive relationship with Singapore's real GDP per capita.

Essentially, the result of this study illustrates that Thailand needs to prioritize its ability to grow its talent competitiveness as it has a direct negative impact on Thailand's real GDP per capita. After the comparative examination between Singapore, Malaysia, and Thailand, the study found the correlation between GTCI indices and real GDP per capita should be examined based on each respective country's context so that appropriate policy could be designed and matched with the condition of talent development. The Thai government should prioritize the development of vocational and technical education and global knowledge skills so that the country can expand its talent supply to match the demand of the market in the innovation-driven economic system.

Field of Study:	Population Policy and Human Development	Student's Signature .....
Academic Year:	2021	Advisor's Signature .....

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I must also thank Dr. Nopphawan Photphisutthiphong and Dr. Thoedsak Chomtohsuwan for their helpful and supportive comments on my research. Their expertise in economics and SPSS helped me very much with computing data and informational analysis. I am very thankful for your time and feedback to make my research project more complete.

Finally, I would like to thank all of my professors at the College of Population Studies, Chulalongkorn University, who have supported me through the year of virtual learning under the pandemic. All of your encouragement and guidance made me feel confident in my ability to proudly complete this project.

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1.1 The Landscape of Global Talent Competitiveness Index

Since the beginning of the 21st century, the World Economic Forum (WEF) established a series of international comparative indices in 2001 for states to compare their level of global competitiveness in the knowledge-based economy (Buracas & Navickas, 2015). Before the concrete establishment of the first version of the Global Talent Competitiveness Index (GTCI) in 2013, the WEF and Institute Européen d'Administration des Affaires (INSEAD) developed earlier forms of intellectual indices such as the Global Innovation Index (GII) and the Network Readiness Index (NRI) to evaluate a country's capacity and success in innovation and a country's readiness towards information and communication technological-based economy (Buracas & Navickas, 2015; Evans, 2013).

With the essential understanding of the global innovation and informational technology competitiveness, the three organizations of INSEAD, Human Capital Leadership Institute, and Adecco Group partnered up to highlight the importance of talent development as one of the most important resources for each state to utilize and improve its knowledge-based economic competitiveness (Evans, 2013). Through Peter Drucker's quote "You can't improve what you don't measure," the Global Talent Competitiveness Index aims to be the main tool to evaluate the implications of talent for the state's knowledge-based economic development in the future economy (Evans, 2013).

Thailand, like many other middle-income countries, aspires to be a high-income country and, in the future, to be considered one of the first world nations. However, the challenges of (1) middle income trap, (2) inequality trap, and (3) imbalanced trap are the key socio-economic issues that challenge Thailand's transformation from an efficiency-driven economy to an innovation-driven economy (RoyalThaiEmbassy, 2018; Schwab, 2018). Therefore, The Royal Thai Government announced their 20-year plan through the "20-years National Strategy" to accelerate the country's development in the creative-and-innovative sector from 2018 to 2037, with a large focus on elevating Thailand to new heights (OfficeofInternationalAffairs, 2018). So

that the country may enjoy economic prosperity and its welfare system, for Thai citizens.

One of the notable strategies within Thailand's 20-years National Strategy was the "Thailand 4.0 Model." This was the model that specifically reflected the evolution of Thailand's economic development as well as the plan to transition towards a knowledge-based economy. The four key objectives were as followed:

1. To promote Thailand's value-based economy that made up of innovation, technology, and creative sectors through (1) increasing Research and Development (R&D) expenditure, (2) increasing economic growth rate capacity, and (3) increasing national income per capita from 5,470 USD in 2014 to 15,000 USD in 2032.
2. To promote Thailand's societal inclusivity with the philosophy of "leaving no one behind," to unlock the potentials of all members in the state. The government aims to reduce social disparity from 0.465 in 2013 to 0.36 in 2032 in which would develop at least 20,000 farming households into "SMART farmers" within 5 years.
3. To promote Thailand's human value through the development of Thailand's Human Development Index (HDI) where it aims to elevate the country into the top fifty states within 10 years and ensure that at least 5 Thai universities are ranked within the world's top 100 within 20 years.
4. To promote Thailand's environmental protection through low carbon society strategy and aim to improve at 10 Thai cities into the world's most livable cities within 20 years period (RoyalThaiEmbassy, 2018).

After the enactment of the Thailand's 20-Years National Strategy in 2018 that wishes to elevate Thailand's economic development model from agricultural (Thailand 1.0), light industry (Thailand 2.0), advanced industry (Thailand 3.0), to knowledge-based economy (Thailand 4.0), the study could illustrate through the comparison between Table 1 and Table 2 of the Global Talent Competitiveness Index between 2018 and 2021, that Thailand remains holding the 4th position of its regional group rank despite its overall ranking improved by 2 places. Despite holding the country's status as an upper-middle income group, Thailand is closely followed by the Philippines and Indonesia, with a larger gap to follow Malaysia and Singapore, who have held the top 2 positions throughout the past 3 years. This further indicates that the country still has a lower ability to enable, attract, grow, and retain talent for its knowledge-based economy in recent years when compared to upper-middle and high-income state

Table 1: The Ranking of ASEAN Regional Group in Global Talent Competitiveness Index in 2018

Overall Ranking	Country	Score	Income Group	ASEAN Regional Group Rank
2	Singapore	78.42	High Income	1
27	Malaysia	58.51	Upper-Middle Income	2
54	Philippines	44.17	Lower-Middle Income	3
70	Thailand	39.96	Upper-Middle Income	4
77	Indonesia	38.04	Lower-Middle Income	5
87	Vietnam	35.55	Lower-Middle Income	6
95	Lao PDR	32.38	Lower-Middle Income	7
108	Cambodia	27.02	Lower-Middle Income	8
-	Brunei Darussalam	-	High Income	-
-	Myanmar	-	Lower-Middle Income	-

Source: Created by author based on The Global Talent Competitiveness Index Report in 2018
Note that - indicates no information of the subject

Table 2: The Ranking of ASEAN Regional Group in Global Talent Competitiveness Index in 2021

Overall Ranking	Country	Score	Income Group	ASEAN Regional Group Rank
2	Singapore	82.09	High Income	1
34	Malaysia	59.70	Upper-Middle Income	2
47	Brunei Darussalam	51.61	High Income	3
68	Thailand	45.46	Upper-Middle Income	4
70	Philippines	44.63	Lower-Middle Income	5
80	Indonesia	42.09	Lower-Middle Income	6
82	Vietnam	40.85	Lower-Middle Income	7
105	Lao PDR	32.49	Lower-Middle Income	8
119	Cambodia	27.43	Lower-Middle Income	9
-	Myanmar	-	Lower-Middle Income	-

Source: Created by author based on The Global Talent Competitiveness Index Report in 2021
Note that - indicates no information of the subject

1.2 The Landscape of Migration and Talent Mobility in ASEAN

The Association of Southeast Asian Nations (ASEAN) is an intergovernmental cooperation between 10 member states in the Southeast Asian region that aims to establish a highly competitive economic region where the movement of goods, services, investments, and people can freely flow between the member ASEAN states (Gentile, 2019). In reference to Gentile (2019), ASEAN will become the world's fourth-largest economy by 2030, following the United States, the People's Republic of China, and the European Union. In other words, a greater number of ASEAN member states (AMS) may be able to elevate their income group status, only if effective infrastructure and facilities allow talented individuals to enter an innovative-driven economy. With an overwhelmingly fast pace of technological and innovative development, AMS must increase its talent supply to meet the demand of structural transformation, urbanization, demographic changes, and a knowledge-based economy. According to Gentile (2019), these socio-economical changes may greatly

impact the supply of talented individuals, which may result in a fight to attract this scarce resource.

Table 3: The Total Workforce and Migrant in High-Skilled Jobs

Country	Workforce			Employed Migrants in the Country		
	Total	In High-Skilled Jobs	Migrants	Migrants Share of Workforce (%)	In High-Skilled Jobs	Share of Migrants in High-Skilled Jobs (%)
Brunei Darussalam (2011)	183,700	59,200	67,700	36.9	10,700	18.1
Cambodia (2013)	8,059,600	396,300	49,200	0.6	2,700	0.7
Indonesia (2014)	114,628,000	8,144,200	98,900	0.1	. . .	. . .
Lao PDR	20,300	230,200	600	3.0	. . .	. . .
Malaysia (2014)	13,532,100	3,408,100	1,782,300	13.2	89,700	2.6
Philippines (2013)	38,118,000	9,043,000	. . .	. . .	. . .	. . .
Singapore (2014)	3,623,900	. . .	1,355,700	37.4	. . .	. . .
Thailand (2014)	38,020,400	5,392,800	1,183,800	3.1	130,300	2.4
Viet Nam (2013)	52,207,800	5,218,000	. . .	. . .	. . .	

Source: Skilled Labor Mobility and Migration: Challenges and Opportunities for the ASEAN Economic Community Report, 2019

From the illustration portrayed in Table 3, highlighting the total workforce of high-skilled jobs, and employed migrants in high-skilled jobs, it is evident that not every AMS had shared their information on their country's supply of talents who fit into high-skilled jobs. For instance, as a high-income state, Singapore holds a relatively smaller proportion of the total workforce in high-skilled jobs when compared to upper-middle income states such as Malaysia and Thailand. On the other hand, Gentile (2019) had illustrated that Singapore holds the highest proportion of migrant share of the workforce at 37.4% when compared to Malaysia's 13.2% and Thailand's 3.1 percent. This means that Singapore is a lot better at enabling, attracting, growing, and retaining both vocational and technical skills (VT Skills), and global knowledge skills (GK Skills) talents when compared to its counterparts.

In a recent situation where ASEAN established the ASEAN Economic Community (AEC) to deepen regional integration and economic cooperation among AMS, the 2025 AEC blueprint intends to (1) become a highly integrated and cohesive economy; (2) increase competitiveness and innovation among AMS and increase regional integration and economic cooperation; (3) connect and promote cooperation in the future economy; (4) become more resilient and inclusive of people from diverse socio-cultural backgrounds; and (5) become more influential as a global ASEAN member (ASEAN-ThailandSecretariat, 2016). The making of this agenda stresses the

AMS commitment to remove cross-border restrictions and enable migration mobility as much as possible to meet the demand of knowledge-based industries in the innovation-driven economy (ASEAN-Secretariat, 2017).

Table 4: ASEAN Economic Community 2025 Blueprint

ASEAN Economic Community 2025				
A Highly Integrated & Cohesive Economy	A Competitive, Innovative & Dynamic ASEAN	Enhanced Connectivity & Sectoral Cooperation	A Resilient, Inclusive, People-Oriented & People-Centred ASEAN	A Global ASEAN
Trade in Goods	Effective Competition Policy	Transport	Strengthening the Role of MSMEs	Strategic approach towards external economic relations
Trade in Services	Consumer Protection	ICT	Strengthening the Role of the Private Sector	Review and improve existing ASEAN FTAs and CEPs
Investment Environment	Strengthening IPR Cooperation	E-commerce	Public-Private Partnership	Enhance economic partnerships with non-FTA DPs
Financial Integration, Financial Inclusion, and Financial Stability	Productivity-Driven Growth, Innovation, R&D, Technology Commercialisation	Energy	Narrowing the Development Gap	Engage with regional and global partners
Facilitating Movement of Skilled Labour & Business Visitors	Taxation Cooperation	Food, Agriculture, and Forestry	Contribution of Stakeholders on Regional Integration Efforts	Support to the multilateral trading system
Enhancing Participation in GVCs	Good Governance	Tourism		Engagements with regional and global institutions
	Effective, Efficient, Coherent and Responsive Regulations, and GRP	Healthcare		
	Sustainable Economic Development	Minerals		
	Global Megatrends and Emerging Trade-related Issues	Science &Technology		

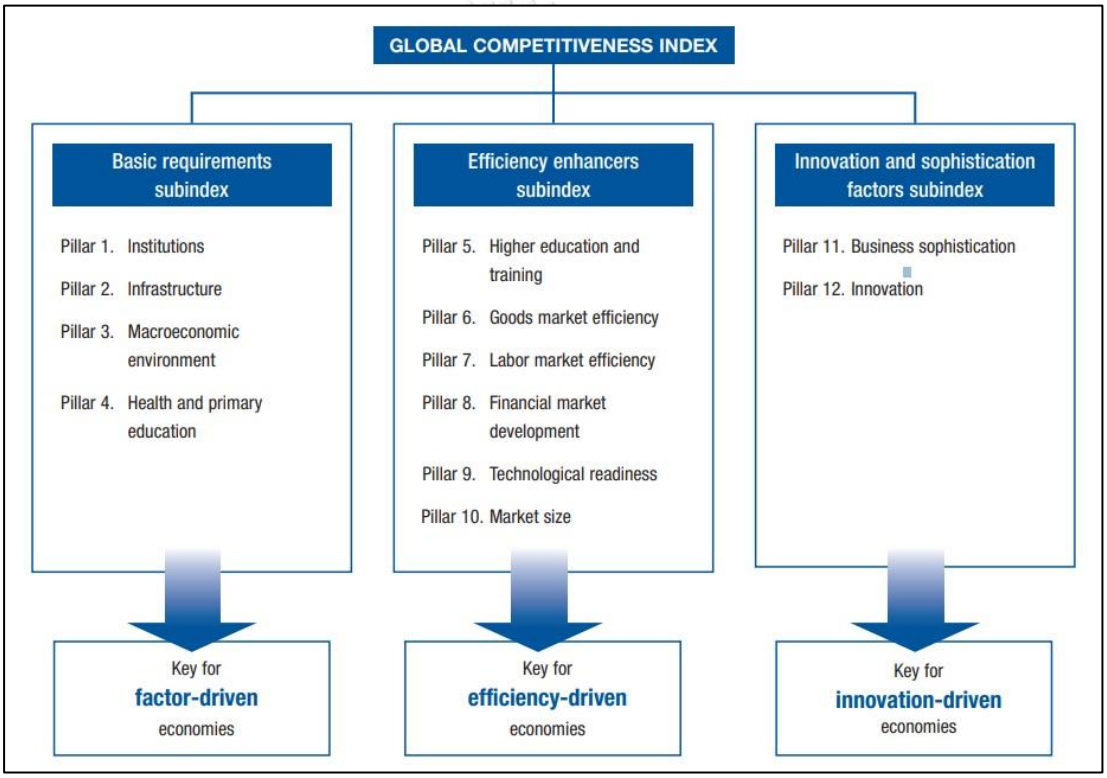
Source: ASEAN Secretariat, 2017

According to Table 4, AEC 2025 Blueprint indicates that the AMS will be a highly integrated and cohesive economy, especially through facilitating the movement of skilled labor and business visitors, as well as a competitive, innovative, and dynamic ASEAN which emphasizes productivity-driven growth, innovation, research and development, and technology commercialization. This implies the importance of the migration flow of skilled labor and the promotion of talent development among the AMS.

1.3 The Landscape of Talents in Innovation-Driven Economy

Not to be misled between the Global Talent Competitiveness Index (GTCI) and the Global Competitiveness Index (GCI), the key distinction lies between the evaluation of talent development in GTCI and the evaluation of a state's economic structure in GCI. In reference to Schwab (2018), the GCI aims to evaluate long-term growth and prosperity by addressing key socio-economic issues and proposing economic growth strategies.

Figure 1: Global Competitiveness Index Framework



Source: Global Competitiveness Index Report, 2018

In reference to Figure 1, the GCI categorized subindex to which addresses the key for states to meet their type of economic structure, based on this framework, factor-driven economies describe the first stage of development in which a large proportion of unskilled labor is employed, and which is highly dependent on natural materials. More specifically, the country's ability to develop was hampered by a lack of institutions, infrastructure, the environment, and basic healthcare and education. As a result of the heavy emphasis on manual labor resource extraction, the supply of talent is severely constrained. As states move towards the second stage of economic

development, the illustration portrayed the development of processed goods and quality production where the competitiveness of private and public institutions drives the extraction of resources to become finished goods. The efficiency-driven economies showed the development of blue-collar jobs and the growing number of white collars in the economic system. The number of talented individuals that fit into high-skilled occupations remains low, but it is moving in the direction of innovation-driven economies. Finally, in the innovation stage, where wages and standards of living are significantly increased, only innovative countries can afford to pay the prices. The last stage of economic development ultimately highlights the fullest extension of talent development and its supply-driven knowledge-based economy, which can be specifically seen in states in the high income group. (Rostami et al., 2019).

According to Table 5, it illustrates that Singapore is the only AMS to hold innovation-driven economies, followed by Malaysia, which was also the only AMS to be under the transition from efficiency-driven to innovation-driven. On the other hand, Indonesia and Thailand remain in efficiency-driven economies, which means that the supply of talented individuals is limited and they need to attract or grow more talents to support Thailand's 20-year National Plan (Schwab, 2016).

Table 5: Categorizing States to Each Type of Global Competitiveness Index Economies

Stage 1: Factor-driven (35 economies)	Transition from stage 1 to stage 2* (15 economies)	Stage 2: Efficiency-driven (31 economies)	Transition from stage 2 to stage 3* (20 economies)	Stage 3: Innovation-driven (36 economies)
Bangladesh	Algeria (58.2, 36.4, 5.5)	Albania	Argentina (31.2, 50, 18.8)	Australia
Benin	Azerbaijan (54.5, 39.1, 6.4)	Armenia	Chile (28.6, 50, 21.4)	Austria
Burundi	Bhutan (46.5, 45.1, 8.4)	Bosnia and Herzegovina	Costa Rica (32.9, 50, 17.1)	Bahrain
Cambodia	Botswana (53.8, 39.7, 6.6)	Brazil	Croatia (32.3, 50, 17.7)	Belgium
Cameroon	Brunei Darussalam (50.2, 42.3, 7.4)	Bulgaria	Hungary (30.6, 50, 19.4)	Canada
Chad	Honduras (47.8, 44.1, 8)	Cape Verde	Latvia (27.3, 50, 22.7)	Cyprus
Congo, Democratic Rep.	Kazakhstan (43.4, 47.4, 9.1)	China	Lebanon (34.2, 50, 15.8)	Czech Republic
Ethiopia	Kuwait (49.9, 42.6, 7.5)	Colombia	Lithuania (25.3, 50, 24.7)	Denmark
Gambia, The	Mongolia (47.3, 44.5, 8.2)	Dominican Republic	Malaysia (39.1, 50, 10.9)	Estonia
Ghana	Nicaragua (57.6, 36.8, 5.6)	Ecuador	Mauritius (38.9, 50, 11.1)	Finland
Guinea	Nigeria (58.5, 36.1, 5.4)	Egypt	Oman (27.2, 50, 22.8)	France
Haiti	Philippines (41.5, 48.9, 9.6)	El Salvador	Panama (28.4, 50, 21.6)	Germany
India	Ukraine (56.1, 37.9, 6)	Georgia	Poland (31.7, 50, 18.3)	Greece
Kenya	Venezuela (55.5, 38.4, 6.1)	Guatemala	Romania (38.8, 50, 11.2)	Hong Kong SAR
Kyrgyz Republic	Viet Nam (56.5, 37.6, 5.9)	Indonesia	Saudi Arabia (36.7, 50, 13.3)	Iceland
Lao PDR		Iran, Islamic Rep.	Seychelles (25.2, 50, 24.8)	Ireland
Lesotho		Jamaica	Slovak Republic (21.3, 50, 28.7)	Israel
Liberia		Jordan	Trinidad and Tobago (24.1, 50, 25.9)	Italy
Madagascar		Mexico	Turkey (35.6, 50, 14.4)	Japan
Malawi		Montenegro	Uruguay (23.3, 50, 26.7)	Korea, Rep.
Mali		Morocco		Luxembourg
Mauritania		Namibia		Malta
Moldova		Paraguay		Netherlands
Mozambique		Peru		New Zealand
Nepal		Russian Federation		Norway
Pakistan		Serbia		Portugal
Rwanda		South Africa		Qatar
Senegal		Sri Lanka		Singapore
Sierra Leone		Swaziland		Slovenia
Tajikistan		Thailand		Spain
Tanzania		Tunisia		Sweden
Uganda				Switzerland
Yemen				Taiwan, China
Zambia				United Arab Emirates
Zimbabwe				United Kingdom
				United States

Source: Global Competitiveness Index Report, 2015-2016

1.4 Significance of the Study

Following the contextual introductory on (1) the current landscape of the Global Talent Competitiveness Index (GTCI), (2) trending migratory patterns and talent mobility, and (3) talent supply in a knowledge-based economy, the study can conclude that the "War for Talent" is true and especially apparent amongst ASEAN member states (AMS) that look to transition towards high-income countries with a limited supply of talented individuals. (Beechler & Woodward, 2009). In reference to Beechler & Woodward (2009), the four key factors that impact the war for talent are (1) the changes in demographic and economic trends; (2) the increment of migration mobility; (3) the transformation of the business environment, skills, and culture; and (4) the increment of workforce diversity. These are notable challenges that Thailand needs to consider when it looks to acquire over 2.3 million talents to fulfill its 20-year National Strategy. (Punpuing, 2018).

In order to tackle the coming war for talent between AMS, Thailand must examine its current Global Talent Competitiveness Index (GTCI) to understand the current country's abilities to:

1. Enable infrastructures and institutions for attracting and growing talent to support Thailand 4.0 strategy.
2. Attract both external and internal talents through the elimination of migrant mobility barriers and institutional challenges.
3. Grow talents through the development of Vocational and Technical Skills Education (VT Skills Program) and Global Knowledge Skills Education (GK Skills Program).
4. Retain as many talents in Thailand's labor market as possible.

Given the rising war for talent, the study would adopt comparative analysis between Singapore, Malaysia, and Thailand to better understand the level of significance and relationship between GTCI and Real GDP per capita. Ultimately, the study holds Thailand as the epicenter of the investigation and aims to propose policy recommendations for Thailand to improve GTCI indices and transition the country towards innovative-driven economies in the form of Real GDP per capita.

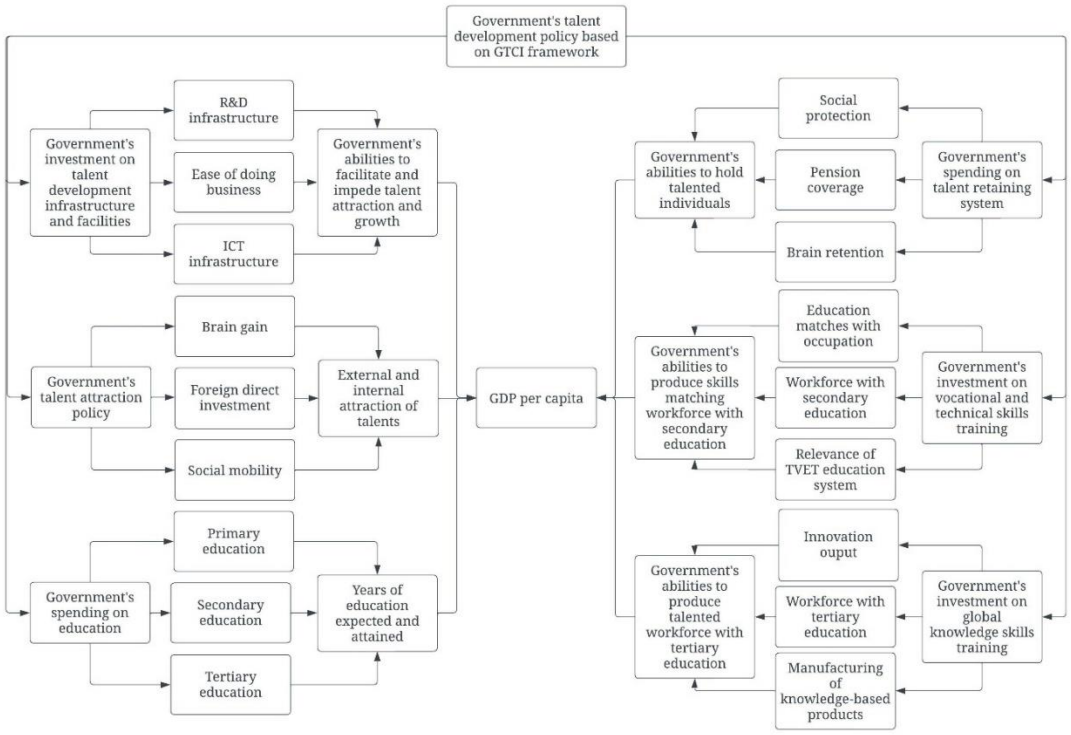
1.5 Objective of the Study

The study aims to:

1. Examine the significance of 6 Global Talent Competitiveness Index on Real GDP per capita through multiple linear regression method across 8-years time series data between Singapore, Malaysia, and Thailand.
2. Investigate whether there is correlation between Real GDP per capita and each of the 6 Global Talent Competitiveness Index for a single country.
3. Conduct a comparative study between Singapore, Malaysia, and Thailand to better understand Thailand's abilities to enable, attract, grow, and retain talents in for the development towards innovation-driven economy in the form of Real GDP per capita.
4. Propose policy recommendation for Thailand to promote the betterment of enabling, attracting, growing, and retaining talented individuals, so that Thailand could acquire talents to support knowledge-based economy and

transition Thai's economic system towards innovative-driven economies in the form of higher Real GDP per capita.

1.6 Conceptual Framework



Source: Created by author based on six pillars and selected indices of GTCI

Following the conceptual framework on the government's talent development policy that is based on the GTCI model, this conceptual framework highlights the implication of each of the 6 Global Talent Competitiveness Indices, where the increment of each GTCI index would result in an increase in Real GDP per capita of the respective country. To further elaborate on each of the GTCI indices, the top left column indicates the actions of governments where their investment in talent development infrastructure and facilities would result in an increase in the value of research and development (R & D) infrastructure, ease of doing business, and information and communications technology (ICT) infrastructure. The action of the government is predicted to have a positive relationship with the following results and thus illustrate a higher level of the government's ability to facilitate and impede talent attraction and growth, which are essential elements for the country to increase its Real GDP per capita.

Moving towards the second governmental action, the enactment of a talent attraction policy would result in an increase in brain gain, foreign direct investment, and social mobility, which indicates the government's ability to attract both external and internal talents to elevate the country's Real GDP per capita.

Looking at the bottom section of the first column, the third government's action shows their investment in education, which matches with the growth index in the GTCI model. With the government's expenditure on primary, secondary, and tertiary education, the country may expect to see an increased number of individuals who are expected to have attained more years of education. Essentially, with an increased number of years of education, the country could expect to grow its talent, which can play a critical role in promoting Real GDP per capita.

In the right column of the conceptual framework, the model illustrates the government's ability to hold and retain talented individuals through the establishment of social protection, pension coverage, and brain retention policies. The framework intends to signify the importance of the long-term stay of the talents, which could help promote the development of the country's Real GDP per capita.

Continuing the figures below, the government's talent retaining system, the framework describes the importance of vocational and technical skills training programs (VT Skills), which would support individuals to match with mid-level skills occupations, promote the acquisition of secondary education, and highlight the relevance of VT skills set so that the country can grow its talent to match the country's demanding industries.

Lastly, the government's investment in global knowledge skills training programs (GK skills) specifically aims at increasing innovation output, growing the workforce with tertiary education, and manufacturing innovation-driven products. The application of GK skills would directly complement Thailand's 20-year National Strategy and its 4.0 Industrialization approach, in which the knowledge-based economy is the primary driver of Thailand's transition from a middle-income to a high-income state.

1.7 Key Terminologies

1.7.1 Defining Talent

According to the article "Defining Talent: Insights from Management and Migration Literature for Policy Design" by Cerna and Chou, 2019, the authors aim to define talent through migration literature as well as proposed policy recommendations through the perspective of migration policymakers. Considering policymakers that hold a binary perspective where talent is perceived as qualities rather than a relational concept, the intrinsic approach would define talent as an innate characteristic and qualify an individual to have skillsets that are well-above other people. (Cerna & Chou, 2019). To be more specific, talent is "the sum of a person's abilities," where one's intrinsic skills, knowledge, and experience are innately above others and do not require hard work to utilize. On the other hand, an extrinsic approach would define talent as the cultivation of skills, knowledge, and experience through talent development programs. Talents are perceived as extrinsic qualities where an educational training program would drive an individual towards the attainment of talent abilities and specific skillsets.

Following the three case study countries, "talent" in migration studies through a binary perspective identifies migrants as either low- or high-skilled, with no clear in-between. On the other hand, the composite approach defines "talents" in relation to individuals' occupations and their educational levels. More specifically, individuals who are technicians, professionals, or academics would be recognized as high-skilled workers, whereas those who are construction workers or manual labor are recognized as low-skilled workers (Cerna & Chou, 2019).

Overall, the migration studies chose to define talent using both binary and composite approaches, where talents are perceived intrinsically or extrinsically. For the purpose of this study, talent will be used to identify individuals who hold occupations in a knowledge-based economy as well as those who have attained a tertiary education background. This would allow the interpretation talent to be high-level experts and specialists who are highly demanded by the Thai labor force market to support the Thailand 20-year National Plan and the Thai 4.0 strategy.

1.7.2 Defining Real GDP per capita

In reference to (OECD, 2013), The Gross Domestic Product (GDP) per capita is an economic measurement that evaluates the economic performance of a country through a country's average living standards and/or economic well-being. More specifically, Real GDP per capita measures the changes in a country's economic activity and income per person that result from the changes in (1) labor productivity and (2) labor utilization without the effect of price changes (Amadeo, 2020) (OECD, 2017). Essentially, the term highlights the level of individuals' consumption per capita that is correlated with the welfare of the country (Fyliuk et al., 2019). The growth of Real GDP per capita magnifies the economic performance through its broad measure of the average living standards and the economic wellbeing of the country. Additionally, the real GDP per capita would enable for more accurate measurement when conducting comparative study over a period of time (Amadeo, 2020). Therefore, as the country is able to generate a high Real GDP per capita, the study has shown that it would also increase the nation's competitiveness level.

1.7.3 Defining Global Talent Competitiveness Index (GTCI)

Through the Global Talent Competitiveness Index Report in 2021, the GTCI framework is used to conduct comparative evaluation between states on the topics of (1) enabling talents, (2) attracting talents, (3) growing talents, and (4) retaining talents for their contribution in a knowledge-based and innovative-driven economy. The structure of GTCI is primarily separated into two models: input and output. The input model consisted of four key indices of Enable, Attract, Grow, and Retain, whereas the output model contains a vocational and technical skills index and a global knowledge skills index.

Figure 2: The Global Talent Competitiveness Framework

Global Talent Competitiveness Index	Input Model	Enable	Regulatory Landscape	- Rule of Law - Political Stability - Regulatory Quality - Corruption - Government Effectiveness
			Market Landscape	- Cluster Development - R&D Expenditure - ICT Infrastructure - Urbanization - Extent of Market Dominance - Ease of Doing Business
			Business and Labor Landscape	- Labor Rights - Labor-Employer Cooperation - Technology Utilization - Firms with Website - Professional Management - Relationship of Pay to Productivity - Investment in Emerging Technologies
		Attract	External Openness	- Migrant Stock - International Students - Brain Gain - FDI and Technology Transfer - Prevalence of Foreign Ownership
			Internal Openness	- Tolerance of Minorities - Tolerance of Immigrants - Social Mobility - Women in Tertiary Education - Women in High-Skilled Jobs - Leadership Opportunities for Women
		Grow	Formal Education	- Vocational Enrolment - Tertiary Enrolment - Tertiary Education Expenditure - Reading, Math's, and Science - University Ranking
			Lifelong Learning	- Business and Economic Subject Ranking - Prevalence of Training Firms - Employee Development - Formal and Non-Formal Studies
			Access to Growth Opportunities	- Delegation of Authority - Youth Inclusion - Use of Virtual Social networks - Use of Virtual Professional Networks
		Retain	Sustainability	- Pension Coverage - Social Protection - Brain Retention - Environmental Performance
			Lifestyle	- Personal Rights - Personal Safety - Physician Density - Sanitation
	Output Model	Vocational and Technical Skills	Mid-Level Skills	- Workforce with Secondary Education - Population with Secondary Education - Technicians and Associate Professional - Labor Productivity per Employee
			Employability	- Ease of Finding Skilled Employees - Relevance of Education System to the Economy - Skills Matching
		Global Knowledge Skills	High-Level Skills	- Professionals - Researchers - Workforce with Tertiary Education - Population with Tertiary Education - Senior Officials and Managers - Availability of Scientists and Engineers
			Talent Impact	- Innovation Output - High-value Export - New Business Density - Scientific Journal Articles - New Product Entrepreneurial Activity

Source: Created by author based on Global Talent Competitiveness Index Report 2021

The input model highlights the states' resources and efforts in developing their talent competitiveness. The output model, on the other hand, measures the quality of talents after states have invested resources and effort in talent development programs. Talents were assessed using two levels of skill: (1) middle-skilled and (2) high-skilled. Regardless of talent levels, the GTCI framework can be divided into three levels of indices. The first level indices represent the original six pillars, which combine both input and output models to illustrate the overall picture of the analysis. The second level and third level indices were used to construct a more in-depth and detailed interpretation, specifically on which of the areas in the six main pillars were correlated and statistically significant. Lastly, the third levels and all relating variables related GTCI is illustrated in Figure 2, and they were retrieved from The Global Talent Competitiveness Index Report in 2021.

1.7.3.1 Pillar 1: Enable

The first pillar of the GTCI input model, enable, illustrates how the nation facilitates and impediments the processes of talent recruiting and growth. The Regulatory Landscape, Market Landscape, and Business and Labor Landscape indices were nominalized and computed using the indices from the third level. These are the second-level variables that make up the Enable index. The following are the components of the second-level indices:

Regulatory Landscape:

1. The government effectiveness indicator reflects the perceptions of (1) the quality of public services; (2) the quality of the civil service; (3) the degree of its independence from political pressure; (4) the quality of policy formulation; and (5) the government’s credibility.
2. The rule of law indicator reflects the perceptions of (1) individuals’ confidence in and adherence to the rules of society and (2) the likelihood of crime and violence.
3. The political stability indicator reflects the perceptions of (1) the likelihood of political instability and (2) politically motivated violence.

4. The regulatory quality indicator reflects the perceptions of the government's ability to formulate, implement, and regulate permits for the development of the private sector.
5. The corruption indicator reflects the perceptions of business individuals and country professionals on the level of corruption in the public sector.

Market Landscape:

1. Competition intensity indicator proposes the survey question of "In your country, how intense is competition in the local markets?" through the World Economic Forum's Executive Opinion Survey (EOS).
2. Extent of market dominance indicator proposes the survey question of "In your country, how do you characterize corporate activity?" through the World Economic Forum's Executive Opinion Survey (EOS).
3. Ease of doing business indicator reflects country's 10 businesses topics from starting a business to resolving insolvency.
4. Cluster development indicator proposes the survey question of "In your country, how widespread are well-developed and deep clusters centration of firms, suppliers, producers of related products and services, and specialized institutions in a particular field?" through the World Economic Forum's Executive Opinion Survey (EOS).
5. R&D expenditure indicator reflects a total intramural expenditure on research and development during a specific period in percentage of GDP.
6. ICT infrastructure indicator reflects the Network Readiness Index that consisted of (1) mobile tariffs, (2) handset prices, (3) internet access, (4) 4-G mobile network coverage, (5) fixed broadband subscriptions, (6) international internet bandwidth, and (7) internet access in schools.
7. Urbanization indicator reflects number of people living in urban areas through the national statistical offices.

Business and Labor Landscape:

1. Ease of hiring indicator reflects employment's regulations relating to hiring and scheduling of working hours.

2. Ease of redundancy indicator reflects employment's regulation based on redundancy indicators that measures seven key indices of employing workers.
3. Active labor market policies indicator proposes the survey question of "In your country, to what extent do labor market policies help unemployed people to reskill and find new employment?" through the World Economic Forum's Executive Opinion Survey (EOS).
4. Tertiary-educated unemployment reflects percentage of labor force with high level of education who are unemployed.
5. Labor rights indicator reflects level of country's compliance with fundamental labor rights.
6. Labor-employer cooperation indicator proposes the survey question of "In your country, how do you characterize labor-employer relations?" through the World Economic Forum's Executive Opinion Survey (EOS).
7. Professional management indicator proposes the survey question of "In your country, who holds senior management positions in companies?" through the World Economic Forum's Executive Opinion Survey (EOS).
8. Relationship of pay to productivity indicator proposes the survey question of "In your country, to what extent is pay related to employee productivity?" through the World Economic Forum's Executive Opinion Survey (EOS).
9. Technology utilization indicator proposes the survey question of "In your country, to what extent do business adopt the latest technologies?" through the World Economic Forum's Executive Opinion Survey (EOS).
10. Investment in emerging technologies indicator proposes the survey question of "In your country, to what extent do companies invest in emerging technologies?" through the World Economic Forum's Executive Opinion Survey (EOS).
11. Firms with website indicator reflects the estimated number of multipurpose industrial robots per 10,000 employers in the manufacturing department

1.7.3.2 Pillar 2: Attract

"Attract" is the second pillar in the GTCI input model and can be classified into two key approaches: (1) external attraction and (2) internal attraction. On one hand, the external attraction focuses on attracting external resources such as foreign direct investment and high-skill migration. On the other hand, internal attraction focuses on attracting internal resources by removing socio-cultural barriers that obstruct the development of individuals with an underprivileged background from entering the high-skill labor market. The first level of attraction can be illustrated through the second levels of (1) external openness and (2) internal openness. More specifically, the second levels are calculated and nominalized by third level indices. The elaboration of second-level indices is as follows:

External Openness:

1. The FDI and technology transfer indicators propose the survey question of "To what extent does foreign direct investment bring new technology into your country?" through the World Economic Forum's Executive Opinion Survey (EOS).
2. The Prevalence of foreign ownership indicator proposes the survey question of "In your country, how prevalent is foreign ownership of companies?" through the World Economic Forum's Executive Opinion Survey (EOS).
3. The migrant stock indicator reflects the number of adult migrant stock population aged 25 years old as a percentage of the total population of the same age group.
4. International student's indicator reflects the number of international students studying in a given country as a percentage of the total tertiary enrolment in the country.
5. The Brain Gain indicator proposes the survey question of "To what extent does your country attract talented people from abroad?" through the World Economic Forum's Executive Opinion Survey (EOS).

Internal Openness:

1. Tolerance of minorities indicator reflects the division and schisms between different groups in society, specifically based on social and political characteristics and their role in access to services and resources.
2. Tolerance of immigrant's indicator proposes the survey question of "Is the city or area where you live a good place or not, a good place to live for immigrants from other countries?" through the Gallup World Poll.
3. Social mobility indicator proposes the survey question of "In your country, to what extent do individuals have the opportunity to improve their economic situation through their personal efforts regardless of the socio-economic status of their parents?" through the World Economic Forum's Executive Opinion Survey (EOS).
4. Women in tertiary education indicator reflects percentage of female students who officially registered in an educational programmed at the tertiary level.
5. Women in high skilled jobs indicator reflects percentage of female mangers, professionals, technicians, and associate professionals.
6. Females graduates indicator reflects percentage of female graduates who acquired highest educational attainment at the tertiary level.
7. Gender development gap indicator reflects the disparities between men and women on (1) health, (2) knowledge, and (3) living standards that based on HDI.
8. Leadership opportunities for women indicator proposes the survey question of "In your country, to what extent do companies provide women with the same opportunities as men to rise to positions of leadership?" through the World Economic Forum's Executive Opinion Survey (EOS).

1.7.3.3 Pillar 3: Grow

"Grow" is the third pillar in the GTCI input model that can be defined in the broader term that includes the development of (1) apprenticeships, (2) training, (3) continuous education, and (4) experience for better access to growth opportunities. The first level of grow pillar can be illustrated through the second levels of (1) Formal Education, (2) Lifelong Learning, and (3) Access to Growth Opportunities. More specifically, the second levels are calculated through the nominalized scores of the third level indices as follows:

Formal Education:

1. The Vocational enrolment indicator reflects the total number of students enrolled in vocational programs in secondary education.
2. The tertiary enrolment indicator reflects the total tertiary enrollment of the population age group that has officially registered for the tertiary level of education.
3. The tertiary education expenditure indicator reflects the number of resources invested by the government in tertiary education students.
4. The reading, math, and science indicators reflect 15-year-old students' performance in reading, mathematics, and science.
5. The University ranking indicator reflects world university ranking through five pillars of (1) Teaching, (2) Research, (3) Citations, (4) International Outlook, and (5) Industry income.

Lifelong Learning:

1. The Business and economics subject ranking indicator reflects business and economic indices based on 5 pillars of (1) Teaching, (2) Research, (3) Citations, (4) International Outlook, and (5) Industry income.
2. The prevalence of training in a firm's indicator reflects the percentage of firms that offer formal training programs for permanent and full-time employees.
3. The World Economic Forum's Executive Opinion Survey (EOS) proposes the survey question of "In your country, to what extent do companies invest in

training and employee development?" through the World Economic Forum's Executive Opinion Survey (EOS).

4. The Formal and non-formal studies indicator reflects the share of individuals aged 16–65 years who participated in formal and non-formal education.
5. The Quality of management school's indicator proposes the survey question "In your country, how do you assess the quality of business schools?" through the World Economic Forum's Executive Opinion Survey (EOS).

Access to Growth Opportunities:

1. The World Economic Forum's Executive Opinion Survey (EOS) proposes the survey question of "In your country, to what extent does senior management delegate authority to subordinates?" through the World Economic Forum's Executive Opinion Survey (EOS).
2. The youth inclusion indicator reflects the share of young individuals aged 15–24 who are not in education, employment, or training.
3. The use of virtual social networks indicator proposes the survey question of "In your country, how widely are virtual social networks used?" through the World Economic Forum's Executive Opinion Survey (EOS).
4. Use of virtual professional networks reflects the number of registered LinkedIn accounts per 1,000 labor forces aged between 15-64 years old.
5. The personal rights indicator reflects the level of (1) political rights, (2) freedom of expression, (3) freedom of assembly, and (4) private property rights.
6. The collaboration within organizations indicator proposes the survey question of "In your country, to what extent do people collaborate and share ideas within a company?" through the World Economic Forum's Executive Opinion Survey (EOS).

1.7.3.4 Pillar 4: Retain

"Retain" is the fourth or last pillar in the GTCI input model that can be defined as the country's ability to hold talented individuals within the state. The first level of the retention pillar can be illustrated through the second levels of (1) sustainability and (2) lifestyle. More specifically, these second levels were calculated through the nominalized scores of the third level indicators as follows:

Sustainability:

1. The pension coverage indicator reflects the share of people above retirement age who receive an old-age pension in percentage.
2. The social protection indicator proposes the survey question of "In your country, to what extent does a formal social safety net provide protection to the general population from economic insecurity in the event of job loss or disability?" through the World Economic Forum's Executive Opinion Survey (EOS).
3. The brain retention indicator proposes the survey question of "To what extent does your country retain talented people?" through the World Economic Forum's Executive Opinion Survey (EOS).
4. The environmental performance indicator reflects how well the countries perform in environmental health and ecosystem vitality.

Lifestyle:

1. The personal rights indicator reflects an opportunity perspective in the social progress index, where five variables are ranked from 0 to 5: (1) political rights, (2) freedom of expression, (3) freedom of religion, (4) access to justice, and (5) property rights for women.
2. Personal safety is reflected in the social progress index through a basic human needs perspective, where (1) homicide rate, (2) perceived criminality, (3) political killing and torture, and (4) traffic deaths are ranked from 0 to 5.
3. The physician density indicator reflects the number of doctors, which includes generalists and medical specialists, per 10,000 people.

4. The sanitation indicator reflects the percentage of the population that has access to basic sanitation services that are not shared with other households.

1.7.3.5 Pillar 5: Vocational and Technical Skills

"Vocational and Technical Skills" (VT Skills) is the fifth pillar or the first pillar in the GTCI output model that highlights mid-level skills and their implications on employability. In this case, employability is measured through the degree of skills gaps and labor market mismatches. In this first level of the VT pillar, it can be illustrated through the second levels of (1) mid-level skills, and (2) employability. More specifically, these second levels were calculated through the nominalized scores of the third level indicators as follows:

Mid-Level Skills:

1. The workforce with secondary education indicator measures the proportion of the labor force aged fifteen and over who have completed their secondary education.
2. The population with secondary education indicator represents the percentage of people aged twenty-five and up who have completed their secondary education.
3. The technicians and associate professionals' indicator reflects the number of technicians and associate professionals as a share of the total workforce.
4. The labor productivity per employee indicator reflects the division between total output (GDP US $PP) and total labor input used (labor force).

Employability:

1. The ease of finding skilled employees indicator proposes the survey question of "In your country, to what extent can companies find people with the skills required to fill their vacancies?" through the World Economic Forum's Executive Opinion Survey (EOS).
2. The indicator of education system relevance to the economy proposes the survey question "How well does your country's education system meet the needs of a competitive economy? through the World Economic Forum's Executive Opinion Survey (EOS).

3. The skills matching indicator reflects the percentage of the workforce whose education matches their occupation.
4. Skills matching with the secondary education indicator proposes the survey question of "In your country, to what extent do graduating students possess the skills needed by businesses at the secondary level?" through the World Economic Forum's Executive Opinion Survey (EOS).
5. Skills matching with tertiary education indicators proposes the survey question of "In your country, to what extent do graduating students possess the skills needed by businesses at the university level?" through the World Economic Forum's Executive Opinion Survey (EOS).

1.7.3.6 Pillar 6: Global Knowledge Skills

"Global Knowledge Skills" (GK Skills) is the sixth pillar and the final pillar in the GTCI model that describes the characteristics of high-skilled workers as (1) knowledgeable, (2) professional, (3) managerial, and (3) leadership to hold creative and effective problem-solving abilities. Considering the GK pillar as the first level, it can be illustrated through the second levels of (1) High-Level Skills and (2) Talent Impact. More specifically, these second levels were calculated through nominalized scores of the third level indicators as follows:

High-Level Skills:

1. The workforce with tertiary education indicator reflects the percentage of the labor force age 15 and above who have acquired the highest educational attainment at the tertiary level.
2. The population with tertiary education indicator represents the percentage of the population aged twenty-five and over who have obtained the highest level of education at the tertiary level.
3. The professionals indicator reflects the number of professionals as a share of the total workforce.
4. The researchers' indicator reflects the estimated number of professionals who are engaged in the conception and the creation of new knowledge, products, processes, methods, and systems in the country.

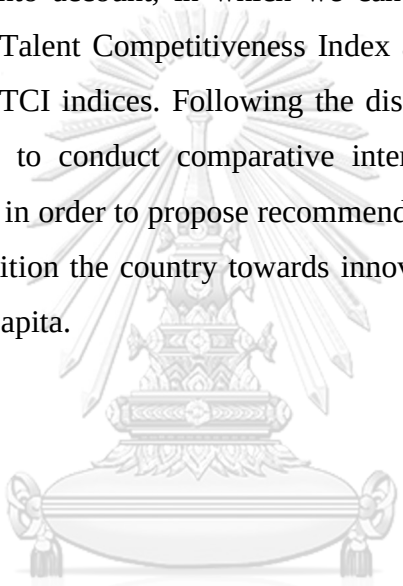
5. The percentage of legislators, senior officers, and managers in total employment is reflected in the senior officials and managers indicators.
6. Availability of scientists and engineer's indicator propose the survey question of "In your country, to what extent are scientists and engineers available?" through the World Economic Forum's Executive Opinion Survey (EOS).

Talent Impact:

1. The innovation output indicator reflects two pillars developed by the World Intellectual Property Organization: (1) knowledge and technology output, which describes the process of knowledge creation; and (2) creative output, which describes creative goods and services in the country.
2. The high-value exports indicator reflects the percentage of high-technology manufactured goods across all classifications.
3. The new product entrepreneurial activity indicator reflects the percentage of the total of early-stage entrepreneurs through the Global Entrepreneurship Monitor project.
4. The new business density indicator reflects the number of newly registered firms with limited liability per 1,000 workers aged 15–64 years old.
5. The Scientific journal articles indicator reflects the number of scientific and engineering articles published in the fields of (1) physics, (2) biology, (3) chemistry, (4) mathematics, (5) clinical medicine, and (6) space sciences.

1.8 Scope of the Study

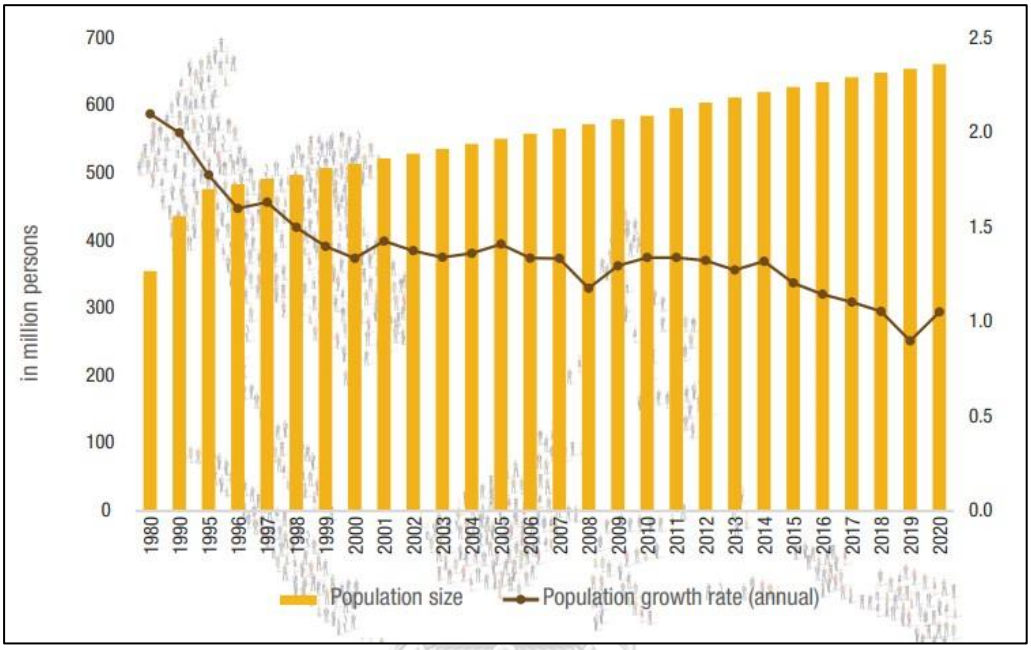
In response to the key objectives, the study first collects the six nominalized pillar index scores of Singapore, Malaysia, and Thailand from the past 8 years (2013–2021), while 2015 and 2016 were considered as single years, to establish a general statistical context between these ASEAN countries (Evans, 2013, 2014, 2015-2016, 2017, 2018; Monteiro, 2019, 2020, 2021). The study organizes statistical data and conducts a multiple linear regression model to see the association and significance level of each of the 6 GTCI pillars. Furthermore, the study incorporates the COVID-19 epidemic as the dummy variables into account, in which we can see the extent of COVID-19 impacts on the Global Talent Competitiveness Index and countries' abilities to hold the significance of 6 GTCI indices. Following the discoveries, the study will utilize the numerical findings to conduct comparative interpretation between Singapore, Malaysia, and Thailand in order to propose recommendations for Thailand to improve GTCI indices and transition the country towards innovative-driven economies in the form of Real GDP per capita.



Chapter 2: Literature Review

2.1 ASEAN and the Global Talent Competitiveness Index

Figure 3: ASEAN's Population Size and Population Annual Growth Rate from 1980 to 2020



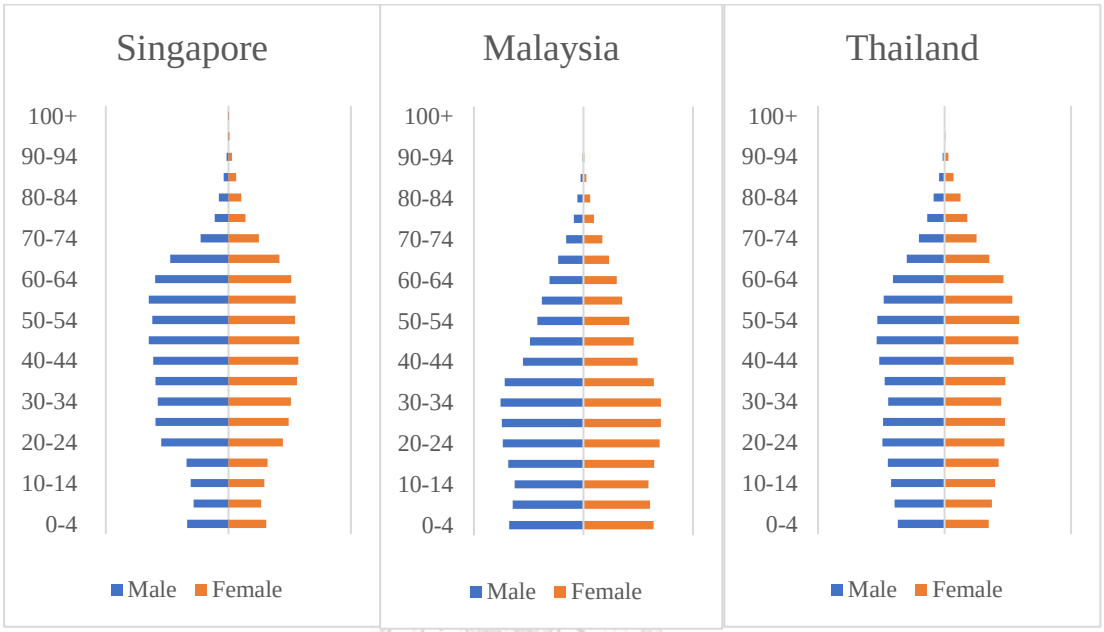
Source: ASEAN Key Figures Report, 2021

Over the period of 1980 to 2020, ASEAN experienced a near-doubling of its population size from natural increase and the expansion of ASEAN membership. Following the illustration in Figure 3, the graph indicates a declining trend of ASEAN population growth starting from 2% in 1990 to almost 1% in 2020 through the annual population growth rate. Essentially, it indicates that while ASEAN holds the 3rd largest population in the world, the region's age structure may face future population demographic challenges from the decline in fertility rate and an increase in old-age population (TheASEANSecretariat, 2021).

With the possible changes in youth, working-age, and old-age populations, the decrement of ASEAN population size and annual population growth rate signifies the key issue of higher dependency ratio from the lower supply of working-age population and higher support demand for the old-age population. Therefore, it is pivotal for ASEAN member states to develop national talent development strategies

to promote the (1) reduction of poverty, (2) betterment of education, and (3) economic growth under the stress of a declining working-age population.

Figure 4: Singapore, Malaysia, and Thailand Population Pyramid in 2020



Source: Created by author based on United Nation's World Population Prospects 2019

To begin, the study first takes a closer look at Singapore's population pyramid to better understand the country's demographic trend and plausible challenges for its labor force market. When directing the attention towards the base of the pyramid in Figure 4, which indicates the young dependent population aged between 0-14 years old, it is apparent that Singapore's birth rate has been low in the last 15 years. Despite a small increment in Singapore's birth rates in the past 10 years, the overall size of the base illustrated a stabilizing younger population and a potential decrement of economically active population in the future. As the study shifts its attention to the middle portion of the pyramid, it is clear that the majority of Singapore's population is currently in their working-age population, which ranges from 15–64 years old. As the steepness of Singapore's population pyramid indicates a lower value of the death rate, it further correlates with the height of the pyramid, which shows that a greater number of Singaporeans are accounted for elderly dependents population age 65 years and above. (TheUnitedNations, 2019).

Moving towards a similar trend, Malaysia's population pyramid in 2020 describes an overall demographic transformation that their working-age population is moving upwards towards an ageing society. Despite the majority of Malaysia's demographic lies between the ages of 20 and 40 years old, the steepness of the pyramid signifies that many Malaysians are healthier and live longer, as well as have fewer children (TheUnitedNations, 2019).

Lastly, Thailand's demographic trends also show a similar pattern to Singapore's population pyramid, where the narrow base of Thailand's pyramid indicates a low birth rate that is below the replacement level when compared to the working-age proportion of the structure. The steepness of the pyramid is almost the same as the proportion of Singaporean elderly where the elderly population is increasing and living longer. Therefore, the shrinking size of the working-age population would increase the dependency ratio and stress for them to support their elderly population in the future.

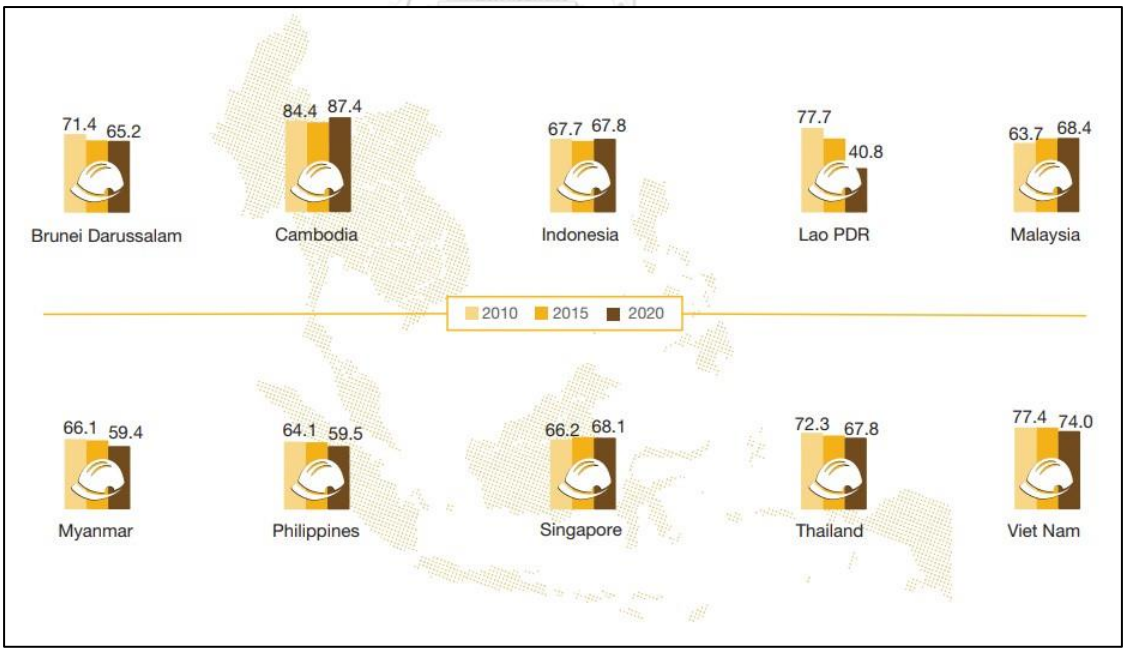
Table 6: The Percentage of Population Age Composition between Singapore, Malaysia, and Thailand in 2020

	Singapore	Malaysia	Thailand
Age 0-14	12	23	17
Age 15 - 64	74	69	70
Age 65+	13	7	13
Youth Dependency Ratio	17	34	23
Old Age Dependency Ratio	18	10	18

Source: Created by author based on World Development Indicator, 2020

According to Table 6, illustrating the detailed percentage of population age composition between Singapore, Malaysia, and Thailand in 2020, it is apparent that each country in the selected case studies has its own areas that challenge their policy design. More specifically, in the case of Singapore, where the youth dependency ratio is 17% and the old age dependency ratio is 18%, the findings indicate a lower dependency ratio when compared to Malaysia and Thailand. In other words, the proportion of the Singaporean working age population may have a lesser economic burden when compared to the other two countries. Malaysia, on the other hand, indicates a high proportion of youth dependency ratio of 34%, meaning that the younger population requires more financial support when compared to the aged population. Thailand also shares a similar pattern with Malaysia, where its youth dependency ratio is higher than its old age dependency ratio, indicating that the younger population requires more support from the Thai working-age population when compared to the Thai old-age population.

Figure 5: ASEAN Labor Force Participation Rates between 2010 and 2020

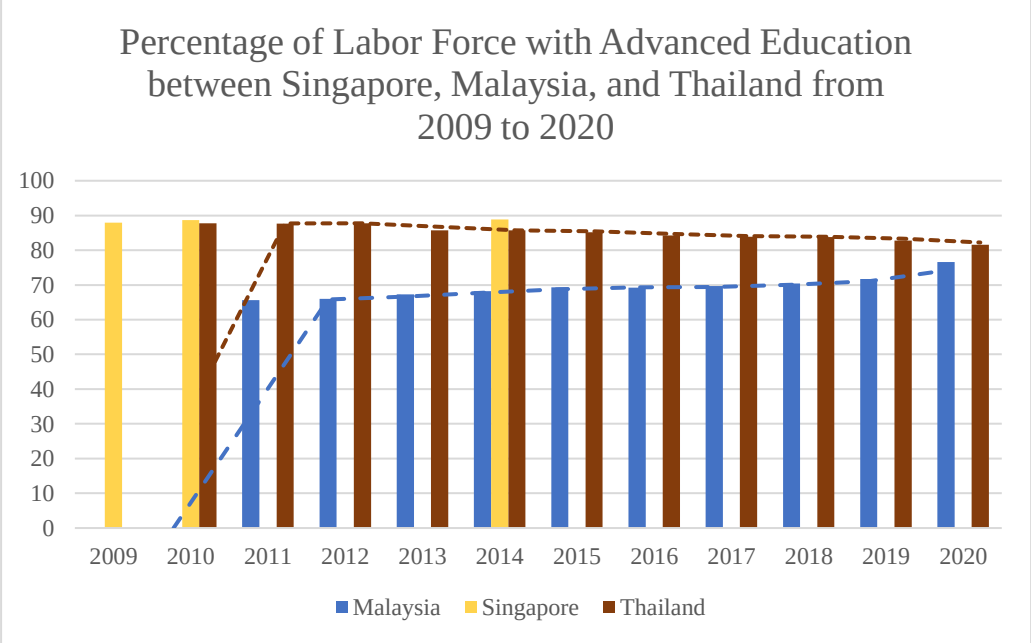


Source: ASEAN Key Figures Report, 2021

Moving forward, the illustration in Figure 5 highlights the differences in labor force participation rate (LFPR) between ASEAN member states (AMS) in 2010 and 2020. It is apparent that six out of ten AMS are experiencing a decreasing labor force

participation rate, while the other four AMS states (Cambodia, Indonesia, Malaysia, and Singapore) still enjoy an increasing share of labor force participation in their own labor force market. To be more specific, two out of three countries in this case study were shown to have positive trends, where (1) Malaysia presented an increase from 63.7% to 68.4%, as well as Singapore's LFPR increased from 66.2% to 68.1%. On the other hand, Thailand was seen to have a significant decrease from 72.3% in 2010 to 67.8% in 2020. Essentially, this means that Thailand needs to focus on its labor force participation and develop its talent to meet the demands of industry in the future.

Figure 6: The Percentage of Labor Force with Advanced Education between Singapore, Malaysia, and Thailand from 2009 to 2020

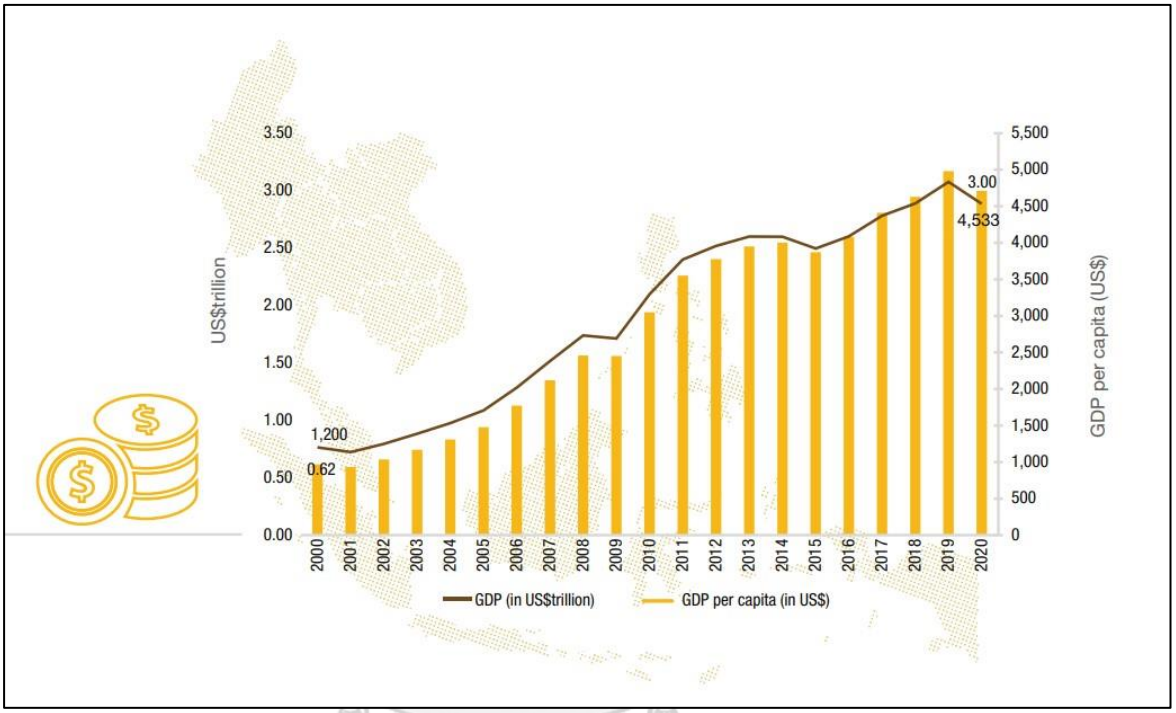


Source: Created by Author based on the United Nation: World Development Indicator, 2020

In reference to Figure 6, which illustrates the percentage of the labor force with advanced education among Singapore, Malaysia, and Thailand, it is apparent that despite limited statistical information by Singapore, the country continues to have the highest proportion of the labor force with a high education level in years 2010 and 2014. Moreover, the figure also illustrates a pivotal trend. When trendlines were drawn, Malaysia and Thailand were seemingly heading in different directions. On one hand, Malaysia's trends tend to be increasing as the country progresses throughout the decades. On the other hand, the proportion of the Thai labor force with advanced

education tends to have a decreasing trendline. Therefore, Thailand needs to resupply its talent pool by either attracting international talents or growing Thai talents to correspond to the 20-year national strategy and move Thailand's labor force towards a knowledge-based economy.

Figure 7: ASEAN GDP (US$) and GDP per capita (US$) since 200 to 2020



Source: ASEAN Key Figures Report, 2021

Considering the current state of the ASEAN economy as the 5th largest economic body in the world, the ASEAN Economic Community (AEC) combined its total GDP of $3.2 trillion with the 3rd fastest growing Indo-Pacific economy after China and India (Limaye, 2021). The region's GDP is projected to grow over 5.5% per year and become the 4th largest economy by overtaking India and Japan by 2030 (Limaye, 2021). Following the illustration in Figure 7, indicating ASEAN's positive trend in GDP and GDP per capita over the period of 2000 to 2018, Despite a sharp decline from 2019 to 2020 by the COVID-19 epidemic, the region's total GDP in 2020 was almost five times the GDP value in 2000.

Table 7: The Compound Annual Growth Rate of Real GDP per capita in $USD between Singapore, Malaysia, and Thailand across 8 Years Period

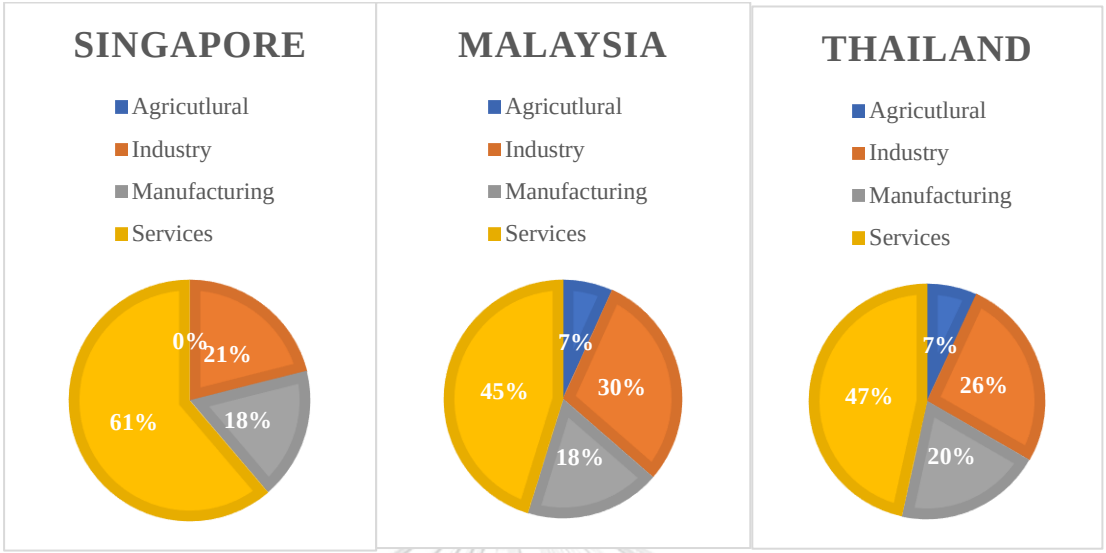
	Singapore	Malaysia	Thailand
2013	58560.51	11377.71	6302.36
2014	59330.83	11456.93	5994.86
2015-2016	56129.29	9805.22	5839.71
2017	59221.92	9724.47	6304.67
2018	62556.71	10719.85	6880.59
2019	61816.79	10761.53	7293.75
2020	58772.98	9877.80	6771.10
2021	67718.12	10205.90	6715.67
CAGR	1.83%	-1.35%	0.80%

Source: Created by Author based on the World Bank, 2013 - 2021

In reference to Table 7, the Compound Annual Growth Rate (CAGR) and Real GDP per capita (USD) between Singapore, Malaysia, and Thailand, indicates that Singapore holds the top position as the highest Real GDP per capita despite the country's lowest CAGR when compared with Malaysia and Thailand. Following Singapore, Malaysia holds the middle position in both Real GDP per capita by year and CAGR, while Thailand holds the lowest Real GDP per capita with the highest compound annual growth rate.

To further elaborate on the key distinction between Real GDP per capita across 8 years and compound annual growth rate, it is evident that CAGR illustrates a bigger image. Despite experiencing some increment and decrement in Real GDP per capita, all of the countries enjoy an 8-year positive Real GDP per capita growth rate.

Figure 8: Singapore, Malaysia, and Thailand's Structure of Economic Sectors by Percentage of GDP in 2020



Source: Created by Author based on the World Development Indicators Database, 2020

More specifically, ASEAN's economic structure can be defined and categorized into three main sectors: (1) agriculture, (2) industry, and (3) services. Figure 8 indicates that the service sector is the largest and leading industry in the ASEAN economy. The proportion of the service sector rose from 46.5% in 2005 to 50.6% in 2020, reflecting a transitioning trend of agriculture and industry sectors into the services industry. This can be seen through the decrease of the other two sectors over the 15-year period, where the share of the industry sector decreased from 39.5% to 35.8%. Similarly, the share of the agriculture sector also decreased from 12.9% to 10.5%.

Through the comparative case studies between Singapore, Malaysia, and Thailand, Figure 8 further illustrates the differences in industries that contribute to the percentage of their GDP in 2020. From the pie chart, both Malaysia and Thailand do have a relatively similar economic structure where the service sector dominates the majority of 45–47% of the country's GDP. Following the service sector, the industrialized department holds around 30% of the country's GDP, followed by manufacturing and agriculture, respectively. Due to the geographical limitation, Singapore's agricultural sector remains at 0%, whereas Singapore's service sector dominates over 60% of the country's GDP in 2020. The key indication of a large

proportion of the service sector may indicate the greater importance of the service industry when compared to other key departments.

Table 8: Percentage of Employment by Sector in Singapore, Malaysia, and Thailand between 2015 to 2020

	Singapore				Malaysia				Thailand			
	Male		Female		Male		Female		Male		Female	
	2015	2020	2015	2020	2015	2020	2015	2020	2015	2020	2015	2020
Agriculture	0.1	0.1	0.0	0.0	15.3	13.0	7.9	5.9	34.3	34.1	29.8	28.3
Industry	21.8	18.8	12.2	11.0	32.5	31.3	19.3	20.0	26.1	25.4	20.8	19.8
Service	78.8	81.1	87.8	89.0	52.2	55.7	72.8	74.1	39.5	40.5	49.4	52.0

Source: Created by author based on World Development Indicator 2020

From Table 8 in which indicates the different share of employment by sectors between Singapore, Malaysia, and Thailand, the observable trends continue to follow the similar patterns as the increases in the proportion of service sector. In this case, the employment in service sector by both genders are significantly increase in year 2020.

Table 9: Structure of Service Sector in Singapore, Malaysia, and Thailand between 2010 to 2020 in Percentage

	Singapore		Malaysia		Thailand	
	2010	2020	2010	2020	2010	2020
Transport	29.5	30.5	10.1	8.2	10.5	8.6
Travel	28.6	4.0	40	35.9	39.9	33.1
Insurance and Financial Services	4.9	7.8	23.4	22.3	30.9	25.2
Computer Information, Communication, and other Commercial Services (CICC)	47.0	57.8	48.5	54.8	49.6	58.3

Source: Created by author based on World Development Indicator 2020

Through the illustrations from Tables 8 and 9, it is apparent that the service sector is dominating its proportion of the country's GDP through the reduction in agricultural, industry, and manufacturing sectors across all three countries. Table 8 indicates the importance of the service sector for the development of a country's economic growth. Therefore, Table 9 supplements the findings by highlighting that "Computer information, communication, and other commercial services (CICC)" is the leading sector within the service sectors between the three countries. The tables also signify a similar observable trend of decreasing the portion of other services to improve the share of CICC. This reflects the importance of the working-age population, specifically in the CICC sector, where it plays a critical role in shaping and developing the country's GDP.

According to the article "Indonesian Human Resources Readiness in Terms of Facing the ASEAN Economic Community" by Fathin et al. in 2014, the authors aim to investigate the implication of the ASEAN Economic Community's (AEC) Mutual Recognition Arrangement (MRA) on Indonesia's human resource development. The

authors specifically used globalization theory to (1) describe the impact of globalization on the supply of human resources, and (2) discuss the impact of globalization on human resource competitiveness (Fathin et al., 2014). In this study, the authors defined globalization through the lens of economists as the development of (1) trading flows, (2) technological change, (3) the flow of cross-border capital, (4) tariff liberalization, and (5) economic sectors from production-based economies to service industries. In the optimistic perspective, the authors described the implications of globalization as follows: if developing countries could develop their talents and skilled individuals to match their occupations, then the country's level of competitiveness would greatly increase as the supply of talented individuals also increases. On the other hand, from the pessimistic point of view, the authors state that developed countries will always have an easier time attracting, growing, and retaining talents as they can afford to pay higher salaries for their talents. Through these two perspectives, the authors assume that the implementation of Mutual Recognition Arrangement (MRA) by the ASEAN Economic Community (AEC) could result in two possible scenarios where (1) Indonesia would face brain drain phenomena as Indonesian talents may choose to work abroad when compared directly to the differences in financial income; On the other hand, the optimistic perspective would argue that Indonesia may benefit from the incoming flow of foreign talents considering that the infrastructure and facilities are suitable for talents to thrive (Fathin et al., 2014). Ultimately, the initiation of MRA by AEC could resulted in either of the two possibilities depending on the country's abilities to enable, attract, grow, and retain talents for their innovative-driven economies

In a closer examination of the process of talent and migration mobility in ASEAN, Chen and Su-Yen (2016) argued that while the ASEAN agreement on the MRA would result in an increase in migration mobility between ASEAN member states (AMS), the inequality in (1) infrastructural development, (2) political systems and beliefs, (3) labor and talent attractiveness, and (4) financial and capital market structures would lead to disproportionate benefit for some AMS and impoverish others. Through the examination of the Global Talent Competitiveness Index reports in 2014 and 2015, the authors concluded that Singapore is a clear winner in the war of

talent and is likely to benefit from brain gain from the neighboring countries (Chen & Su-Yen, 2016). The authors discussed their findings that Singapore's ICT and R&D infrastructure, pro-business climate, and investment in tertiary institutions played a critical role in enabling, attracting, growing, and retaining talents coming into the country since Singapore is one of the very few ASEAN member states that could offer the best climate for foreign talents when compared to others. While Singapore's long-term attractiveness may be difficult to compete with through the lens of other AMS, the author noted that Malaysia, the Philippines, Indonesia, and Thailand are all competing for the short-term employment of talented individuals. More specifically, the short-term attractiveness and its implications for economic development must not be overshadowed by Singapore's success. The key reasoning being that these talents are critical for developing countries to make the transition from an efficiency-driven to an innovation-driven economy. While the countries may not be able to retain talent in the long run, the transition period would allow developing countries to improve their quality of life and create job opportunities for future migrant mobility (Chen & Su-Yen, 2016).

When considering the relations between the state of ASEAN and the GTCI index, Chen & Su-Yen (2016) described the characteristics of talent mobility through the theoretical framework of the push and pull model. On one hand, the authors found that talent mobility is largely motivated by comparing economic opportunities between a home and a foreign country. When one foreign country is presented with better financial opportunities and quality of life, talents will be drawn to countries with better infrastructure and supporting facilities. To be more specific, the authors used Singapore as the key study to highlight the Singaporean government's ability to act as a magnet to pull talents from all over the world by committing to invest in its infrastructure and creating an attractive pro-business climate with better job opportunities, so that the country is the most attractive location for talents to grow and thrive (Chen & Su-Yen, 2016). It should also be noted that "push factors" also play a pivotal role in driving young talents away from their place of origin. Chen & Su-Yen (2016) described this phenomenon through Malaysia's affirmative policies, which led to the disconnection between Malaysians of Chinese and Indian ethnicity. Therefore,

many Malaysians with these descendants were pushed to social injustice and resulted in their leaving their home country for other places such as Singapore.

2.2 Singapore and the Global Talent Competitiveness Index

According to the article by Wong et al. (2016) on "Talent Management in the Public Sector: A Comparative Study of Singapore, Malaysia, and Thailand," the authors highlight the implication of (1) pre-service scholarships, (2) management associate program (MAP), (3) administrative service, and (4) high-potential program (HiPo) on Singapore's talent management practices that elevate Singapore to become the most attractive pro-business climate for talents in the ASEAN region (Wong et al., 2016). Singapore's first key talent management scheme on pre-service scholarships emphasizes Singapore's perspective on attracting the best young men and women to serve in the government. Candidates were assessed through high-school academic results, leadership skills, and their desire to serve in the public sector. This form of internal attraction allows Singapore to bind its young talents to only work in the government, in which case they would directly be placed under the MAP development program to specifically develop skillsets that match their role in the government. Essentially, the 2-year government-initiated MAP program would allow participants to broaden their perspectives and experiences and deepen their management and leadership skills. The implication of these programs can be elaborated through the administrative service scheme, where Singaporeans in their mid-thirties could elevate their roles into directors and executives in their respective departments when compared to Malaysia and Thailand, where it usually takes longer time to develop their own talents in the public sector. Lastly, Singapore's high-potential program (HiPo) also emphasizes the country's infrastructure and ability to impede talent attraction and growth, in which the program offers more opportunities for in-service officers to enroll in the millstone-training program to improve leadership capabilities for as many Singapore officers as possible so that the country can ensure the quality of talent succession line in the innovation-driven economy.

In reference to the article "Talent Management in Small Advanced Economies," by Michailova and Ott in 2019, the authors aimed to investigate the implications of talent management (TM) in small-advanced economies through the use of the Global Talent

Competitiveness Index (GTCI) in 2018 and 2019. The significance of the research stated by the authors was to understand and interpret the ranking phenomenal where four out of five countries in the GTCI report were small-advanced economies for two consecutive years. The authors defined countries with small-advanced economies through two key criteria: (1) the International Monetary Fund's (IMF) classification of advanced economies; and (2) the total population of a country. Through the IMF's recognition of countries with advanced economies, the organization differentiates through (1) the subject's Real GDP per capita, (2) the subject's export diversification, and (3) the subject's degree of integration into the global financial system (Michailova & Ott, 2019). On the other hand, the authors referred to the Small Advanced Economies Initiative's criteria and concluded that the total population of a country between 4 to 10 million would then consider a country to have a small economy. All in all, the authors chose Singapore, Sweden, and Denmark as their case studies to investigate and examine the implications of TM in states with small-advanced economies (Michailova & Ott, 2019).

The authors found that Singapore and states with small-advanced economies are (1) more exposed and vulnerable to the changes in global economic and political development, (2) more conscious about their advantages and talent competitiveness, and (3) more constrained by policy availability. To be more specific, with the consideration of Singapore's GTCI score of 78.42 in 2018 and 77.27 in 2019, the country ranked second globally and ranked first in the ASEAN region for two consecutive years. Singapore also ranked first in its ability to enable and attract talent, meaning that Singapore was able to create a favorable climate for talent to develop, thrive, and compete in the Singaporean labor market. In notable instances, Singapore's investment in "Global Schoolhouse" has attracted many top international talents to study and stay in the country. The country also utilized a government-led "home growing" policy to ensure that Singaporeans are equipped with the right skills for their roles in both the public and private sector. The government's effort and investment were incredibly apparent through their philosophical perspective of "get the best people in; give them challenging work; and pay them well," which resulted in

Singapore being the fourth most attractive destination among individuals in the Asia-Pacific region (Michailova & Ott, 2019).

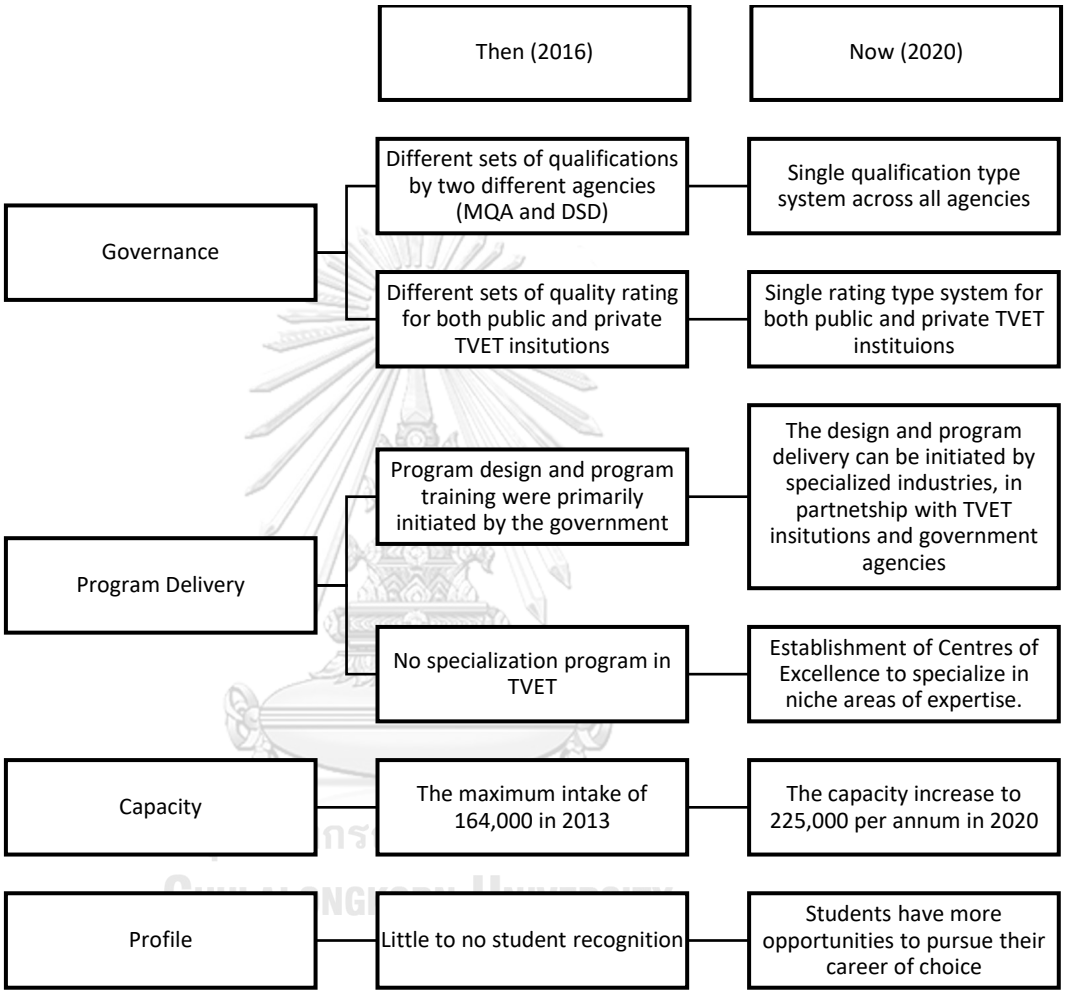
Despite Singapore's high ability to attract foreign talents, the country has also been developing and investing in talent management strategies ever since Singapore had declared its independence (Poocharoen & Lee, 2013). Singapore's efforts to develop its talents can be seen in the development of early years children, where profession and teacher training are always monitored and regulated by government-initiated agencies. Apart from Singapore's investment in its education infrastructure, the government is also focused on attracting talented foreign researchers and professors to teach Singaporean students in the local Singaporean universities. (Poocharoen & Lee, 2013). All in all, the success of Singapore's talent management lies within the balance between an exclusive and inclusive approach. On one hand, Singapore's exclusive approach designs its policy to target both talents in the business sector and the academia sector. On the other hand, Singapore's inclusive approach ensures that all opportunities and services are available for Singaporean citizens to develop their talents to match the skillsets of the knowledge-based economy (Poocharoen & Lee, 2013).

2.3 Malaysia and its Global Talent Competitiveness Index

Similar to Singapore's pre-service scholarship that encourages young talents to enter public service, the Malaysian government also invests and offers pre-service scholarships for young Malaysians who may want to work in the Malaysian government and encourages young scholars to pursue tertiary education abroad. When Jabatan Perkhidmatan Awam (JPA) scholars finished their degrees and wanted to return to the Malaysian economy, there was no guarantee of a job position if there were no available positions to apply for. However, the Malaysian government has initiated a joint collaboration between JPA and Talent Corp to enable scholars to work in private sectors and ease their transition to the public sector later when job positions are available. Essentially, the Malaysian government noticed that these young scholars who completed their tertiary education abroad were in a vulnerable situation that could be attracted away from the Malaysian labor force market due to previous limitations on Malaysian infrastructure. Therefore, the country has ensured that young

talents must be retained and nurtured so that they can contribute to the growth of the Malaysian economy (Poocharoen & Lee, 2013).

Figure 9: Malaysia's Technical and Vocational Education and Training (TVET) Policy Summary



Source: Malaysia Economic Planning Unit Report, 2016

In reference to Figure 9 in which highlights the transformation of Malaysia's TVET program in each of the key areas of (1) governance, (2) program delivery, (3) capacity, and (4) profile (MalaysianEconomicPlanningUnit, 2016) Essentially, Malaysia's TVET has changed some of its policies to match with the development of talents in new industries where the government initiated a single qualification system instead of several qualification institutions to ease the requirements and potential unnecessary steps for Malaysian workers. Moreover, the improved version of TVET

has collaborated with private organizations to ensure that training and program delivery match the requirements of the firms so that graduates may directly enter the industries after their completion.

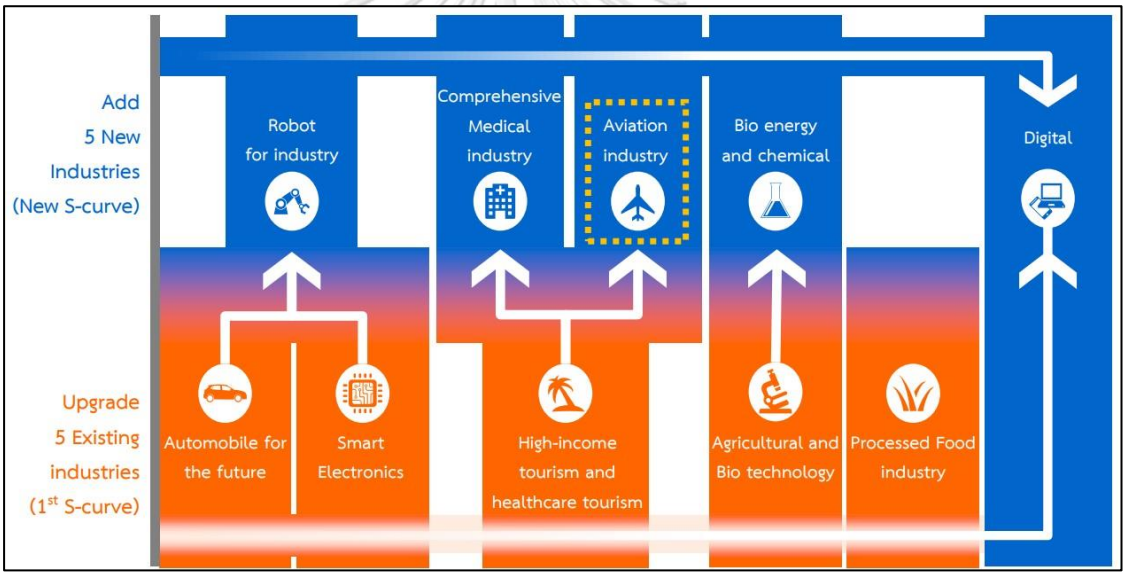
2.4 Thailand and its Global Talent Competitiveness Index

Contrary to Singapore and Malaysia's talent management schemes, Thailand's pre-service scholarship scheme can be categorized into two types: (1) the specific ministry-bonded scholarship and (2) the non-specific ministry scholarship. Scholars who took a specific ministry-bonded scholarship, on one hand, would know exactly where they are bonded after graduation, on the other hand scholars who took a non-specific ministry scholarship would be more vulnerable to job opportunities and security due to the possibility of mismatching skillsets and a lack of guaranteed position that would match the talent (Poocharoen & Lee, 2013).

According to the article "Talent Risk Components in the Thailand Automobile Industry," by Junkao et al. (2017), the key variables that may be especially important for the development of talent management in the Thai context are: (1) education policy; (2) talent mismatch; and (3) internal branding. As the article takes a closer look at Thai education policy, the authors found that Thailand's national talent programs are traditionally ignored by the demand of the talent market. More specifically, with an increasing demand for engineers in Thailand's automotive industry increasing to 17.05% of the total market demand, the Thai education policies were only able to produce 6.60% of the engineers graduates, meaning that Thailand lacks its ability to grow Thai talents to supply the demand from the labor market (Junkao et al., 2017). Over the years of studies on Thailand's development of the electric vehicle (EV) industry, Osatis & Asavanirandorn (2022), have shed more light on the challenges that engineers, technicians, and operators would face under an unclear government-initiated roadmap. More specifically, the key issues of (1) increasing labor demand with lower supply for high-skilled engineers; (2) the need for clearer upskilling existing technicians' roadmap on new technological knowledge; and (3) the decreasing employment trend for low-skill operators have been shown to have a significant impact on the development of Thailand's next-generation automotive industry. (Osatis & Asavanirandorn, 2022). Due to the earlier challenge of Thailand's

education policy, the issue of talent mismatch also raises the key question of whether the education system was unable to produce new talents that matched labor demand, and thus both the private and public sectors need to spend more time looking overseas and attracting the right talent for the industry. In terms of internal branding in Thailand, while this issue may not be as popular as Thailand's education policy and talent mismatch, the failure of development of good internal branding will greatly impact the organization's supply and their commitment, as talented individuals may have more opportunities and job options and may decide to leave the organization if there is no retention system in place to ensure that talents continue to stay within the organization (Junkao et al., 2017).

Figure 10: Thailand's Eastern Economic Corridor (EEC) and S-curve Industries



Source: The Board of Investment of Thailand, 2021

Following Thailand's attempt to make the country move towards a high-income country by 2037 through its 20-year National Strategy through the Eastern Economic Corridor (EEC) project. The illustration shown in Figure 10, shows that Thailand aims to upgrade its five existing industries in the first phase of S-curve, as well as add five new industries to support Thailand's 4.0 vision. Essentially, the project aims to develop Thailand's (1) fundamental infrastructure, (2) digital infrastructure, (3) livable smart cities and financial centers, (4) targeted industries that utilize advanced technologies, (5) tourism, and (6) human resources, education, research, and technology.

In reference to the article “Aging and the labor market in Thailand” written by Moroz (2021), and published by World Bank Blogs, Thailand’s labor market is also projected to decline due to the country’s inability to (1) promote labor force participation, (2) transition low-productivity workers out of agricultural sector, and (3) develop national human resource to undertake knowledge-driving economy. More specifically, the share of Thailand’s working-age population will further decline to 56% in 2060 (Moroz, 2021). While nearly 30% of the working-age population is projected to decline, the share of older-age population aged 65 and older continue to increase from 13% in 2020 to 31% in 2060 (Moroz, 2021). Essentially, this may rank Thailand as the 22nd largest share of old-age population in 2060 with fewer resources available to tackle the issue of aging and labor market. Additionally in the article, “Thailand’s performances in the world competitiveness ranking” (NXPO, 2020), Thailand’s scientific infrastructure competitiveness had fell by one rank from the previous years. Despite some improvement in Thailand’s scientific and ICT competitiveness, the country’s rating remains behind Singapore and Malaysia. In the sector of Research and Development (R&D) expenditure, Thailand experiences an increase of total R&D personal per capita from 20.9 to 24 FTE, per 10,000 people but fell by one rank from 40th to 39th (NXPO, 2020). In terms of patent applications per capita, Thailand had also improved its application filed per 100,000 inhabitants from 2.43 to 2.54 applications. Despite this improvement, Thailand remains far behind the world average patent application per capita of 83.39, and Singapore’s 131.50 applications (NXPO, 2020).

To further elaborate the implication of EEC Bruton (2017) stated that Thailand is one of the most favored nations when speaking on the topic of women’s education, rights, and work participation. Women appeared to have better education performance than men due to their participation in the education pyramid; they face very little to no discrimination in job opportunities; and their salaries are based on their performance rather than gender discrimination. (Bruton, 2017). On the other hand, the external attraction can be explained by the level of foreign direct investment (FDI) in Thailand. According to an OECD report in 2021, Thailand is the third major FDI destination in ASEAN, following Singapore and Indonesia. With the establishment of

Thailand’s EEC, the country was able to attract greenfield investment to promote Thailand's 4.0 strategy in new S-curve industries. Despite an increase in FDI and concentrated investment from Japan, the United States, and Singapore, the country must be aware of the uneven development and distribution of regional development, which may have an impact on the development of domestic talent if Thailand relies too heavily on foreign firms to outperform Thai organizations (OECD, 2021). Essentially, Thailand continued to receive positive benefit from FDI, but the authoritative figure needs to ensure that domestic talents and infrastructure needs to also develop alongside the establishment of new innovation-drive economies

2.5 Gap in Literature

Despite a series of talent management literature in ASEAN as well as in Singapore, Malaysia, and Thailand, extremely limited studies have been conducted through the incorporation of the Global Talent Competitiveness Index against the Real GDP per capita of ASEAN member states. The closest integration of GTCI indices with a country’s Real GDP per capita was done by Fyliuk et al. in 2019. The author adopted Global Talent Competitiveness Index (GTCI), against GDP per capita in Ukraine. Essentially, the authors found that there is an apparent gap between states in the global core and the periphery states outside of the core. In other words, high-income countries that are traditionally considered global core states tend to have a more competitive advantage when enabling, attracting, and retaining talented individuals. (Fyliuk et al., 2019). With the coming war for talents in ASEAN region, Singapore had already became the strongest actor in ASEAN when evaluating the country’s ability to increase its supply to meet the nation’s demand (Michailova & Ott, 2019). With a lot of attention towards Thailand as the epicenter of the research, the study aims to propose appropriate policy recommendations on talent development in relation to Singapore and Malaysia’s policies. The study will also intend to fulfill the missing literacy gap in Thailand so that the country will be aware of its level of global talent competitiveness index and prepare the country’s infrastructure to better enable, attract, grow, and retain talents for Thailand's 4.0 approach to become one of the high-income countries and be within the global core.

Chapter 3: Data and Methodology

3.1 Data and Data Collection

Figure 11: The Global Talent Competitiveness Index and Variables

		1st Level	2nd Level
Global Talent Competitiveness Index	Input Model	Enable	Regulatory Landscape
			Market Landscape
			Business and Labor Landscape
		Attract	External Openness
			Internal Openness
		Grow	Formal Education
			Lifelong Learning
			Access to Growth Opportunities
		Retain	Sustainability
			Lifestyle
	Output Model	Vocational and Technical Skills	Mid-Level Skills
			Employability
		Global Knowledge Skills	High-Level Skills
			Talent Impact

Created by Author based on the Global Talent Competitiveness Index Report, 2021

Through the Global Talent Competitiveness Index Reports from 2013 and 2021, the GTCI index categorized its variables into two categories: (1) input model and (2) output model. According to figure 11, the input model consisted of four indices in the

first level and contained a total of ten indices in the second level. On the other hand, the output model consisted of two indices in the first level and contained a total of four indices in the second level.

With the decision to account for three countries as the case study, the collection of data from Singapore, Malaysia, and Thailand was largely collected through the GTCI report from 2013 to 2021. That is, each country would have a total of forty-eight data points for first-level variables, and depending on the level of significance and relationship, only the second-level variables would be considered to better understand and interpret the correlation between Real GDP per capita and GTCI indices in the first level. In summary, the study would have over 144 data points over an 8-year period between three countries as the case study.

Figure 12: The Number of Global Talent Competitiveness Index and its Variables

	Quantitative Data	Composite Indicator	Qualitative Data	**Total Variables**
2013	19	9	20	48
2014	19	9	20	48
2015-2016	31	10	24	65
2017	27	10	24	61
2018	25	15	25	65
2019	25	15	28	68
2020	27	14	29	70
2021	29	15	24	68

Source: The Global Talent Competitiveness Index Report, 2021

According to Figure 12 in which highlights the amount of each type of data that construct GTCI's 1st and 2nd level, the categorization of each data can be elaborate as:

1. Quantitative Data were hard data that were collected from public sources such as the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations Conference on Trade and Development (UNCTAD). For instance, (1) percentage of workforce with tertiary education in 2020, (2) percentage of population with tertiary education in 2019, and (3) percentage of professionals in 2020
2. Composite Data were indices that collected from the World Bank, the Global Innovation Index, and Environmental Performance Index. For example, (1) environmental performance in 2020, (2) personal rights in 2020, and (3) personal safety in 2020
3. Qualitative Data or survey data were mainly collected from the World Economic Forum's Executive Opinion Survey. Some of the topics that were classified as survey data were: (1) social protection in 2020, (2) brain retention in 2018, and (3) ease of finding skilled employees in 2020.

3.2 Data and Data Analysis

Despite the use of the same framework across an 8-year period, each of the yearly reports consisted of a different totality of nominalized variables. For instance, in the year 2020, a total of 70 variables were used to measure and reflect the 3rd level indicators, whereas in 2019 and 2021, a total of 68 variables were used. Despite the differences in the total number of variables to reflect the GTCI indicators, the six core-pillars and 14 sub-pillars remain the same and are available for direct comparative study.

To better understand the coming of normalized scores of the GTCI framework, the reports employed the min-max normalization formula of:

$$100 \times \frac{(VALUE - \mathrm{MIN})}{(MAX - MIN)}$$

To normalize the scores of each indicator into the range of (0-100), where high scores reflect better outcomes of respective indicators. For the instance where higher

value reflects worse outcome, the reports employed reverse normalization formula as follows:

$$100 \times \frac{(MAX - \text{VALUE})}{(MAX - MIN)}$$

Source: The Global Talent Competitiveness Index Report, 2021

In consideration to the research objective, the study will first use compound annual growth rate equation to contextualize the situation of Real GDP per capita. This model will be used to describe the rate at which Real GDP per capita would have grown when the value may rise or fall over a specific value of over time. The equation follows:

$$CAGR = ((\frac{V_{final}}{V_{begin}})^{1/t} - 1) \times 100$$

Where $CAGR$ is compound annual growth rate

V_{final} is final value

V_{begin} is beginning value

t is time in years

Through the IBM SPSS version 22.0.0.0, the study will input the normalized information acquired from the GTCI report in order to compute multiple linear regression to investigate the level of significance of each variable against the Real GDP per capita across an 8-year period. The equation will be used to find the estimated Real GDP per capita when the findings show that specific variables are statistically significant, which illustrates a clearer picture of to what extent a variable impacts Real GDP per capita of the country. The general equation follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu_1$$

Where Y_i indicates dependent variable

β_0 indicates population at the Y intercept

β_1 β_2 β_3 indicates population slope coefficients

X_1 X_2 X_3 indicates independent variables

μ_1 indicates random error terms

Following the general multiple regression model, the dependent and independent variables are illustrated through Table 10:

Table 10: The Table of Dependent and Independent Variables

Dependent Variable	Independent Variables	
Real GDP per capita	Input	Output
	Enable	Vocational and Technical Skills
	Attract	Global Knowledge Skills
	Grow	
	Retain	

Created by Author based on the Global Talent Competitiveness Index, 2013 - 2021

3.3 Research Methodology

Through the original objective that aims to:

1. Examine the significance of 6 Global Talent Competitiveness Index on Real GDP per capita through multiple linear regression method across 8-year time series data between Singapore, Malaysia, and Thailand.
2. Investigate whether there is correlation between Real GDP per capita and each of the 6 Global Talent Competitiveness Index.
3. Conduct a comparative study between Singapore, Malaysia, and Thailand to better understand Thailand's abilities to enable, attract, grow, and retain talents in for the development towards innovation-driven economy in the form of Real GDP per capita.
4. Propose policy recommendation for Thailand to promote the betterment of enabling, attracting, growing, and retaining talented individuals, so that Thailand could acquire talents to support knowledge-based economy and enhance Thai's economic system towards innovative-driven economies in the form of higher Real GDP per capita.

The formulation of research question are as follows:

Research Question 1: *What variables of the GTCI pillars are statistically significant and positively correlated with the Real GDP per capita of Singapore, Malaysia, and Thailand?*

Research Question 2: *What variables of the GTCI pillar at the second level are statistically significant and positively correlated with the Real GDP per capita of Singapore, Malaysia, and Thailand?*

Research Question 3: *What are the key areas that Thailand should be focusing on in order to improve its capability to enable, attract, grow, and retain talents in order to improve its Real GDP per capita for the betterment Thailand's future talent development?*

Therefore, the study hypothesizes that:

Hypothesis 1: *Input-model are all statistically significant and positively associated with Real GDP per capita.*

Hypothesis 2: *Output-model are all statistically significant and positively associated with Real GDP per capita.*

Chapter 4: Empirical Results and Discussion

The chapter aims to present and interpret the empirical findings of Singapore, Malaysia, and Thailand's Real GDP per capita against variables in the GTCI input and output model. The study will evaluate the time series data of the Global Talent Competitiveness Index Report from 2013 to 2021, where the year 2015 and 2016 were combined into a single year. Therefore, a total of 8-years time series will be gathered from Singapore, Malaysia, and Thailand. Through the GTCI report that published by INSEAD: The Business School for the World, Fontainebleau, France, the study will use the nominalized scores of the six pillars and the calculated Real GDP per capita of Singapore, Malaysia, and Thailand to examine the relationship between GTCI indices and the Real GDP per capita of the countries in this case study. The author will use IBM SPSS Statistics version 22.0.0.0 as the main tool to investigate the level of significance and coefficients of each variable to ultimately prove the study's hypotheses mentioned in Chapter 3.

4.1 Empirical Results of Singapore, Malaysia, and Thailand Real GDP per capita

Table 11: Real GDP per capita of Singapore from 2013 to 2021

Year	Nominal GDP per capita (Current $US)	GDP Deflator	Real GDP per capita
2013	56967.43	97.28	58560.51
2014	57562.53	97.02	59330.83
2015-2016	56253.52	100.22	56129.29
2017	61150.73	103.26	59221.92
2018	66859.34	106.88	62556.71
2019	65831.19	106.49	61816.79
2020	60729.45	103.33	58772.98
2021	72794.00	107.50	67718.12

Created by Author based on World Bank, 2013-2021

Note: Base year of GDP deflator is 2015, owing to consistency with GTCI data, the author calculated the average value of real GDP per capita, GDP deflator and Nominal GDP per capita of 2015-2016

Table 12: Real GDP per capita of Malaysia from 2013 to 2021

Year	Nominal GDP per capita (Current $US)	GDP Deflator	Real GDP per capita
2013	10970.10	96.42	11377.71
2014	11319.06	98.80	11456.93
2015-2016	9886.51	100.83	9805.22
2017	10259.30	105.50	9724.47
2018	11380.08	106.16	10719.85
2019	11432.83	106.24	10761.53
2020	10412.35	105.41	9877.80
2021	11371.10	111.42	10205.90

Created by Author based on World Bank, 2013-2021
Note: Base year of GDP deflator is 2015, owing to consistency with GTCI data, the author calculated the average value of real GDP per capita, GDP deflator and Nominal GDP per capita of 2015-2016

Table 13: Real GDP per capita of Thailand from 2013 to 2021

Year	Nominal GDP per capita (Current $US)	GDP Deflator	Real GDP per capita
2013	6168.26	97.87	6302.36
2014	5951.88	99.28	5994.86
2015-2016	5916.68	101.32	5839.71
2017	6593.82	104.59	6304.67
2018	7298.95	106.08	6880.59
2019	7814.38	107.14	7293.75
2020	7158.77	105.73	6771.10
2021	7233.39	107.71	6715.67

Created by Author based on World Bank, 2013-2021
Note: Base year of GDP deflator is 2015, owing to consistency with GTCI data, the author calculated the average value of real GDP per capita, GDP deflator and Nominal GDP per capita of 2015-2016

$$REAL\ GDP\ PER\ CAPITA = (Nominal\ GDP\ per\ capita\ \div GDP\ Deflator) \times 100$$

According to Table 11, 12 and 13, of which describes the calculated Real GDP per capita for the betterment in the accuracy and comparing the economic status of states' Real GDP per capita over time. The findings indicated that after the effect of price changes were considered through the GDP deflator, the Real GDP per capita were slightly lower than the nominal Real GDP per capita and thus allowing the study for more accurate comparison of the Real GDP per capita over time.

4.2 The Covariance Analysis of Singapore, Malaysia, and Thailand's GTCI Variables in the Input Model

Table 14: The Covariance Analysis (ANCOVA) of Singapore GTCI Variables in the Input Model through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance

	Enable	Attract	Grow	Retain
Enable	1.000			
Attract	0.850*** (0.007)	1.00		
Grow	0.669 (0.070)	0.582 (0.130)	1.00	
Retain	0.103 (0.808)	0.139 (0.742)	-0.448 (0.265)	1.00
VIF	4.924	3.726	3.623	2.040
Tolerance	0.203	0.268	0.276	0.490
N	8	8	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021

Note: p-value in the parentheses

***p < 0.01

According to Hair et al., (2010)'s criteria on multicollinearity, the three key qualifications that would cause multicollinearity problem are:

1) *The value of correlation matrix exceeds 0.90; r > 0.90*
2) *The value of variance inflation factors (VIF) exceeds 10; VIF > 10*
3) *The value of tolerance below 0.10; T < 0.10*

Through the illustration from Table 14 in which indicates the relationship between GTCI variables in the input model in the case of Singapore, the findings describe a high statistically significant correlation between Enable and Attract indices where r = 0.850 and p-value = 0.007. However, in reference to Hair et al. (2010), criteria on multicollinearity, the relationship between Enable and Attract did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.850 is below 0.90, (2) the value of VIF of 4.924 did not exceed 10 and (3) the value of tolerance of 0.203 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Singapore to see their relationship with the country's real GDP per capita.

Table 15: The Covariance Analysis (ANCOVA) of Malaysia GTCI Variables in the Input Model through Pearson Correlation, Variance Inflation Factors (VIF), and Value of Tolerance

Malaysia	Enable	Attract	Grow	Retain
Enable	1.000			
Attract	0.105 (0.805)	1.00		
Grow	-0.082 (0.848)	0.459 (0.253)	1.00	
Retain	0.562 (0.147)	0.734** (0.038)	5.333 (0.173)	1.00
VIF	1.301	2.326	1.466	2.330
Tolerance	0.319	0.302	0.469	0.136
N	8	8	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021
Note: p-value in the parentheses
**p < 0.05

Through the illustration from Table 15 in which indicates the relationship between GTCI variables in the input model in the case of Malaysia, the findings indicate some relationship between Attract and Retain index where r = 0.734 and p-value = 0.038. However, in reference to Hair et al. (2010), criteria on multicollinearity, the relationship between Attract and Retain have did not meet the qualifications of

collinearity as (1) the value of correlation matrix of 0.734 is below 0.90, (2) the value of VIF of 2.326 did not exceed 10 and (3) the value of tolerance of 0.302 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Malaysia to see their relationship with the country's Real GDP per capita.

Table 16: The Covariance Analysis (ANCOVA) of Thailand GTCI Variables in the Input Model through Pearson Correlation, Variance Inflation Factors (VIF), and Value of Tolerance

Thailand	Enable	Attract	Grow	Retain
Enable	1.000			
Attract	-0.166 (0.694)	1.00		
Grow	-0.339 (0.412)	-0.347 (0.399)	1.00	
Retain	0.079 (0.852)	0.713** (0.047)	-0.455 (0.258)	1.00
VIF	1.301	2.326	1.466	2.330
Tolerance	0.769	0.430	0.682	0.429
N	8	8	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021

Note: p-value in the parentheses

**p < 0.05

Through the illustration from Table 16 in which indicates the relationship between GTCI variables in the input model in the case of Thailand, the findings indicate some relationship between Attract and Retain index where r = 0.713 and p-value = 0.047. However, in reference to Hair et al. (2010), criteria on multicollinearity, the relationship between Attract and Retain did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.713 is below 0.90, (2) the value of VIF of 2.326 did not exceed 10 and (3) the value of tolerance of 0.430 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Thailand to see their relationship with the country's Real GDP per capita.

4.3 Empirical Results of GTCI's Input Model and Countries' Real GDP per capita

Table 17: The Statistical Analysis of Singapore, Malaysia, and Thailand's Real GDP per capita against the 4 GTCI variables in Input Model Across 8 Years Period

	Singapore	Malaysia	Thailand
Constant	43641.720 (1.8879)	23639.589 (1.427)	12676.434 (4.012)
Enable	430.069 (1.010)	-117.901 (-0.591)	-34.866 (-0.976)
Attract	-315.459 (-0.952)	-80.901 (-0.731)	-4.716 (-0.123)
Grow	409.564 (1.854)	-50.435 (-0.350)	-73.269** (-4.343)
Retain	-329.228 (-1.066)	40.671 (0.301)	-22.063 (-0.425)
N	8	8	8
R-Square	0.889	0.351	0.879
Adjusted ($\boldsymbol{R^2}$)	0.742	-0.515	0.718
DF	7	7	7

Note: t-statistic in the parentheses
** $p < 0.05$

In reference to Table 17 in which illustrates the level of significance and relationship between variables in GTCI's input model and respective country's Real GDP per capita, the findings of each country can be formulated into equations as follows:

$$SINGAPORE'S\ REAL\ GDP\ PER\ CAPITA = 43641.72 + 430.07\ (Enable) - 315.46\ (Attract) + 409.56\ (Grow) - 329.23\ (Retain)$$

$$MALAYSIA'S\ REAL\ GDP\ PER\ CAPITA = 23639.59 - 117.90\ (Enable) - 80.90\ (Attract) - 50.43\ (Grow) + 40.67\ (Retain)$$

$$THAILAND'S\ REAL\ GDP\ PER\ CAPITA = 12{,}676.43 - 34.87\ (Enable) - 4.72\ (Attract) - 73.27(Grow) - 22.06\ (Retain)$$

Following the findings from the multiple regression model, the study found that Thailand was the only country that the GTCI variable in the input model was associated with Thailand's Real GDP per capita. More specifically, Thailand's Grow index is the only variables that is statistically significance at 5% and negatively correlated with Thailand's Real GDP per capita. Additionally, Thailand's adjusted R-squared of 0.718 indicates that approximately 71.8% of the changes in Thailand's Real GDP per capita can be explained by (1) Enable, (2) Attract, (3) Grow, and (4) Retain. The relationship can be interpreted as follows:

(1) If Thailand's Grow index increase by 1 unit, then Thailand's Real GDP per capita will decrease by $73.27 USD.

4.3.1 Interpretation of Grow Index and Thailand's Real GDP per capita

In reference to the original definition of Grow Index that defined through key development areas of (1) apprenticeships, (2) training, (3) continuous education, and access to growth opportunities, the study found that there was a negative correlation between Thailand real GDP per capita and its Grow Index. In other word, as the Thai government increases its effort and investment in the transformation of Thai's education, it rather decreases the growth of Thailand real GDP per capita. To interpret this finding, the paper will draw from prior literature reviews to show that Thailand's inability to (1) produce occupation-matching skills through vocational and technical programs, (2) promote tertiary education enrolment through assisting low-income families with educational expenditure, and (3) upskill vocational workers towards innovation-driven economy are the key rationales that caused Thailand to experience negative real GDP per capita when investing into its educational reformation.

To describe the first challenge that Thailand was still looking to improve the quality of its talents to fulfill the skillsets of knowledge-based economy, Vivatsurakit & Vechbanyonggratana (2021) specifically describe the relationship of vertical skills mismatch between formal and informal workers in Thailand economy. Considering

that informal workers made up of large contributions to Thai economy, the understanding of vertical mismatch is critical to highlight the current state of Thailand's educational and training policies that they did not effectively support the development of informal workers for the higher occupation status. Additionally, the authors found that the effort of Thai government's investment in education and economic policies have resulted in an overeducation of younger generations of workers, especially among informal workers. The key reasoning was that the employment opportunities in Thai labor market were limited and that overeducation faces wage penalties in private firms. Essentially, the authors described an alarming trend of the pressure to attain high levels of general education without key direction and promises for formal employment in both private and public organizations. Despite their general educational attainment in both secondary and tertiary level, very limited alignment between education curriculum and offered degree with formal jobs were made and managed by the Thai authorities. Therefore, despite the effort and investment in Thailand 20-years national plan through EEC and Thailand 4.0 approach, the alarming issue of younger generation with mismatch skillsets may cause Thailand's real GDP per capita to decrease as they may force to go to informal work and have difficult to transition to knowledge-based sector (Vivatsurakit & Vechbanyongratana, 2021).

In consideration to Junkao et al. (2017)'s article, where the authors argued that Thailand's education policy, mismatching talents, and internal branding are critical elements that contribute to the negative correlation of growing index and Thailand's real GDP per capita, the idea of internal branding was emphasized to highlights workers' satisfaction with their organization and relations with both their workers and workplace. While the concept of internal branding highlights the organization's ability to retain and attract talented individuals into the firms, the authors also emphasize the possible issue of employee vintage where talents hold their position for a long period of time would result in a lower career opportunity for others upcoming talents to grow in the innovation-driven sectors. This ultimately reflects the need to increase an effort to bridging the gap between better-off individuals and talents from lower-income families, as Thailand net enrolment rate significantly decreases as

student move up their educational level. More specifically, the article by (Khumthong, 2016) indicates that while the rich and poor families may have similar access to primary education, the post-secondary education signifies large disparities of tertiary educational attainment between poorer and richer families. The results confirms an earlier assumption through Buracom's (2011) article, while the investment in primary and secondary education benefits lower-income families due to the subsidy in education expenditure, the tertiary education, on the other hand, largely benefits the rich as they hold more substantial ability to support tertiary education expenditure (Buracom, 2011). Therefore, the allocation of education budget by the Thai government should also pay closer attention to the enrolment of tertiary education by lower-income students, so that the country could its talent supply to support Thailand's 4.0 approach.

In the lights of War for Talent and the establishment of ASEAN Economic Community (AEC) that increases states' competition for talents in their own innovation-driven economy, many talented individuals may seek to find the best possible job opportunities that would allow them to thrive and live in a good business climate (Maxwell, 2016). Therefore, Thailand should consider all of the possible options to create suitable infrastructure and utilities to support the growth of Thai talents for Thailand to fulfill the highly demanded talented workforce in innovation-driven economy. More specifically in the department of (1) information technology, (2) communication, and (3) leadership of which are traits that the global labor market is competing for individuals with all the qualities mentioned. Considering that Thailand is caught between labor intensive and capital intensive economy, it is critical for Thai authority to leap for the transitional period of talents in Thailand (Jitsuchon, 2012). Due to the stagnant level of research and development and personals, Thailand should allocate its resources to develop R&D personnel and offer training program for the ease of transition toward the making of innovative products so that Thailand long-term economic growth could be achieved.

According to Maxwell's (2016) article on "GTCI Index highlights ASEAN's Disparity", the authors emphasized the importance of good governance and practices through factors such as political instability, military rule, and loss of civil liberties

could limit Thailand's ability to attract and grow talents for its innovation-driven economy. Therefore, despite a close acknowledgement of Thailand's inability to (1) produce occupational-matching skills, (2) aid poorer low-income families with education expenditures, and (3) upskill vocational skilled labors towards knowledge-based economy, the state authority should also consider the construction of good governance and practices as it may impact talents access to growth opportunity in Thailand. Considering that good governance impacts the level of political rights, freedom of expression, freedom of assembly, and private property rights, of which all are pivotal background to aid the development of talented individuals for Thailand's innovation-driven economy.

4.4 The Covariance Analysis of Singapore, Malaysia, and Thailand's GTCI Variables in the Output Model

Table 18: The Covariance Analysis (ANCOVA) of Singapore GTCI Variables in the Output Model through Pearson Correlation, Variance Inflation Factors (VIF), and Value of Tolerance

	Vocational and Technical Skills	Global Knowledge Skills
Vocational and Technical Skills	1.000	
Global Knowledge Skills	0.933*** (0.001)	1.000
VIF	7.763	7.763
Tolerance	0.129	0.129
N	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021

Note: p-value in the parentheses

***p < 0.01

Through the illustration from Table 18 in which indicates the relationship between GTCI variables in the output model in the case of Singapore, the findings indicate a very strong correlation between Singapore VT skills and GK skills where r = 0.933 and p-value = 0.001. In reference to Hair et al. (2010), criteria on multicollinearity, the relationship between VT skills and GK skills met the qualifications of collinearity as (1) the value of correlation matrix of 0.933 exceeded 0.90. Despite, the value of

VIF of 7.763 did not exceed 10 and (3) the value of tolerance of 0.129 is greater than 0.10 (Hair et al., 2010). The study chose to examine each of the variables independently to avoid the issue of multicollinearity and better examine the implication of VT skills and GK skills with Singapore's real GDP per capita.

Table 19: The Covariance Analysis (ANCOVA) of Malaysia GTCI Variables in the Output Model through Pearson Correlation, Variance Inflation Factors (VIF), and Value of Tolerance

	Vocational and Technical Skills	Global Knowledge Skills
Vocational and Technical Skills	1.000	
Global Knowledge Skills	0.695* (0.056)	1.000
VIF	1.936	1.936
Tolerance	0.517	0.517
N	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021
Note: p-value in the parentheses
*p < 0.10

Through the illustration from Table 19 in which indicates the relationship between GTCI variables in the output model in the case of Malaysia, the findings indicate some relationship between VT skills and GK skills indices where r = 0.695 and p-value = 0.056. Additionally, in reference to Hair et al. (2010), criteria on multicollinearity, the relationship between VT skills and GK skills did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.695 is below 0.90, (2) the value of VIF of 1.936 did not exceed 10 and (3) the value of tolerance of 0.517 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Malaysia to see their relationship with the country's real GDP per capita.

Table 20: The Covariance Analysis (ANCOVA) of Thailand GTCI Variables in the Output Model through Pearson Correlation, Variance Inflation Factors (VIF), and Value of Tolerance

	Vocational and Technical Skills	Global Knowledge Skills
Vocational and Technical Skills	1.000	
Global Knowledge Skills	0.651* (0.080)	1.000
VIF	1.736	1.736
Tolerance	0.576	0.576
N	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021

Note: p-value in the parentheses

*p < 0.10

Through the illustration from Table 20 in which indicates the relationship between GTCI variables in the output model in the case of Thailand, the findings indicate weak relationship between VT skills and GK skills indices where r = 0.651 and p-value = 0.080. Additionally, in reference to Hair et al. (2010), criteria on multicollinearity, the relationship between VT skills and GK skills did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.651 is below 0.90, (2) the value of VIF of 1.736 did not exceed 10 and (3) the value of tolerance of 0.576 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Thailand to see their relationship with the country's real GDP per capita.

4.5 Empirical Results of GTCI's Output Model and Countries' Real GDP per capita

Table 21: The Statistical Analysis of Singapore, Malaysia, and Thailand's real GDP per capita against GTCI variables in Output Model Across 8 Years Period

	Singapore's VT	Singapore's GK	Malaysia	Thailand
Constant	33878.363 (4.226)	28551.617 (2.128)	13888.124 (5.803)	5157.303 (4.541)
Vocational and Technical Skills	393.014** (3.339)		-58.470 (-1.059)	95.753* (2.232)
Global Knowledge Skills		478.864* (2.389)	2.453 (0.046)	-64.766 (-1.444)
N	8	8	8	8
R-Square	0.650	0.487	0.290	0.499
Adjusted $\boldsymbol{R^2}$	0.592	0.402	0.006	0.299
DF	7	7	7	7

Created by Author based on the Global Talent Competitiveness Index, 2013 - 2021
Note: p-value in the parentheses
*p < 0.10, ** p < 0.05

In reference to Table 21 in which illustrates the level of significance and relationship between variables in GTCI's output model and respective countries' real GDP per capita, the findings of each country can be formulated into equations as follows:

$$SINGAPORE'S\ REAL\ GDP\ PER\ CAPITA = 33878.36 + 393.01\ (VT\ Skills)$$

$$SINGAPORE'S\ REAL\ GDP\ PER\ CAPITA = 28551.62 + 478.86\ (GK\ Skills)$$

$$MALAYSIA'S\ REAL\ GDP\ PER\ CAPITA = 13888.12 - 58.47\ (VT\ Skills) + 2.45\ (GK\ Skills)$$

$$THAILAND'S\ REAL\ GDP\ PER\ CAPITA = 5157.30 + 95.75\ (VT\ Skills) - 64.77\ (GK\ Skills)$$

Following the findings from the multiple regression model, the study found that Singapore and Thailand are the two countries that GTCI variables in the output model were associated with country's real GDP per capita More specifically, when variables

of the output model were tested independent from each other, Singapore's VT skills is statistically significant at 5% level, whereas its GK skills is statistically significant at 10%. Furthermore, Thailand's VT skills also found to have positive correlation with Thailand's real GDP per capita at 10% significance level. Considering Thailand's adjusted R-squared of 0.299 indicates that approximately 29.9% of the changes in Thailand real GDP per capita can be explained by Vocation and Technical Skills, and Global Knowledge Skills. The relationships between GTCI variables and its respective country can be interpreted as follows:

(1) If Singapore's VT Skills increase by 1 unit, then Singapore's real GDP per capita will increase by $393.01 USD.

(2) If Singapore's GK Skills increase by 1 unit, then Singapore's real GDP per capita will increase by $478.86 USD.

(3) If Thailand's VT Skills increase by 1 unit, then Thailand's real GDP per capita will increase by $95.75 USD.

4.5.1 Interpretation of Singapore's Vocational and Technical Skills, and Global Knowledge Skills against its Real GDP per capita

In reference to the original definition of Vocational and Technical Skills Index that defined through key development areas of mid-level skills and degrees of employability, the study found that there is a positive correlation between Singapore real GDP per capita and its Vocational and Technical skills Index. In other word, as the Singaporean government increases its effort and investment in the development of vocation and technical skills workers, it further contributes to the growth of Singapore real GDP per capita. To interpret this finding, the paper will draw from prior literature reviews to show that Singapore's ability to (1) collaborate between private and public organizations, (2) decrease negative connotation of vocational and technical skills, and (3) elevate vocational and technical skills institution to the global level are the key rationales that caused Singapore to experience positive real GDP per capita when the country had invested in vocational education institution.

In reference to Seng (1965), the Singapore's vocational technical education (VTE) had played a critical role in shaping Singapore social and economic development ever

since. The VTE refers to the technical education that aim to upskill graduates with occupational skills and meet the standards of the required industries and economies (Seng, 1965). Through the collaboration between Singaporean government with multinational corporations (MNCs) such as (1) Tata of India, (2) Rollei of Germany, and (3) Phillips of Holland, the country was able to enlarge its pool of technical talents directly meets with the market demand. More specifically, it ensures that graduates were promise with formal occupations and their skills were match with the desire economic sector. Furthermore, this allows Singapore's authorities to establish Vocation and Industrial Training Board (VITB) to better regulate and support the re-skilling and up-skilling of Singaporean talents for its knowledge-based industries.

Additionally, the author noted that despite large comparison between vocational education and university education, the negative connotation of vocational education and technical skills were apparent in many countries that perceived the development in VT skills as academically lower than university level, but Seng (1965) counter-argued that, despite the negative connotation, VT skills and education remains the greatest gap in human resource development in the continuously changing economy. The author noted that the evaluation of success for VTE were consisted of (1) the employability of graduates, graduates personal development, opportunities for further education, and career development. Since the independence of Singapore, the Institute of Technical Education (ITE) had played a critical role in raising world-class educational institution that focuses on vocational technical education and training of talents. Through the large investment and effective management of Singapore's authorities towards education and training of vocational technical education, the country was able to create talents supply to drive Singapore economy towards innovation-driven economy.

Considering a clear economic plan in mind, the 1991 Singapore's economic action plan aimed Singapore to transition the country into the first-league nation within 30 years. This approach was reflected through the large focus and development on manufacturing and service institution of which companies are needed to diversify its product to support Singapore's export-oriented economy. In combination with series of government-initiated committee of which collaborated with private firms,

Singapore was able to elevate its quality of education in all aspects from primary level that focuses on English and Mathematics, to specialized vocational and technical skills.

With substantial supply of quality vocational and technical skills talents in Singaporean labor market, Chong (2014) emphasizes the importance of high vocational education level that it allows Singapore to keep in pace with the transitioning economy towards innovation-driven system and upskilling its talents towards global knowledge skills (Chong, 2014). Considering that definition of Global Knowledge skills that defines through the development of high-level skills and its talent impact. The success process was primarily described through the development of Institute of Technical Education (ITE) that elevates Singaporean vocational and technical talents to a world-class level skill. With large investment in both graduates enrolment and their access to work opportunity after graduation, the ITE graduates experience a gradual increases in average income from S$1391 in 2009 to S$1646 in 2013 (Chong, 2014). This allows Singapore to narrow the gap of socio-economic inequalities in Singaporean society of which also impacts the perception on the attainment of vocational and technical skills. With the development in Singaporean perspective towards the significant and value of vocational and technical education, the country was able to produce highly skilled VT workers of which can be further upskill through series of government initiative programs such as SkillFuture initiative.

4.5.2 Interpretation of Thailand's Vocational and Technical Skills Index and its Real GDP per capita

Following in a similar pattern as Singapore's VT and GK Skills, Thailand's vocational and technical skills was also shown to have positive correlation with Thailand's Real GDP per capita. In reference to the Eastern Economic Corridor's (EEC) Committee meeting on January 7, 2022, the EEC had attracted over 1.7 trillion baht per capita, and it had created over 14,467 jobs in which aims to provide more than 150,000 jobs in the knowledge-based economy. (EasternEconomicCorridor, 2022). Furthermore, the EEC specifically aims at Thailand's issue of middle-income trap and the government sets the goal to become innovation-driven economy by 2029 (EasternEconomicCorridor, 2022). The committee announced that the investment in

EEC areas had increased and accounted for 52% of the total investment in the country. Additionally, the project had also experienced an increase in foreign direct investment (FDI), which had risen by 59% in 2018. Despite all of the intentions that were expressed by the Thai authorities, the country maintains to lack the supply of quality of employability skills for the new economic sector (Sa-Nguanmanasak & Khampirat, 2019). According to the Sa-Nguanmanasak and Khampirat (2019), Thailand has been very successful in producing high number of TVE graduates. However, unlike Singapore, the study was unable to guarantee that the skills of Thai graduates from vocational and technical education were high skills. More specifically, the lower proportional increase of Thailand's real GDP per capita by VT skills may indicates the lack of TVE manpower in the areas of (1) communication skills, (2) computer and ICT skills, and (3) management and leadership skills, in which are all essential elements to elevates Thai VT graduates into a higher level (Sa-Nguanmanasak & Khampirat, 2019).

4.6 The Covariance Analysis of Singapore, Malaysia, and Thailand's GTCI Variables in the Input Model during COVID-19 Epidemic

Table 22: The Covariance Analysis (ANCOVA) of Singapore GTCI Variables in the Input Model through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance during the Years of COVID-19 Epidemic

	Enable	Attract	Grow	Retain	Y_Covid-19
Enable	1.000				
Attract	0.850*** (0.007)	1.000			
Grow	0.669 (0.070)	0.582 (0.130)	1.000		
Retain	0.103 (0.808)	0.139 (0.742)	-0.448 (0.265)	1.000	
Y_Covid-19	0.398 (0.328)	0.226 (0.591)	0.641 (0.087)	-0.336 (0.416)	1.000
VIF	5.103	4.089	4.521	2.040	1.873
Tolerance	0.196	0.245	0.221	0.490	0.534
N	8	8	8	8	8

Created by Author based on the Global Talent Competitiveness Index, 2013 - 2021
Note: p-value in the parentheses
*** p < 0.01

Through the illustration from Table 22 in which indicates the relationship between GTCI variables in the input model in the case of Singapore during the years of COVID-19 epidemic, the findings describe a high statistically significant correlation between Enable and Attract indices where r = 0.850 and p-value = 0.007. However, in reference to Hair et al. (2010), criteria on multicollinearity, the relationship between Enable and Attract did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.850 is below 0.90, (2) the value of VIF of 5.103 did not exceed 10 and (3) the value of tolerance of 0.196 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Singapore to see their relationship with the country's Real GDP per capita.

Table 23: The Covariance Analysis (ANCOVA) of Malaysia GTCI Variables in the Input Model through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance during the Years of COVID-19 Epidemic

	Enable	Attract	Grow	Retain	Y_Covid-19
Enable	1.000				
Attract	0.105 (0.805)	1.000			
Grow	-0.082 (0.848)	0.459 (0.253)	1.000		
Retain	0.562 (0.147)	0.734** (0.038)	0.533 (0.173)	1.000	
Y_Covid-19	-0.414 (0.308)	0.759** (0.029)	0.132 (0.755)	0.172 (0.684)	1.000
VIF	5.300	26.462	3.136	9.491	16.964
Tolerance	0.189	0.038	0.319	0.105	0.059
N	8	8	8	8	8

Created by Author based on the Global Talent Competitiveness Index, 2013 - 2021
Note: p-value in the parentheses
** p < 0.05

Through the illustration from Table 23 in which indicates the relationship between GTCI variables in the input model in the case of Malaysia during the years of COVID-19 epidemic, the findings describe a statistically significant correlation between Attract and Y_COVID-19 where r = 0.759 and p-value = 0.029. More importantly, the value of VIF of 26.462 did exceed 10 and (3) the value of tolerance of 0.038 is lower than 0.10 (Hair et al., 2010).

Therefore, the study would leave out Attract index under the examination between Y_Covid-19 with other GTCI variables as the study aims to investigate the correlation and the level of significance of GTCI during the years of COVID-19 in Malaysia.

Table 24: The Covariance Analysis (ANCOVA) of Thailand GTCI Variables in the Input Model through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance during the Years of COVID-19 Epidemic

	Enable	Attract	Grow	Retain	Y_Covid-19
Enable	1.000				
Attract	-0.166 (0.694)	1.000			
Grow	-0.339 (0.412)	-0.347 (0.399)	1.000		
Retain	0.079 (0.852)	0.713** (0.047)	-0.455 (0.258)	1.000	
Y_Covid-19	0.077 (0.856)	0.855*** (0.007)	-0.536 (0.170)	0.704 (0.051)	1.000
VIF	1.395	5.491	1.679	2.346	5.358
Tolerance	0.717	0.182	0.596	0.426	0.187
N	8	8	8	8	8

Created by Author based on the Global Talented Competitiveness Index, 2013-2021
Note: p-value in the parentheses
** $p < 0.05$, ***$p < 0.01$

Through the illustration from Table 24 in which indicates the relationship between GTCI variables in the input model in the case of Thailand during the years of COVID-19 epidemic, the findings describe a high statistically significant correlation between Attract and Y_Covid-19 indices where r = 0.855 and p-value = 0.007.

However, in reference to Hair et al. (2010), criteria on multicollinearity, the relationship between Enable and Y_Covid-19 did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.855 is below 0.90, (2) the value of VIF of 5.491 did not exceed 10 and (3) the value of tolerance of 0.182 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Singapore to see their relationship with the country's real GDP per capita.

4.7 Empirical Results of GTCI's Input Model and Countries' Real GDP per capita under the COVID-19 Epidemic

Table 25: The Statistical Significance of Singapore, Malaysia, and Thailand's GTCI indices in Input Model against Country's Real GDP per capita under the Years with COVID-19 Epidemic

	Singapore	Malaysia	Thailand
Constant	37617.621 (1.604)	30021.130 (2.071)	9091.924 (4.094)
Enable	514.537 (1.212)	-234.229 (-1.206)	-20.079 (-0.960)
Attract	-423.086 (-1.245)		64.153 (1.922)
Grow	523.962 (2.168)	-107.360 (-0.826)	-83.149** (-8.146)
Retain	-327.860 (-1.084)	51.276 (0.552)	-15.380 (-0.5202)
Years with COVID-19	-2081.606 (-1.062)	-1221.838 (-1.444)	-751.604 (-2.718)
N	8	8	8
R-Square	0.929	0.549	0.974
Adjusted R^2	0.752	-0.053	0.910
DF	7	7	7

Note: t-statistic in the parentheses
** $p < 0.05$

In reference to Table 25 in which illustrates the level of significance and relationship between variables in GTCI's input model and respective countries' real GDP per capita under COVID-19 epidemic, the findings of each country can be formulated into equations as follows:

$$SINGAPORE'S\ REAL\ GDP\ PER\ CAPITA = 37617.62 + 514.54\ (Enable) - 423.09\ (Attract) + 523.96\ (Grow) - 327.86\ (Retain) - 2081.61\ (Years\ with\ COVID - 19)$$

$$MALAYSIA'S\ REAL\ GDP\ PER\ CAPITA = 30021.13 - 234.23\ (Enable) - 107.36\ (Grow) + 51.28\ (Retain) - 1221.84\ (Years\ with\ COVID - 19)$$

$$THAILAND'S\ REAL\ GDP\ PER\ CAPITA = 9091.92 - 20.08\ (Enable) + 64.15\ (Attract) - 83.15\ (Grow) - 15.38\ (Retain) - 751.60\ (Years\ with\ COVID - 19)$$

Following the findings from the multiple regression model, the study found that Thailand is the only country that the GTCI variable in the input model was associated with Thailand's real GDP per capita in the years of COVID-19 epidemic. More specifically, Thailand's Grow index is the only variable that is statistically significance at 5% and negatively correlated with Thailand's real GDP per capita. Additionally, Thailand's adjusted R-squared of 0.910 indicates that approximately 91% of the changes in Thailand's real GDP per capita in the years of COVID-19 epidemic can be explained by (1) Enable, (2) Attract, (3) Grow, and (4) Retain.

In consideration to the dummy variables where, (1) the sample of Enable index under the COVID-19 epidemic is treated as 1, and without COVID-19 is treated as 0, (2) the sample of Attract index under the COVID-19 epidemic is treated as 1, and without COVID-19 is treated as 0, (3) the sample of Grow index under COVID-19 epidemic is treated as 1, and without COVID-19 is treated as 0, and (4) the sample of Retain index under COVID-19 is treated as 1, and without COVID-19 is treated as 0. The relationship can be interpreted as follows:

(1) Considering the other independent variables are controlled, if Grow index increase by 1 unit, then Thailand's real GDP per capita will decrease by $83.15 USD in the years with COVID-19 epidemic.

4.7 The Covariance Analysis of Singapore, Malaysia, and Thailand's GTCI Variables in the Output Model during COVID-19 Epidemic

Table 26: The Covariance Analysis (ANCOVA) of Singapore GTCI Variables in the Output Model through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance during the Years of COVID-19 Epidemic

	Vocational and Technical Skills	Global Knowledge Skills	Y_Covid-19
Vocational and Technical Skills	1.000		
Global Knowledge Skills	0.933*** (0.001)	1.000	
Y_Covid-19	0.767** (0.026)	0.768** (0.026)	1.000
VIF	8.163	8.171	2.561
Tolerance	0.123	0.122	0.390
N	8	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021

Note: p-value in the parentheses

** p < 0.0.5, ***p < 0.01

Through the illustration from Table 26 in which indicates the relationship between GTCI variables in the output model in the case of Singapore under COVID-19 epidemic, the findings indicate a very strong correlation between Singapore VT skills and GK skills where r = 0.933 and p-value = 0.001. In reference to Hair et al. (2010), criteria on multicollinearity, the relationship between VT skills and GK skills met the qualifications of collinearity as (1) the value of correlation matrix of 0.933 exceeded 0.90. Despite, the value of VIF of 8.163 did not exceed 10 and (3) the value of tolerance of 0.123 is greater than 0.10 (Hair et al., 2010). The study chose to examine each of the variables independently to avoid the issue of multicollinearity and better

examine the implication of VT skills and GK skills with Singapore's real GDP per capita.

Table 27: The Covariance Analysis (ANCOVA) of Malaysia GTCI Variables in the Output Model through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance during the Years of COVID-19 Epidemic

	Vocational and Technical Skills	Global Knowledge Skills	Y_Covid-19
Vocational and Technical Skills	1.000		
Global Knowledge Skills	0.695 (0.056)	1.000	
Y_Covid-19	0.626 (0.097)	0.820** (0.013)	1.000
VIF	1.972	3.659	3.108
Tolerance	0.507	0.273	0.322
N	8	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021

Note: p-value in the parentheses

** $p < 0.0.5$

Through the illustration from Table 27 in which indicates the relationship between GTCI variables in the output model in the case of Malaysia under COVID-19 epidemic, the findings indicate a strong correlation between Malaysia's GK skills and Y_Covid-19, where r = 0.820 and p-value = 0.013. In reference to Hair et al. (2010), criteria on multicollinearity, the relationship between GK skills and Y_Covid-19 did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.820 did not exceeded 0.90, (2) the value of VIF of 3.659 did not exceed 10 and (3) the value of tolerance of 0.273 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Malaysia to see their relationship with the country's real GDP per capita.

Table 28: The Covariance Analysis (ANCOVA) of Thailand GTCI Variables in the Output Model through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance during the Years of COVID-19 Epidemic

	Vocational and Technical Skills	Global Knowledge Skills	Y_Covid-19
Vocational and Technical Skills	1.000		
Global Knowledge Skills	0.651 (0.080)	1.000	
Y_Covid-19	0.742** (0.035)	0.726** (0.042)	1.000
VIF	2.363	2.246	2.875
Tolerance	0.423	0.445	0.348
N	8	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021

Note: p-value in the parentheses

** $p < 0.0.5$

Through the illustration from Table 28 in which indicates the relationship between GTCI variables in the output model in the case of Thailand under COVID-19 epidemic, the findings indicate a strong correlation between Thailand's VT skills and Y_Covid-19 where r = 0.742 and p-value = 0.035. In reference to Hair et al. (2010), criteria on multicollinearity, the relationship between VT skills and Y_Covid-19 did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.742 did not exceeded 0.90, (2) the value of VIF of 2.363 did not exceed 10 and (3) the value of tolerance of 0.423 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Thailand to see their relationship with the country's real GDP per capita.

4.8 Empirical Results of GTCI's Output Model and Countries' Real GDP per capita under the COVID-19 Epidemic

Table 29: The Statistical Significance of Singapore, Malaysia, and Thailand's Global Talent Competitiveness Index, Output Model in the Years of COVID-19 Epidemic

	Singapore's VT	Singapore's GK	Malaysia	Thailand
Constant	25877.684 (2.131)	23903.115 (1.086)	13147.157 (3.677)	5447.763 (2.724)
Vocational and Technical Skills	520.648** (2.786)		-55.896 (-0.907)	90.370 (1.622)
Global Knowledge Skills		552.496 (1.625)	19.582 (0.242)	-69.841 (-1.230)
Years with COVID-19	-2597.088 (-0.890)	-1064.389 (-0.282)	-338.374 (-0.308)	117.894 (0.187)
N	8	8	8	8
R-Square	0.698	0.495	0.306	0.503
Adjusted $\boldsymbol{R^2}$	0.577	0.294	-0.214	0.131
DF	7	7	7	7

Created by Author based on the Global Talent Competitiveness Index, 2013 -2021
Note: t-statistic in the parentheses
** $p < 0.05$

In reference to Table 29 in which illustrates the level of significance and relationship between variables in GTCI's output model and respective countries' real GDP per capita under COVID-19 epidemic, the findings of each country can be formulated into equations as follows:

$$SINGAPORE'S\ REAL\ GDP\ PER\ CAPITA = 25877.68 + 520.65\ (VT\ Skills) - 2597.09\ (Years\ with\ COVID - 19)$$

$$SINGAPORE'S\ REAL\ GDP\ PER\ CAPITA = 23903.12 + 552.50\ (GK\ Skills) - 1064.39\ (Years\ with\ COVID - 19)$$

$$MALAYSIA'S\ REAL\ GDP\ PER\ CAPITA = 13147.16 - 55.90\ (VT\ Skills) + 19.58(GK\ Skills) - 338.37\ (Years\ with\ COVID - 19)$$

$$THAILAND'S\ REAL\ GDP\ PER\ CAPITA = 5447.76 + 90.37\ (VT\ Skills) - 69.84\ (GK\ Skills) + 117.89\ (Years\ with\ COVID - 19)$$

In consideration to the dummy variables where, (1) the sample of Enable index under the COVID-19 epidemic is treated as 1, and without COVID-19 is treated as 0, (2) the sample of Attract index under the COVID-19 epidemic is treated as 1, and without COVID-19 is treated as 0, (3) the sample of Grow index under COVID-19 epidemic is treated as 1, and without COVID-19 is treated as 0, and (4) the sample of Retain index under COVID-19 is treated as 1, and without COVID-19 is treated as 0. The study found that Singapore's vocational and technical skills was the only GTCI variable in the output model was statistically significant and associated with Singapore's Real GDP per capita in the years of COVID-19 epidemic.

4.9 The Covariance Analysis of Singapore and Thailand's GTCI Second Level Variables

In regard to the earlier findings where (1) Thailand's Grow and Vocational and Technical Skills were statistically significant, and (2) Singapore's Vocational and Technical Skills, and Global Knowledge Skills were statistically significant, this section aims to evaluate the second level of each index in order to investigate which of the following second-level variables are statistically significant with respective country's real GDP per capita.

Table 30: The Covariance Analysis (ANCOVA) of Singapore's 2nd Level Variables in VT Skills Index through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance.

	Mid-Level Skills	Employability
Mid-Level Skills	1.000	
Employability	-0.123 (0.772)	1.000
VIF	1.015	1.015
Tolerance	0.985	0.985
N	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021
Note: p-value in the parentheses

Through the illustration from Table 30 in which indicates the relationship between 2nd level of VT Skills Index in the case of Thailand, the findings indicate no correlation between Singapore's mid-level skills and employability where r = -0.123 and p-value = 0.772. In reference to Hair et al. (2010), criteria on multicollinearity, the relationship between mid-level skills and employability did not meet the qualifications of collinearity as (1) the value of correlation matrix of -0.123 did not exceeded 0.9, (2) the value of VIF of 1.015 did not exceed 10 and (3) the value of tolerance of 0.985 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Singapore to see their relationship with the country's real GDP per capita

Table 31: The Covariance Analysis (ANCOVA) of Singapore's 2nd Level Variables in GK Skills Index through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance.

	High-Level Skills	Talent Impact
High-Level Skills	1.000	
Talent Impact	0.688* (0.059)	1.000
VIF	1.897	1.897
Tolerance	0.527	0.527
N	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021
Note: p-value in the parentheses
*p < 0.10

Through the illustration from Table 31 in which indicates the relationship between 2nd level of GK Skills Index in the case of Singapore, the findings indicate some correlation between Singapore's high-level skills and talent impact where r = 0.688 and p-value = 0.059. In reference to Hair et al. (2010), criteria on multicollinearity, the relationship between high-level skills and talent impact did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.688 did not exceeded 0.9, (2) the value of VIF of 1.897 did not exceed 10 and (3) the value of tolerance of 0.527 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Singapore to see their relationship with the country's real GDP per capita

Table 32: The Covariance Analysis (ANCOVA) of Thailand's 2nd Level Variables in Grow Index through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance.

	Formal Education	Lifelong Learning	Access to Growth Opportunities
Formal Education	1.000		
Lifelong Learning	0.342 (0.407)	1.000	
Access to Growth Opportunities	0.804** (0.016)	-0.002 (0.996)	1.000
VIF	4.235	1.500	3.740
Tolerance	0.236	0.667	0.267
N	8	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021
Note: p-value in the parentheses
** $p < 0.05$

Through the illustration from Table 32 in which indicates the relationship between 2nd level of Grow Index in the case of Thailand, the findings indicate a strong correlation between Thailand's formal education and access to growth opportunities where r = 0.804 and p-value = 0.016. In reference to Hair et al. (2010), criteria on multicollinearity, the relationship between formal education and access to growth opportunities did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.804 did not exceeded 0.9, (2) the value of VIF of 4.235 did not exceed 10 and (3) the value of tolerance of 0.236 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Thailand to see their relationship with the country's real GDP per capita.

Table 33: The Covariance Analysis (ANCOVA) of Thailand's 2nd Level Variables in VT Skills Index through Pearson Correlation, Variance Inflation Factors (VIF) and Value of Tolerance.

	Mid-Level Skills	Employability
Mid-Level Skills	1.000	
Employability	0.090 (0.832)	1.000
VIF	1.008	1.008
Tolerance	0.992	0.992
N	8	8

Created by Author based on the Global Talent Competitiveness Index Report, 2013-2021
Note: p-value in the parentheses
** $p < 0.05$

Through the illustration from Table 33 in which indicates the relationship between 2nd level of Vocational and Technical Skills Index in the case of Thailand, the findings indicate weak correlation between Thailand's mid-level skills and employability where r = 0.090 and p-value = 0.832. In reference to Hair et al. (2010), criteria on multicollinearity, the relationship between formal education and access to growth opportunities did not meet the qualifications of collinearity as (1) the value of correlation matrix of 0.090 did not exceeded 0.9, (2) the value of VIF of 1.008 did not exceed 10 and (3) the value of tolerance of 0.992 is greater than 0.10 (Hair et al., 2010). Therefore, the study may be able to examine these variables for the case of Thailand to see their relationship with the country's real GDP per capita.

4.10 Empirical Results of 2nd Level Indices with Singapore and Thailand's Real GDP per capita

The study further analyzes second-level indices after the first-level variables were identified to be significant and have a relationship with the respective country's Real GDP per capita. In this case, Singapore and Thailand are considered as these are the countries that had a correlation with the first level of GTCI indices. The study found that the GTCI's output of vocational and technical skills was statistically significant and had a positive relationship with Singapore's Real GDP per capita. To be more specific, Singapore Mid-Level Skills and its Employability were second level

variables that statistically significance and had positive relationship with Singapore's Real GDP per capita across 8 years period.

Table 34: The Statistical Significance of Singapore's 2nd-Level Indices in GTCI Output Model Across 8 Years Period.

	Vocational and Technical Skills Index	Global Knowledge Skills Index
Constant	32439.716 (0.057)	29030.625 (0.135)
Mid-Level Skills	222.971 (0.295)	
Employability	194.273** (2.946)	
High-Level Skills		220.140 (0.511)
Talent Impact		254.212 (0.358)
N	8	8
R-Square	0.651	0.487
Adjusted $\boldsymbol{R^2}$	0.512	0.282
DF	7	7

Created by Author based on the Global Talent Competitiveness Index, 2013 -2021
Note: t-statistic in the parentheses
** p < 0.05

In reference to Table 34 in which illustrates the level of significance and relationship between second level variables in GTCI's model and Singapore's real GDP per capita, the findings of can be formulated into equations as follows:

$$SINGAPORE'S\ REAL\ GDP\ PER\ CAPITA = 32439.72 + 222.97\ (Mid - Level\ Skills) + 194.27\ (Employabiltiy)$$

$$SINGAPORE'S\ REAL\ GDP\ PER\ CAPITA = 29030.63 + 220.14\ (High - Level\ Skills) + 254.21\ (Talent\ Impact)$$

Following the findings from the multiple regression model, the study found that Employability Index is the only second level variable that was associated with Singapore's real GDP per capita. More specifically, Singapore's employability index is the only variable that is statistically significant at 5% level and positively correlated with Singapore's real GDP per capita. Additionally, Singapore's adjusted R-squared of 0.512 indicates that approximately 51.2% of the changes in Singapore's real GDP per capita can be explained by (1) Mid-level skills, and (2) Employability. The relation can be interpreted as follows:

(1) If Singapore's Employability increase by 1 unit, then Singapore's real GDP per capita will increase by $194.27 USD.

The findings in Table 34 further illustrate the importance of Singapore VT skills and its infrastructure to enable the betterment in Institute of Technical Education (ITE). More specifically, in terms of employability in which highlights the abilities of skilled employees to find firms that meet their set of skills. The skill matching indicator is specifically emphasized through the lens of Employability where Singapore had successfully developed quality VT talents that meet the demand of Singaporean's innovation-driven economic structure as well as ease the transition of skill talents towards GK skills index. Despite the second level variables in GK skills are not significant, both VT and GK skills had shown to have positive coefficient and benefit in the development of Singapore's real GDP per capita.

Table 35: The Statistical Significance of Thailand's 2nd Level Indices in GTCI Input and Output Model Across 8 Years Period.

	Grow Index	Vocational and Technical Skills Index
Constant	9012.393 (9.162)	4501.122 (3.409)
Formal Education	-18.449 (-0.286)	
Lifelong Learning	-21.852** (-3.158)	
Access to Growth Opportunities	-17.931 (-0.581)	
Mid-Level Skills		17.139 (0.584)
Employability		36.783 (0.231)
N	8	8
R-Square	0.828	0.321
Adjusted $\boldsymbol{R^2}$	0.698	0.049
DF	7	7

Created by Author based on the Global Talent Competitiveness Index, 2013 -2021
Note: t-statistic in the parentheses
** p < 0.05

In reference to Table 35 in which illustrates the level of significance and relationship between second level variables in GTCI's model and Thailand's real GDP per capita, the findings can be formulated into equations as follows:

$$THAILAND'S\ REAL\ GDP\ PER\ CAPITA = 9012.39 - 18.45\ (Formal\ Education) - 21.85\ (Lifelong\ Learning) - 17.93\ (Access\ to\ Growth\ Opportunities)$$

$$THAILAND'S\ REAL\ GDP\ PER\ CAPITA = 4501.12 + 17.14\ (Mid - Level\ Skills) + 36.78\ (Emplyability)$$

Following the findings from the multiple regression model, the study found that Lifelong Learning Index is the only second level variable that was associated with Thailand's real GDP per capita. More specifically, Thailand's Lifelong Learning index is the only variable that is statistically significant at 5% level and negatively correlated with Thailand's real GDP per capita. Additionally, Thailand's adjusted R-squared of 0.698 indicates that approximately 69.8% of the changes in Thailand's real GDP per capita can be explained by (1) Formal Education, (2) Lifelong Learning, and (3) Access of Growth Opportunities. The relation can be interpreted as follows:

(1) If Thailand's Lifelong Learning increase by 1 unit, then Thailand's real GDP per capita will decrease by $21.85 USD.

The findings that illustrated in Table 35 further emphasized the importance of lifelong learning in which mainly defined through the investment in training programs, participation in formal and non-formal studies, and quality of business school in Thailand. The findings indicate that Thailand investment in these institutions is ineffective as it directly resulted in a decrease in Real GDP per capita. As mentioned in the rationale and discussion of the main finding, Thailand has a very limited ability to (1) produce occupation-matching skills through vocational and technical programs, (2) promote tertiary education enrolment through assisting low-income families with educational expenditure, and (3) upskill vocational workers towards innovation-driven economy.

Chapter 5: Conclusion and Policy Recommendation

Recalling to the original research questions in which aim to investigate (1) the level of significance and correlation of the Global Talent Competitiveness Index (GTCI) with Singapore, Malaysia, and Thailand's Real GDP per capita through multiple linear regression model, (2) the significance level and correlation of 2nd level GTCI variables with countries that the 1st level GTCI variables were significance and correlated with Real GDP per capita, and (3) the key areas that Thailand should improve its capability to enable, attract, grow, and retain talents for the betterment in real GDP per capita and talent development for Thailand's future innovation-driven economy. This chapter will highlight (1) the summary of research findings, (2) the policy recommendations and (3) the limitations and future improvements of the study.

5.1 Research Summary

Through the examination of GTCI variables in the input and output model against Real GDP per capita of Singapore, Malaysia, and Thailand, the study concludes that (1) Singapore's Vocational and Technical Skills (VT Skills), and Global Knowledge Skills (GK Skills) are the only two GTCI variables that are statistically significant and illustrate positive relationship with Singapore's Real GDP per capita; (2) Malaysia's Real GDP per capita did not show any statistical significance and relationship with GTCI variables; and (3) Thailand's Grow Index in the input model was shown to have a negative relationship with Thailand's Real GDP per capita, in other words, as Thailand increases its investment in growing talent, Thailand may experience a decrease in its real GDP per capita. In consideration to the empirical findings, the study found that each country's contextual background plays a pivotal role in highlighting the strengths and weaknesses of the countries' ability to Enable, Attract, Grow, Retain talent in VT and GK skills, therefore, the summary of each country can be concluded as follows:

In the case of Singapore, the empirical findings illustrated that Singapore's Real GDP per capita was positively correlated with Vocational and Technical Skills (VT Skills), and Global Knowledge Skills (GK Skills). The result can be interpreted through Singapore's country context of a "small-advanced economy," where the country had elevated its talent market through a very well establishment of vocational technical

education (VTE) that propelled Singapore from low-income to high-income country within the decades of its declared independence. As a small-advanced economy, Singapore was heavily focused on the development of its key sectors of manufacturing and service industries. Through the government initiation and collaboration with many notable multinational corporations (MNCs), Singapore was able to upgrade its VTE to the world class level of which directly supports the development of Singaporean talents for Singaporean innovation-driven economy. Considering series of investments and efforts that Singapore had put into its education system, Singapore was able to join the ranks of Hong Kong, the Republic of Korea, and Taiwan as a top state in Asia-Pacific region that could provide very high level of manufacturing and service products since 1970s. The development of talents can be seen since the early establishment of Vocation and Industrial Training Board (VITB) to today's SkillFuture policy that directly aims to upskill Singaporean's workers to meet with the knowledge-based industries in the innovation-driven economy. To be more specific, Singapore' VTE elevates Singaporean's masteries in electronics and engineering sectors of which further improves the development of computer information, communication, and other commercial services (CICC) in Singapore's high-end production. Through the government approach on vocational and technical trainings and the illustration of the study's findings, the author found that the collaboration between public and private agencies was critical to ensure that the production of quality talents with skills-matching abilities are produced and support with the demanding market in innovation-driven sectors. Therefore, (1) the early efforts, (2) the continuous investment, and (3) the close collaboration with private firms were essential factors that push Singapore to become one of the top destinations for talents around the world to contribute to the increment of Singapore's Real GDP per capita.

On the other hand, in the case of Malaysia where there were no GTCI variables that statistically significant and associated with Malaysia's Real GDP per capita, the study found that Malaysia philosophical approach and its actions were closely following Singapore's model. To be more specific, Malaysia's Technical and Vocational Education and Training (TVET) policy highlighted the centralization and

collaboration of Malaysian government with private firms through government-initiated program that designed by private organization so that the skills of graduates from vocational and technical education may directly correlate with the desire skills-set of the market. More specifically, The Eleventh Malaysia plan had illustrated the development of Malaysia Vocational and Technical Skills through TVET where the improvement in governance, program delivery, capacity, and profile of graduates had been significantly improved and elevated Malaysia from efficiency-driven economy in stage 2 to innovation-driven economy. In consideration to the development in Malaysia's governance where different set of qualifications were set by different agencies with different set of quality rating were established in its earlier form of vocation and technical market, the government had invested its effort to centralize its qualification system and single-type rating in which ease the process of talents and their development for Malaysia's innovation-driven economic system. The new TVET program also improves its delivery of vocational and technical education where the Malaysian's Centre of Excellence was established to promote the specialization of expertise as well as reflect strong partnership between private and public agencies for the improvement of Malaysia's economic well-being. Despite the empirical results that indicates no relationship between GTCI and Malaysia's Real GDP per capita, the study found that Malaysia is currently heading towards the same direction as Singapore with its focus on the production of quality talents to aid Malaysia's innovation-driven economy.

As the study focuses on Thailand as the epicenter, the empirical result illustrated that Thailand's Real GDP per capita was correlated with Grow Index, and Vocational and Technical Skills (VT Skills). While VT Skills was positively correlated with Thailand's Real GDP per capita, the Grow index highlights a reverse correlation, where as the Grow index increases, Thailand's Real GDP per capita decreases. The key rationales that could help to explain this phenomenon is through Thailand's country context in area of educational system of which challenge the production of talent supply due to Thailand's limitation to (1) produce occupation-matching skills through vocational and technical programs, (2) promote tertiary education enrolment through assisting low-income families with educational expenditure, and (3) upskill

vocational workers towards innovation-driven economy. Considering series of challenges that stem from an underdevelopment of Thailand's educational system that propose various of barriers for talents to succeed under Thailand's perception and framework, the study highlights that Thailand's inability to produce occupation-matching skills stems from limited collaboration between Thai authorities and private organizations. These further push new graduates to undergo specific-private organization training grounds to meet with the occupational-skills set or even entering informal work due to long processes that new graduates need to go through. Additionally, the study also found that there are an apparent of inequality in term of net enrolment in tertiary education. In other words, wealthier families are more likely to support their children to enroll in higher education where poorer families are more likely to discourage their children to enroll in high education and seek to work after their post-secondary education. With the issues of skills-mismatching, and educational inequality, the study also found that these limitations would lead to a tougher time for Thailand to upskill its vocational workers towards innovation-driven economy. Therefore, the study propose that Thailand should pay closer attention to its educational development, specifically towards the questions on "how to create single qualification type-rating that graduates from vocational and technical education could use and apply for formal jobs?", "how to promote tertiary education enrolment and guarantee skills-matching occupation with the graduates?," and lastly, "how to develop quality vocational and technical education that could uplift Thai talents for innovation-driven economy?" These some of many questions that surround the contextual challenges that Thailand's currently have to pay closer attention in order to Thailand 4.0 approach to elevate Thai economy to an innovation-driven economic systems.

5.2 Policy Recommendation and its Implication

In regard to earlier questions that the study has highlighted in the summary of the empirical findings, the author found that the three key areas that the Thai government should prioritize are (1) the creation of single national qualification and single rating across graduates from vocational and technical education, (2) the subsidization of education expenditure for lower-middle to low-income families to promote the

enrollment of tertiary education and (3) the collaboration with multinational corporations to establish series of training grounds and conferences to allow more opportunities for individuals who seeks to upskill themselves for the Thailand S-curve industries.

In regard to the lists that the government needs to prioritize, the study aims to raise the attention of talents supply in Thailand and the regional War for Talent that will impact progress towards the transition to innovation-driven economy. Considering the country's context that the Thai labor market is largely made up of informal workers as well as migrant population that tends to position in the 3D occupations (Dirty, Dangerous, and Demeaning), the government needs to put more emphasis on the development of innovative products as these are high-end productions that reflect the limitless valuation of knowledge-based and ideas-based product of which many high-income countries are currently focusing on. While Thailand may not be able to compete with major states that form the global core, the country could elevate the livelihood and well-being of Thai citizens through the development in innovation-driven product which reflected through country's Real GDP per capita. Therefore, Thailand must find the paths to change the current negative trajectory of Grow index to positive projection, as the appropriate adjustment on educational policy could direct Thailand's ability to grow its own talent and support the country's transition to innovation-driven economy.

Finally, as the study discuss talent through the lens of intrinsic and extrinsic approach, the former perspective would emphasize Thailand to focus on the short-term development of talents through the establishment of attracting policies to attract talented migrants to come and work in Thailand. While this would allow a direct exchange between talented migrant and local workers, the development and production of talents may be very costly and difficult to retain high-value talents. Therefore, the study focuses on the latter approach, extrinsic perspective, where the infrastructure, teachers and lecturers need to be invested and support the development of teaching institutions, so that there could be many talented teachers and lectures that could support the development of younger generations. As the extrinsic perspective viewed talents as the development process, the individuals who are in charge of the

development process needs to invest and support by the government and private organization to ensure that high quality education are being passed down to educate next generation talents and shift Thailand's Real GDP per capita upwards through growing its talented individuals.

5.3 Research Limitations and Future Improvements

Despite plausible empirical findings and key takeaways from this research study, some of the notable challenges were (1) limitation in sample size, (2) the development of third level variables and their impact on the 1st and 2nd pillars, and (3) the nominalization of the data set.

To highlight the limitation in sample size, the research took place under controlled circumstances by using only reports that were published by the same organization. Therefore, the nominalized data was limited to the publisher of the report. In this case, the earliest version of the report was in 2013, and given that 2015 and 2016 were condensed into a single year, the collection of data was limited by 8 years of published GTCI reports. Considering the importance of higher degrees of freedom through larger sample sizes, which has the power to reject a false null hypothesis and improve the significance of the variables, the empirical findings with a larger sample size may illustrate clearer trends and relationships between independent and dependent variables.

To note on the development of third level variables and their implications on bigger pillars in the GTCI framework, these changes and improvements in data collection must be addressed to understand the role of third level variables in the investigation of this study. While it is important to understand the construction of GTCI's 1st and 2nd pillars, the third level variables were not included in this study as the information differed between each year and may have diverged the study's attention away from the key objective of highlighting the significance level and relationship between GTCI and Real GDP per capita on talent development.

Lastly, with much consideration to the nominalized data set from the report, the author noticed that the sources of each data set in the GTCI framework came from various sources with different units of measurement. While the nominalized score aids

the calculation and computing process, each variable of its original unit of measurement may have a different impact on the empirical findings. Therefore, nominalized data sets were used to control the unit of measurement and ensure the reliability of data as much as possible.

All in all, with regard to key limitations, the future improvement on the topic of Global Talent Competitiveness Index and its implications on a country's talent and economic development may include (1) the inclusion of future data sets to expand the panel study for more than an 8-year period; (2) the detailed examination of 3rd level variables and their implications on GTCI pillars; and (3) the inclusion of raw data information before its nominalization to the GTCI reports. While these suggested improvements are far from perfect, they may be a starting point to investigate the importance of life-long human capital development and its implications for our country's economic growth and welfare system.

REFERENCES

Amadeo, K. (2020). *Real GDP Per Capita, How to Calculate It, and Data Since 1947*. https://www.thebalance.com/real-gdp-per-capita-how-to-calculate-data-since-1946-3306028#:~:text=Real%20GDP%20per%20capita%20is,between%20countries%20and%20over%20time.

ASEAN-Secretariat. (2017). *ASEAN Economic Community (AEC)* https://asean.org/wp-content/uploads/2012/05/7c.-May-2017-Factsheet-on-AEC.pdf

ASEAN-ThailandSecretariat. (2016). *ASEAN Economic Community*. https://asean2019.go.th/en/abouts/%E0%B8%9B%E0%B8%A3%E0%B8%B0%E0%B8%8A%E0%B8%B2%E0%B8%84%E0%B8%A1%E0%B9%80%E0%B8%A8%E0%B8%A3%E0%B8%A9%E0%B8%90%E0%B8%81%E0%B8%B4%E0%B8%88%E0%B8%AD%E0%B8%B2%E0%B9%80%E0%B8%8B%E0%B8%B5%E0%B8%A2%E0%B8%99/

Beechler, S., & Woodward, I. C. (2009). The global “war for talent”. *Journal of International Management*, *15*(3), 273-285. https://doi.org/https://doi.org/10.1016/j.intman.2009.01.002

Bruton, C. (2017). *Women at Work: Asian Trends*. https://www.bangkokpost.com/business/1275951/women-at-work-asian-trends

Buracas, A., & Navickas, V. (2015). CRITERIA OF GLOBAL TALENT COMPETITIVENESS: CASES OF TURKEY & LITHUANIA [Article]. *Journal of Knowledge Economy & Knowledge Management*, *10*(1), 129-141. https://chula.idm.oclc.org/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=asn&AN=102751001&site=eds-live

Buracom, P. (2011). The determinants and distributional effects of public education, health, and welfare spending in Thailand. *Asian Affairs: An American Review*, *38*(3), 113-142.

Cerna, L., & Chou, M. H. (2019). Defining "Talent": Insights from Management and Migration Literatures for Policy Design [Article]. *Policy Studies Journal*, *47*(3), 819-848. https://doi.org/10.1111/psj.12294

Chen, D. J. Q., & Su-Yen, W. (2016). Chapter 2 - ASEAN and the AEC: Challenges and opportunities for human resource management. In A. Nankervis, C. Rowley, & N. M. Salleh (Eds.), *Asia Pacific Human Resource Management and Organisational Effectiveness* (pp. 17-37). Chandos Publishing. https://doi.org/https://doi.org/10.1016/B978-0-08-100643-6.00002-6

Chong, T. (2014). Vocational education in Singapore: meritocracy and hidden narratives. *Discourse: Studies in the Cultural Politics of Education*, *35*(5), 637-648.

EasternEconomicCorridor. (2022). *The Summary of Eastern Economic Corridor Meeting* https://www.eeco.or.th/en/news/415

Evans, B. L. a. P. (2013). *The Global Talent Competitiveness Index*

2013. https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2013-report.pdf

Evans, B. L. a. P. (2014). *The Global Talent Competitiveness Index*

2014. https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-

2014-report.pdf
Evans, B. L. a. P. (2015-2016). *The Global Talent Competitiveness Index 2015-2016*. https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2015-2016-report.pdf
Evans, B. L. a. P. (2017). *The Global Talent Competitiveness Index 2017*. https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2017-report.pdf
Evans, B. L. a. P. (2018). *The Global Talent Competitiveness Index 2018*. https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2018-report.pdf
Fathin, C. A., Perdana, A. B., Kartikasari, A., & Sulistyastuti, D. R. (2014). Indonesian human resources readiness in term of facing the ASEAN economic community. *Jurnal Ilmu Sosial dan Ilmu Politik*, *18*(2), 81-98.
Fyliuk, H., Honchar, I., & Kolosha, V. (2019). The interrelation between economic growth and national economic competitiveness: the case of Ukraine. *Journal of Competitiveness*, *11*(3), 53.
Gentile, E. (2019). *Skilled Labor Mobility and Migration: Challenges and Opportunities for the ASEAN Economic Community*. https://think-asia.org/bitstream/handle/11540/11077/skilled-labor-mobility-migration-asean.pdf?sequence=1
Hair, J., Black, W., Babin, B., & Anderson, R. (2010). Multivariate Data Analysis: a Global Perspective New Jersey: Pearson Prentice Hall.
Jitsuchon, S. (2012). Thailand in a Middle-income Trap. *TDRI Quarterly Review*, *27*(2), 13-20.
Junkao, P., Chandprapalert, A., & Jarinto, K. (2017). Talent Risk Components in the Thailand Automobile Industry. *Journal of Business Administration*, *40*(154), 58-77.
Khumthong, N. (2016). Two decades of Thai Educational Reform: Failures and Successes. https://www.hiso.or.th/hiso/picture/reportHealth/ThaiHealth2020/eng2020_26.pdf
Limaye, S. (2021). *ASEAN MATTERS FOR AMERICA MATTERS FOR ASEAN*. https://www.usasean.org/sites/default/files/uploads/ewc-5-asean-2021-final.pdf
MalaysianEconomicPlanningUnit. (2016). *Malaysia: Eleventh Malaysia Plan 2016-2020*. https://www.epu.gov.my/sites/default/files/2021-05/Chapter%201.pdf
Maxwell, D. (2016). *GTC index highlights ASEAN's disparity*. https://www.linkedin.com/pulse/gtc-index-highlights-aseans-disparity-daniel-maxwell
Michailova, S., & Ott, D. L. (2019). Talent Management in Small Advanced Economies. In *Talent Management in Small Advanced Economies* (pp. 51-75). Emerald Publishing Limited. https://doi.org/10.1108/978-1-78973-449-220191005
Monteiro, B. L. a. F. (2019). *The Global Talent Competitiveness Index 2019*. https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2019-Report.pdf

Monteiro, B. L. a. F. (2020). *The Global Talent Competitiveness Index 2020*. https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2020-report.pdf

Monteiro, B. L. a. F. (2021). *The Global Talent Competitiveness Index 2021*. https://www.insead.edu/sites/default/files/assets/dept/fr/gtci/GTCI-2021-Report.pdf

Moroz, H. E. (2021). *Aging and the labor market in Thailand*. https://blogs.worldbank.org/eastasiapacific/aging-and-labor-market-thailand

NXPO. (2020). *Thailand's Performances in the World Competitiveness Rankings*. https://www.nxpo.or.th/th/en/thailands-performances-in-the-world-competitiveness-rankings/

OECD. (2013). *GDP per capita*. https://doi.org/doi:https://doi.org/10.1787/na_glance-2013-5-en

OECD. (2017). *OECD Compendium of Productivity Indicators 2017*. https://doi.org/doi:https://doi.org/10.1787/pdtvy-2017-en

OECD. (2021). *OECD Investment Policy Reviews: Thailand*. https://doi.org/doi:https://doi.org/10.1787/c4eeee1c-en

OfficeofInternationalAffairs. (2018). *Summary of National Strategy 2018-2037*. https://oia.coj.go.th/th/content/category/detail/id/8/cid/5885/iid/93993

Osatis, C., & Asavanirandorn, C. (2022). An Exploring Human Resource Development in Small and Medium Enterprises in Response to Electric Vehicle Industry Development. *World Electric Vehicle Journal, 13*(6), 98. https://www.mdpi.com/2032-6653/13/6/98

Poocharoen, O.-o., & Lee, C. (2013). Talent Management in the Public Sector: A comparative study of Singapore, Malaysia, and Thailand. *Public Management Review, 15*. https://doi.org/10.1080/14719037.2013.816525

Punpuing, S. (2018). *Foreign Talent Policy in Support of Thailand 4.0 Strategy*. https://elibrary.trf.or.th/project_content.asp?PJID=RDG6110015

Rostami, N., Khyareh, M. M., & Mazhari, R. (2019). Competitiveness, entrepreneurship, and economic performance: Evidence from factor-, efficiency-, and innovation-driven countries. *Economic Annals, 64*(221), 33-64.

RoyalThaiEmbassy. (2018). *Thailand 4.0*. https://thaiembdc.org/thailand-4-0-2/#:~:text=Thailand%204.0%20is%20an%20economic,advanced%20industry%20(Thailand%203.0).

Sa-Nguanmanasak, T., & Khampirat, B. (2019). Comparing employability skills of technical and vocational education students of Thailand and Malaysia: A case study of international industrial work-integrated learning. *Journal of Technical Education and Training, 11*(3).

Schwab, K. (2016). *The Global Competitiveness Index*. https://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf

Schwab, K. (2018). *The Global Competitiveness Report*. https://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf

Seng, L. S. (1965). Vocational technical education and economic development: The Singapore experience. *Toward a better future: Education and training for*

economic development in Singapore since, 114-134.
TheASEANSecretariat. (2021). *ASEAN Key Figures 2021*. https://www.aseanstats.org/wp-content/uploads/2021/12/ASEAN-KEY-FIGURES-2021-FINAL-1.pdf
TheUnitedNations. (2019). *United Nations: World Population Prospects 2019*. https://population.un.org/wpp/dataquery/
Vivatsurakit, T., & Vechbanyongratana, J. (2021). Education–Occupation Mismatch and Its Wage Penalties in Informal Employment in Thailand. *Asian Development Review*, *38*(1), 119-141.
Wong, W., Martorana, S., & Dunleavy, S. (2016). *The future of talent in Singapore 2030*. CIPD.

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HOME ADDRESS	231/2 Moo6, Soi Petchkasaem 126, Omnoi, Kratumbaen, Samut Sakhon, 74130